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September 20, 2024

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SITE ASSESSMENT, REMEDIATION, & REVITALIZATION

Ms. Cynde Devlin, Project Manager
South Carolina Department of Environmental Services
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: Off-Site Remedial Investigation Report
Delavan Spray Technologies Site
Bamberg, South Carolina
SCDHEC VCC Number 13-4762-RP
SCDHEC File Number 51778
AECOM Project Number 60734694

Dear Ms. Devlin:

AECOM Technical Services, Inc. (AECOM) has prepared one (1) hard copy and one (1) electronic copy of the Off-Site Remedial Investigation Report for the Delavan Spray Technologies Site. This is submitted consistent with the schedule outlined by correspondence dated August 21, 2023, and approved on August 28, 2023 by the South Carolina Department of Health and Environmental Control (SCDHEC), which effective July 1, 2024, transitioned to South Carolina Department of Environmental Services (SCDES).

If you have any questions or require further information, please feel free to contact me.

Sincerely,

**AECOM Technical Services, Inc.**

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SITE ASSESSMENT,
REMEDIATION, &
REVITALIZATION

# Off-Site Remedial Investigation Report

## Delavan Spray Technologies Site

**4334 Main Highway**
**US Highway 301 South**
**Bamberg, South Carolina**
**VCC 13-4762-RP**

Prepared by:
AECOM Technical Services, Inc.
5438 Wade Park Blvd
Suite 200
Raleigh, North Carolina 27607
September 2024

Delivering a better world

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# OFF-SITE REMEDIAL INVESTIGATION REPORT

## DELAVAN SPRAY TECHNOLOGIES SITE
## BAMBERG, SOUTH CAROLINA

## RESPONSIBILITY PARTY VOLUNTARY CLEANUP CONTRACT NUMBER 13-4762

The undersigned certify that they have reviewed the attached document and that the document is in material compliance with the guidelines and requirements of the State of South Carolina and the South Carolina Department of Health and Environmental Control (SCDHEC) and specifically, requirements under the SCDHEC Voluntary Cleanup Contract (VCC). The data presentations contained herein are consistent with generally accepted practices in the environmental profession.

***Prepared by:***

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September 18, 2024
Date

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September 18, 2024
Date

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September 18, 2024
Date

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September 18, 2024
Date

Conan Fitzgerald, PE
AECOM Project Manager

September 18, 2024
Date

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# 1. Introduction

AECOM Technical Services, Inc. (AECOM) has prepared this Off-Site Remedial Investigation (RI) Report for RTX on behalf of Delavan Spray, LLC (Delavan). This report details the investigation activities performed to support the *Feasibility Study (FS) for Off-Site Areas* which will focus on remediation of residual chlorinated volatile organic compounds (cVOCs) off-Site (downgradient) of the Delavan Spray Technologies Site (Site). This report is being submitted in accordance with the Voluntary Cleanup Contract (VCC) (VCC 13-4762-RP) signed by the South Carolina Department of Health and Environmental Control (SCDHEC) and Delavan Spray, LLC in July 2013 (SCDHEC July 3, 2013).

# 2. Site Overview

The facility is located in Bamberg, South Carolina (**Figure 1**), and manufactures several types of metal spray nozzles for fuel oils. The Site is comprised of a main manufacturing building and smaller associated support buildings, which are located on approximately 20 acres. A Site layout map is provided as **Figure 2** and a map of the monitoring well network is provided as **Figure 3**.

## 2.1 Background

Assessment activities were initiated at the Site by Hart & Hickman (H&H) in 2003, after chlorinated volatile organic compounds (VOCs) were detected in groundwater beneath the Site (H&H, August 29, 2003). The primary compounds of concern were reported to be tetrachloroethene (PCE) and its degradation products trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), 1,1-dichloroethene (1,1-DCE), and vinyl chloride (VC).

Between 2007 and 2013, H&H conducted multiple groundwater assessments at the Site and surrounding area to further delineate the horizontal and vertical extent of VOCs detected in groundwater. A semi-annual groundwater monitoring program, which began in November 2009, was also instituted to evaluate changes to groundwater conditions at the Site.

On July 5, 2013, a VCC between Delavan Spray, LLC and SCDHEC was executed (VCC 13-4762-RP). In accordance with Section 3 of the VCC, a Remedial Investigation (RI) was conducted in February/March 2014.The RI results, included in the *Remedial Investigation Report* (AECOM, July 3, 2014), provided further delineation of VOCs in soil and groundwater beneath the Site. Furthermore, the RI sampling results were used in conjunction with existing data to complete a Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment.

No additional VOC source areas were identified in soil as a result of the RI. However, following SCDHEC’s review of the RI report, SCDHEC requested additional soil assessment to delineate VOC impacts in the vicinity of the northern former degreaser and additional monitoring wells to delineate VOC impacts in the shallow and deeper (limestone) aquifers. The additional assessment activities were incorporated into the *Post RI Work Plan* (AECOM, June 29, 2015), which was implemented in November 2015. The analytical results were presented in the *Post RI Report* (AECOM, May 17, 2016) and provided further delineation of VOCs in soil and groundwater at the Site.

Following the *Post RI Report*, SCDHEC requested a “work plan for delineation of the shallow and deep groundwater plumes.” The *Groundwater Delineation Work Plan* (AECOM, September 13, 2016), which included groundwater screening with temporary wells and permanent monitoring well installation, was approved by SCDHEC in correspondence dated October 31, 2016, and was implemented between March and May 2017. The results of the investigation, which are documented in the *Groundwater Delineation Report* (AECOM, June 23, 2017), confirmed the presence of PCE concentrations greater than the USEPA Maximum Contaminant Level (MCL) in the limestone aquifer monitoring wells approximately 3,200 feet south/southwest of the Site.

SCDHEC approved the *Groundwater Delineation Report* in correspondence dated June 26, 2017 and agreed with the report’s recommendation for additional delineation of PCE in the limestone aquifer south/southwest of the monitoring well network. The final *Limestone Aquifer Assessment Work Plan* was submitted to SCDHEC on August 27, 2018 (AECOM, August 17, 2018) and approved in correspondence from SCDHEC dated September 20, 2018. The work plan was implemented in November 2019 once off-Site access agreements were established and included the installation of four additional limestone aquifer monitoring wells to delineate the PCE plume in the limestone aquifer. Concentrations of PCE and its degradation products (TCE, cis-1,2-DCE, and vinyl chloride) were below their respective MCLs and these wells completed the delineation of PCE in the limestone downgradient of the Site. Additional details were provided in the *Deep Groundwater Delineation Technical Memorandum* (AECOM, June 10, 2020).

After their review of the *Limestone Aquifer Assessment Work Plan*, in correspondence dated December 18, 2017, SCDHEC requested that Delavan conduct sampling of residential drinking water wells downgradient of the Site. Delavan and AECOM worked with SCDHEC to sample select residential drinking water wells:

- Along Lemon Creek and Orange Grove Roads between US Highway 301 (Main Highway) and US Highway 601 (Broxton Bridge Road) south/southwest of the Site (22 wells);

- Along Broxton Bridge Road between US Highway 301 and Orange Grove Road southeast of the Site (3 wells); and

- Along US Highway 301 southwest of the Site (2 wells).

Samples were collected from 27 residential wells between January and April 2018 and submitted for analysis of PCE and select degradation products (see Figure 4 of the *Fall 2019 Semi-Annual Groundwater Monitoring Report*; AECOM, February 21, 2020). In nine (9) of the samples, PCE was detected at low levels below its USEPA MCL of 5 micrograms per liter (µg/L). Subsequently, PCE was detected in two (2) additional residential wells in November 2018 and one additional well in April 2019. PCE was not detected in the remaining residential well samples (AECOM, February 2018; June 2018; January 2019; June 2019). Although the PCE detections in the residential wells were well below the MCL, Delavan offered to install granular activated carbon (GAC) treatment units on the drinking water wells where the PCE was detected at no cost to the residents (note – one impacted residential well is used for irrigation water only and, therefore, a GAC unit was not installed on this well). All 11 residents with impacted drinking water wells elected to have GAC units installed. Eight of the GAC treatment units were installed in July 2018 and treatment verification sampling was completed in August and September 2018 (AECOM, January 15, 2019). Three additional GAC treatment units were installed in October 2019 and verification sampling was completed in November 2019 (AECOM, February 21, 2020). The residential well sample locations are illustrated in **Figure 4.**

Following completion of the limestone aquifer delineation field work, personnel from Raytheon Technologies Corporation (presently RTX) and AECOM, on behalf of Delavan, met with SCDHEC to discuss the results of the off-Site delineation and the path forward for the Site. Following this meeting, SCDHEC requested that surface water samples be collected from the unnamed tributary to Lemon Creek during the next semi-annual sampling effort (SCDHEC, March 13, 2020). AECOM submitted the proposed plan for surface water sampling to SCDHEC on March 25, 2020 and SCDHEC approved the plan in correspondence dated April 7, 2020. Surface water sampling has been included in the semi-annual monitoring events since April 2020.

In addition to completing the off-Site delineation, Delavan prioritized developing plans to address elevated concentrations of cVOCs in residual "source areas" beneath the Facility, specifically locations of "hot spots" in shallow groundwater in the vicinity of the former PCE degreasers and the former PCE UST. To address these "hot spots", Delavan and AECOM also prepared a work plan for high resolution site characterization (HRSC) of the "hot spots" beneath the Facility using membrane interface probe (MIP) and hydraulic profiling tool (HPT) technology. This work plan was submitted to SCDHEC on February 11, 2019 and was approved by SCDHEC in correspondence dated March 1, 2019. The HRSC investigation was completed in July 2020; the report was submitted on March 9, 2021 and approved by SCDHEC in correspondence dated April 19, 2021.

A call was held with SCDHEC on June 1, 2021 to discuss interim measures to address soil impacts at the Site. Subsequent to this call, an *Interim Removal Action Work Plan* (AECOM, June 18, 2021) for installation of an SVE system at the Site was submitted and approved by SCDHEC in correspondence dated June 28, 2021. Installation of the horizontal extraction wells for the SVE system was completed in September 2021. The system was installed in 2022, with formal startup in June 2022. These activities were documented in the *Construction Completion Report (CCR) – SVE System* (AECOM, August 11, 2022).

In November of 2021, per the request of the SCDHEC during the June 1 call, AECOM submitted a site wide *Feasibility Study (FS) Report* (AECOM, November 30, 2021). Following their review, SCDHEC requested revisions to the FS Report to include remedies for the off-Site groundwater impacts. The report was revised to an *On-Site Focused FS*, submitted to SCHDEC on February 7, 2023, and a separate *FS Work Plan for Off-Site Areas* was submitted to SCDHEC on February 14, 2023 (AECOM, February 14, 2023). SCHDEC approved the *FS Work Plan for Off-Site Areas* on July 24, 2023. The *On-Site Focused FS* is currently in review by the agency.

## 2.2 Geology

The Site lies within the western portion of the South Carolina Coastal Plain Province, which is characterized as a seaward thickening wedge of sediments from the fall line to the coast. These sediments consist of sands, silts, clays and limestones, representing a variety of non-marine and marine depositional environments.

For the purposes of Site characterization, the Site geology has been subdivided into three general geologic zones by previous investigators. The upper zone consists of undifferentiated sands, clayey sands, sandy clays, and silts. In the northern portion of the Site, these sediments tend to contain a higher percentage of clay and silty layers. The middle zone consists of fossiliferous limestone; with a layer of pale yellow, poorly cemented, coarse shell fragments overlying a layer of white, poorly- to moderately-cemented limestone containing finer-grained shell fragments. The lower geologic zone has been described as a loose- to moderately-cemented, calcareous, fine- to medium-grained clayey sandstone based on borings for monitoring wells MW-3D1 and MW-15D1 (H&H, August 1, 2013). However, this zone was not encountered during the limestone aquifer delineation downgradient (south) of the Site, where the white, cemented limestone and shell fragments were observed to become finer-grained and persist to a depth of at least 84 feet below ground surface. These relationships were illustrated on cross-sections included as Figure 4 of the *FS Work Plan for Off-Site Areas*.

## 2.3 Hydrogeology

Groundwater occurrence in the Coastal Plain is typically within the intergranular pore spaces of the sands, silts and limestones (primary porosity) and within solution cavities or fractures of indurated sediments (secondary porosity). Primary production of groundwater occurs from within the more permeable units, while lower permeability clay layers typically retard groundwater movement. Recharge for significant aquifers in the Coastal Plain occurs both as transport from up-dip areas, toward the Fall Line, where the sediments are generally exposed at the land surface and as leakage from adjacent aquifer units through lower permeability aquitards.

Monitoring well groundwater elevations measured in April 2024 were used to create a potentiometric map of the water-table surface in the shallow aquifer (**Figure 5**). Shallow flow patterns resulting from the April 2024 water level measurements are similar to those observed previously at the Site. The equal potential lines indicate groundwater flow beneath the Facility varies between southwestward and westward flow directions, with a local groundwater depression beneath the Facility building at monitoring wells MW-1, MW-3, MW-7, MW-8, and MW-21. This phenomenon was previously recognized in the *RI Work Plan* (H&H, August 1, 2013) and characterized as a “groundwater trough”, a feature that has been observed to extend to MW-5, MW-6, and MW-10 during previous field investigation efforts. The variances in groundwater elevation and flow directions in this portion of the Site could be the result of preferential flow pathways resulting from higher permeability zones due to local facies changes or induced drainage from the sanitary sewer line and/or incised drainage ditch, which forms the northern boundary of the Facility. However, the primary shallow horizontal groundwater flow direction is inferred to be toward the west, toward Halfmoon Branch, which is consistent with findings from prior investigations conducted at the Site. The local groundwater high at MW-27 has intermittently been present during past monitoring events.

Monitoring well groundwater elevations measured in April 2024 were also used to create a potentiometric map of the water-table surface in the deeper limestone aquifer (**Figure 6**). The groundwater flow observed in April 2024 was consistent with regional topography, drainage, and findings from prior investigations conducted at the Site. From the equal potential lines, the inferred horizontal groundwater flow direction is to the south-southwest in the Site vicinity and then to the south/southeast off-Site in the southern portion of the monitoring well network.

Gradients between the shallow aquifer and deeper limestone aquifer are typically downward (positive) with some variation for well pairs located near Halfmoon Branch. For the deeper limestone aquifer / deep sandstone aquifer well pairs, the gradients were upward with a magnitude of 8.96E-04 at MW-3D/MW-3D1 and downward with a magnitude of 7.50E-04 at MW-15D/MW-15D1 in April 2024.

Slug tests have been used to estimate the horizontal hydraulic conductivity of the shallow and deeper limestone aquifer units. To evaluate hydrologic properties of the aquifer units, slug tests were performed in 2015 in shallow monitoring wells MW-1, MW-5 and MW-21 and deeper monitoring wells MW-21D and MW-22D. The estimated horizontal hydraulic conductivity values calculated for the shallow aquifer ranged from 0.175 feet per day (ft/day) to 0.667 ft/day, with a geometric mean of 0.350 ft/day. The estimated horizontal hydraulic conductivity values for the deeper limestone aquifer ranged from 21.2 ft/day to 121 ft/day, with a geometric mean of 47.8 ft/day (AECOM, May 17, 2016). Slug tests were also performed in 2017 in shallow monitoring wells MW-27, MW-28, and MW-29 and deeper monitoring wells MW-30D, MW-31D, and MW-32DR. The estimated horizontal hydraulic conductivity values calculated for the shallow aquifer ranged from 0.215 ft/day to 0.701 ft/day, with a geometric mean of 0.355 ft/day. The estimated horizontal hydraulic conductivity values for the deeper limestone aquifer ranged from 10.7 ft/day to 161 ft/day, with a geometric mean of 63.5 ft/day (AECOM, June 23, 2017). Slug tests have also been performed in limestone monitoring wells located beyond Halfmoon Branch, Lemon Creek and the unnamed tributary to Lemon Creek (MW-33D, MW-34D, MW-35D, and MW-36D). The estimated horizontal hydraulic conductivity values from these wells ranged from 45.22 ft/day to 121.6 ft/day, with a geometric mean of 85.57 ft/day (AECOM, June 10, 2020).

# 3. Preliminary Site Conceptual Model

A preliminary site conceptual exposure model (SCEM) has been developed based on available investigation results to provide a technical basis for the identification, evaluation, and selection of remedial alternatives. The following sections present key components of the SCEM.

## 3.1 Impacted Areas

Site investigations have delineated the cVOC source areas at the Site within the manufacturing building footprint and directly adjacent to the building footprint near the southeast corner of the building. These areas also contain the cVOC source mass that contributes to the downgradient dissolved phase plumes within shallow groundwater and the deeper limestone aquifer. The source areas are currently being addressed through the *On-Site Focused FS*.

## 3.2 Migration Pathways

CVOC mass (primarily PCE) is present off-Site across Highway 301 and is migrating in the direction of the confluence of Halfmoon Branch and Lemon Creek. Hydrogeologic information developed to date indicates that the primary pathway for dissolved phase cVOC migration from on-Site is downward, into the more permeable limestone aquifer. Further vertical migration is apparently limited by the moderately cemented clayey sandstone beginning at approximately 60 ft below grade (as indicated in MW-31D). Thus, cVOC transport is primarily horizontal to the south within the pale yellow and white shell-bearing limestones. Once across Highway 301 the plume broadens but appears to be bounded by Halfmoon Branch to the west and southwest, Lemon Creek to the southeast, and an unnamed tributary to Lemon Creek to the east. The presence of PCE at trace concentrations within Lemon Creek as it crosses US Highway 601 indicate that the PCE plume is discharging from the limestone aquifer unit into the tributaries feeding this surface water feature. The absence of PCE in sentinel monitoring wells (i.e., MW-33D through MW-36D) and most residential wells installed beyond these tributaries strongly suggest that the tributaries create a hydraulic divide that limits further plume expansion. A figure showing the extent of the off-Site PCE impacts from the most recent comprehensive sampling event (November 2023) is included as **Figure 7**.

The presence of trace PCE concentrations [e.g., less than (<) 0.5 micrograms per liter (µg/L)] in residential wells to the southwest along Lemon Creek Road beyond both Halfmoon Branch and Lemon Creek (**Figure 7**) create some uncertainty as to whether the hydraulic divide indicated by these tributaries is absolute. When these residential well detections were first observed, prior to the Limestone Aquifer Assessment and plume delineation, Delavan voluntarily and proactively installed GAC treatment systems for all residents with PCE detections in their residential wells that were willing to accept them. Subsequently, sentinel wells MW-33D through MW-36D were installed in the limestone beyond the various tributaries between the residential properties and PCE plume. To date, PCE has never been detected in any of these sentinel monitoring wells, despite having an often-lower method detection limit than the residential well sample analyses. The presence of PCE in a tributary perpendicular to the plume, and the absence of PCE in monitoring wells beyond that same tributary is normally considered conclusive evidence that the extent of the plume does not extend beyond the tributary toward the residential wells.

Therefore, the original assumption that the PCE detected in the residential wells in the vicinity of Lemon Creek is contributed by the Delavan Site may be inaccurate. These residential wells are approximately 2,500 – 4,000 ft away from MW-30D, the southern-most impacted monitoring well. For the Delavan PCE plume to reach these residential wells, it would have to cross underneath both Halfmoon Branch and Lemon Creek (while also discharging to at least one of these features) and evade detection in sentinel monitoring wells MW-33D, MW-34D, and MW-35D. Alternatively, it may be reasonable to conclude that the traces of PCE detected in the Lemon Creek community residential wells could be derived from an alternative unknown source that exists to the south of Lemon Creek. However, these detections are generally an order of magnitude less than the MCL (and less than the laboratory method reporting limit) and affected residents are protected by the GAC treatment systems voluntarily maintained by Delavan. Thus, a separate investigation to confirm (or deny) the existence of an alternative source does not seem to be warranted at this time. Additionally, the most recent residential well sampling event performed, in November 2023, resulted in only one sample (546 LCR-A) with detectable concentrations of PCE (**Figure 7**) which remained below any applicable regulatory standards.

However, a better understanding of the hydrology of the tributaries between the off-Site plume and the Lemon Creek area residential wells would be beneficial for refining the conceptual site model for the off-Site plume. Therefore, the *FS Work Plan for Off-Site Areas* included a component designed to provide better understanding of the interaction of the PCE groundwater plume entering the surface water features of Halfmoon Branch and Lemon Creek.

## 3.3 Data Gaps

Data gaps identified in the *FS Work Plan for Off-Site Areas* are summarized below:

- cVOC trends and plume stability analyses should be performed on the off-Site monitoring wells.
- A better understanding of the biotic and abiotic methods of plume attenuation currently occurring needs to be developed, through gathering data on standard monitored natural attenuation (MNA) groundwater parameters and possibly other methods.
- Additional surface water samples need to be collected from Halfmoon Branch and/or Lemon Creek to better understand where PCE infiltrates the tributaries.
- The rate of cVOC mass flux at the Site needs to be characterized and how that may be impacted as in-situ remediation is performed in the on-Site area needs to be evaluated.
- The source of the trace amounts of PCE in downgradient residential wells in the Lemon Creek Road area is uncertain and is therefore recognized as a data gap. However, the absence of any groundwater exceedance in this area, and the relative stability of PCE detections over five years of monitoring demonstrate that the GAC systems are not necessary for protection of human health in the Lemon Creek Road area. Thus, unless a spike in cVOCs is detected in the residential wells, an investigation to identify the source(s) of PCE in this area is not recommended.

# 4. Off-Site Remedial Investigation

The following sections summarize the remedial investigation activities performed to gather data to address the identified data gaps, complete the conceptual site model, and support the *FS for Off-Site Areas*. The scope of work included investigation of several media including soil (**Section 4.1**), groundwater (**Section 4.2**), and surface water (**Section 4.3**). A summary of the samples collected during the Off-Site RI is provided as **Table 1**.

## 4.1 Soil Investigation

On April 11, 2024, AECOM mobilized to the site with a subcontracted driller, Redox Tech, LLC (Redox Tech), to collect soil samples from areas off-site with known groundwater cVOC impacts (primarily PCE). A rotary sonic drill rig (8150LS Geoprobe) was used to collect soil samples from two soil borings from the limestone aquifer for evaluation of the abiotic degradation processes as well as total oxidant demand (TOD) and in-situ chemical oxidation (ISCO) treatability. To target the most representative sample, soils samples were collected from depth intervals that matched the respective mid-point of the adjacent monitoring well which consistently exhibited PCE detections in groundwater samples. Soil sample SB-25D was collected from a depth interval of 56-58 feet below ground surface (ft bgs) and was located adjacent to monitoring well MW-25D (screened 52-62 ft bgs). Soil sample SB-31D was collected from a depth interval of 54-56 ft bgs and was located adjacent to monitoring well MW-31D (screened 50-60 ft bgs). After each soil sample was collected, the rods were pulled, and the boring was abandoned with Portland grout cement. The soil samples were shipped under chain of custody protocols to Microbial Insights in Knoxville, Tennessee for the magnetic susceptibility, x-ray diffraction (XRD), and aqueous and mineralogical intrinsic bioremediation assessment (AMIBA) analyses. The soil samples were also sent to Redox Tech in Cary, North Carolina for the TOD and ISCO treatability analyses. Documentation detailing the field work is included in **Appendix A.**

### 4.1.1 Abiotic Degradation Results

Abiotic degradation can be a substantial or even primary process for chlorinated hydrocarbon destruction at sites undergoing or transitioning to MNA. A variety of iron bearing minerals including iron sulfides (mackinawite and pyrite), iron oxides (magnetite), green rust, and iron-bearing clays have been reported as being capable of complete or nearly complete degradation of PCE, TCE, and carbon tetrachloride (He and others, 2009). While the types and quantities often vary, these reactive iron minerals are frequently identified in subsurface environments under iron-reducing and sulfate-reducing conditions.

Magnetic susceptibility quantifies magnetite which is a naturally occurring iron mineral shown to react with PCE, TCE, and carbon tetrachloride. For the soil samples, SB-25D and SB-31D, magnetite was not detected in either sample.

XRD is one of the primary techniques used to identify unknown crystalline materials which can provide abundances of reactive iron-bearing minerals (e.g., pyrite and mackinawite) which are known to aide in the transformation of chlorinated hydrocarbons. The XRD analysis performed on the collected soil samples indicated the presence of only two minerals, quartz and calcite. For soil sample SB-25D, the XRD analyses indicated a relative abundance percentage of 19 percent (%) quartz and 81% calcite. For soil sample SB-31D, the XRD analyses indicated a relative abundance percentage of 2% quartz and 98% calcite.

AMIBA is a collection of analyses performed to quantify iron and sulfur availability in various oxidation-reduction (redox) states to allow assessment of the microbial/mineral/contaminant interaction. For example, iron sulfides are typically formed from the production of hydrogen sulfide from sulfate by sulfate reducing bacteria and ferrous iron from ferric iron by iron-reducing bacteria. The sulfide and ferrous iron are both soluble and will react rapidly in the aqueous phase to produce an insoluble iron sulfide mineral known as mackinawite (FeS) which may reduce chlorinated compounds. The acid volatile sulfide (AVS) result is generally assumed to measure mackinawite or more recently produced iron sulfide, while the chromium-extractable sulfide (CrES) result measures pyrite ($FeS_2$), or aged iron sulfide. For the soil samples, SB-25D and SB-31D, the AVS results was <0.4 milligrams per kilograms (mg/kg). The CrES results for SB-25D and SB-31D were 0.7 and 0.9 mg/kg, respectively. Additionally, supplemental analyses performed concurrently with the AVS and CrES indicated that the total iron was completely ferrous iron (Fe2+) and no ferric iron (Fe3+) indicating an absence of bioavailable iron that can be used as an electron acceptor. As noted in the lab report, the soil samples foamed excessively upon addition of acid during the extraction processes. By the end of extraction, the pH was near 6 standard units (S.U.) when, typically, the pH for testing purposes was below 1 S.U. This was likely due to the calcite content of the limestone aquifer which is known to have acid neutralizing properties. Since the pH was unable to be lowered to the desired 1 S.U. during extraction due to the limestone buffering, the presence of iron sulfides could not be confirmed solely by the AMIBA analyses.

The collection of results from the magnetic susceptibility, XRD, and AMIBA analyses suggests that the current conditions of the limestone aquifer at these off-Site locations are not advantageous for abiotic degradation. The abiotic degradation analytical results are summarized in **Table 2** and the associated laboratory analytical reports are included in **Appendix B.**

### 4.1.2 Total Oxidant Demand and ISCO Treatability Results

Remediation of groundwater contamination using ISCO involves injecting oxidants and other amendments, as required, directly into the source zone and/or downgradient plume. The oxidant chemicals that are commonly used with ISCO include persulfate, permanganate, hydrogen peroxide, and ozone. Permanganate was selected as the oxidant of focus based on the relatively low concentrations of cVOCs and the extent of the cVOC plume in the limestone aquifer. Conditions unique to the limestone aquifer such as the neutral to high pH range and permeability, which are advantageous to permanganate's persistence in the subsurface, were also considered.

Since the amount of oxidant required is a function of not only the dissolved contaminant levels, but also the adsorbed contaminants, free-phase contaminants, dissolved and solid phase reduced minerals, and naturally-occurring organic material, TOD testing is often used to assess the suitability of an ISCO approach at a given site by further estimating the amount of oxidant to be consumed by the soil matrix during the application. TOD typically ranges from 0.05 grams of oxidant per kilogram of saturated soil (g/kg) to 15 g/kg. For soil sample SB-25D and SB-31D, the analytical results indicated an average TOD of 0.86 g/kg and 0.66 g/kg, respectively. These results suggest a relatively low dosing rate should permanganate be used as the primary oxidant for ISCO implementation. The TOD analytical results are summarized in **Table 3** and the associated laboratory analytical report is included in **Appendix B.**

To determine the effectiveness of ISCO treatment of PCE using permanganate, the collected soil samples were subjected to a bench scale test performed by Redox Tech. During the initial treatability testing, the PCE concentrations of the collected soil samples were barely above the respective detection limit which resulted in non-detect results after being treated with potassium permanganate at a dosage rate of 1.0 g/kg. In order to calculate a numerical destruction rate, the treatability test was performed again with control spikes. Specifically, 100 g subsamples were collected from each homogenized soil sample (SB-25D and SB-31D) and then separated into airtight jars where they received 100 milliliters (ml) of distilled water that was spiked with PCE at a concentration of approximately 200 µg/L. Note: 200 µg/L of PCE was chosen to be representative of the upper limit of historical groundwater concentrations detected at monitoring wells MW-25D and MW-31D. For each soil sample, one subsample was left untreated as the "Control Spike" and the other subsample was treated with potassium permanganate at the dosage rate of 1.0 g/kg. The samples were then shipped under chain of custody protocols to GEL laboratories in Charleston, South Carolina for analysis of VOCs via EPA method 8260. For soil samples SB-25D and SB-31D, the analytical results indicated a 98.9% and 96.5% destruction rate, respectively. These results indicate potassium permanganate at the 1.0 g/kg dosage rate will successfully oxidize PCE at the Site. The analytical results for the bench scale test are also summarized in **Table 3** and the associated laboratory analytical report is included in **Appendix B.**

## 4.2 Groundwater Investigation

Additional groundwater investigation was required to evaluate biotic and abiotic attenuation. As part of the investigation, MNA parameter sampling was incorporated into the semi-annual groundwater monitoring on November 7, 2023. Select monitoring wells including MW-3D, MW-13D, MW-14D, MW-21D, MW-22D, MW-25D, MW-26D, MW-30D, MW-31D, and MW-32DR were sampled for analysis of nitrate, ferrous iron, ferric iron, total iron, sulfate, sulfide, manganese, methane, ethene, ethane, acetylene, and chloride. The monitoring wells selected for MNA parameter analysis are illustrated in **Figure 8.** The depth to water in the monitoring wells was measured using an electronic water level meter on November 6, 2023, prior to the start of sampling activities. The monitoring wells were purged via low-flow methodology utilizing a peristaltic pump and disposable tubing. During purging field measured parameters including depth to water, pH, temperature, conductivity, dissolved oxygen (DO), and oxidation reduction potential (ORP) were monitored for stabilization. Once stabilized, the groundwater samples were collected and shipped under chain of custody protocols to SGS North America, Inc. (SGS) in Orlando, Florida for MNA analysis. Field data logs documenting the groundwater sampling are included in **Appendix A.**

Compound specific isotope analysis (CSIA) was also performed to further evaluate degradation. Groundwater samples were collected on March 13, 2024 from select monitoring wells including MW-3D, MW-14D, MW-22D, MW-25D, MW-30D, and MW-31D utilizing the passive diffusion bags (PDBs) or HydraSleeves® which were installed and allowed to equilibrate during the previous sampling event. The monitoring wells selected for the CSIA are illustrated in **Figure 9.** The collected groundwater samples were shipped under chain of custody protocols to the Environmental Isotope Laboratory (EIL) at the University of Waterloo in Ontario, Canada to perform the CSIA.

To better understand the off-site PCE plume stability, a non-parametric trend analysis was performed for the limestone aquifer wells which included MW-3D, MW-13D, MW-14D, MW-21D, MW-22D, MW-25D, MW-26D, MW-30D, MW-31D, and MW-32DR. Specifically, a Mann-Kendall analysis was applied to the groundwater data using the publicly available GSI Environmental Inc. software (www.gsi-net.com).

Passive flux meters (PFMs), supplied by EnviroFlux, LLC (EnviroFlux), were utilized to quantify the mass of contaminants absorbed as well as to calculate groundwater flux. To evaluate the flux of contaminants from the source areas and the downgradient property boundary, the PFMs were installed in select monitoring wells including MW-13D, MW-14D, MW-21, MW-24, and MW-37. The locations of the monitoring wells selected for the PFMs are illustrated in **Figure 10.** Each PFM consisted of a single five-foot interval which was installed in the monitoring wells at a depth that bisected the respective screen interval submerged below the groundwater table. The PFMs were deployed on March 13, 2024 and retrieved on April 10, 2024. The PFMs were sampled in accordance with EnviroFlux standard operating procedures and shipped under chain of custody protocols to EnviroFlux in Gainesville, Florida for analysis.

### 4.2.1 Monitored Natural Attenuation Results

MNA is the sum of natural processes that leads to the decreasing of contaminant concentrations in groundwater over time. The primary objective of MNA as a remedial alternative is to demonstrate that natural processes will reduce the concentrations to levels below regulatory standards which is highly dependent on understanding the current hydrogeologic conditions. To gain a better understanding of these conditions, an analysis of MNA parameters was performed and resulted in detections of manganese, total iron, ferric iron, ferrous iron, chloride, nitrate, sulfate, and methane. Sulfide, acetylene, ethane, and ethene were not detected in the sampled monitoring wells. The results of the MNA parameters detected in the sampled monitoring wells are summarized in **Table 4** and detailed below. The associated laboratory analytical report is included in **Appendix B.**

- Total iron was detected in all ten monitoring wells. Total iron concentrations ranged from 0.018 mg/L (MW-32DR) to 0.678 mg/L (MW-14D). Ferric iron was detected in seven of the ten monitoring wells including MW-3, MW-13D, MW-14D, MW-21D, MW-22D, MW-30D, and MW-31D. The detected ferric iron concentrations ranged from 0.050 mg/L (MW-31D) to 0.580 mg/L (MW-14D). Ferrous iron was detected in two of the ten monitoring wells MW-14D and MW-21D. The detected ferrous iron concentrations in MW-14D and MW-21D were 0.098 mg/L and 0.047 mg/L, respectively. The total, ferric, and ferrous iron detections contradict the results of the AMIBA analyses performed on the soil boring samples, further questioning the reliability of the AMIBA results, which were hindered by the buffering of the limestone as noted above.
- Iron oxides may function as electron acceptors and buffer redox potential. Ferric iron concentrations above 1.0 mg/L are considered indicative that conditions are favorable for reductive dechlorination (Wiedemeier and others, 1998). However, although most of the iron detected was ferric, there were no ferric iron concentrations in the sampled wells that approached the threshold of 1.0 mg/L.
- Chloride was detected in all ten monitoring wells. Chloride concentrations ranged from 4.5 mg/L (MW-21D) to 10.7 mg/L (MW-13D). Chloride can be useful as an indication of biological dechlorination since anaerobic reduction of chlorinated solvents involves the release of chloride ions which are replaced by hydrogen ions. Vinyl chloride can be completely converted to carbon dioxide, chloride, and water in anaerobic environments under certain conditions including the presence of chelated ferric iron. Anaerobic degradation of cis-1,2-DCE can also occur in the presence of manganese and iron oxides.

However, due to the absence of vinyl chloride and cis-1,2-DCE in the deeper limestone aquifer monitoring wells, and most areas across the Site, the resulting chloride concentrations don't provide enough evidence to confirm that anaerobic reduction is occurring.

- Nitrate was detected in all ten monitoring wells. Nitrate concentrations ranged from 0.15 mg/L (MW-21D) to 1.6 mg/L (MW-13D and MW-31D). Nitrate can be used as an electron acceptor and is typically consumed next after oxygen during anaerobic degradation processes. The presence of nitrate above 1.0 mg/L typically indicates that anaerobic reducing bacteria are not dominant in the aquifer. For the limestone aquifer, the presence of nitrate above 1.0 mg/L in six of ten wells and at 1.0 mg/L in two others provides some evidence that anaerobic reductive dechlorination is limited by natural circumstances.
- Sulfate was detected in all ten monitoring wells, while sulfide was non-detect. Sulfate concentrations ranged from 2.3 mg/L (MW-13D and MW-31D) to 4.4 mg/L (MW-14D). Sulfate can be used as a competing electron acceptor in biodegradation of organic constituents. Concentrations below 20 mg/L, as observed in the limestone aquifer, are preferable for reductive dechlorination (Wiedemeier and others, 1998). Conversely, a product of sulfate reduction is hydrogen sulfide, which would lead to the presence of sulfide and indicate anaerobic reduction is occurring. Thus, the limited presence of sulfate is not due to reduction to sulfide.
- Methane was detected in seven of the ten monitoring wells including MW-3D, MW-13D, MW-14D, MW-21D, MW-22D, MW-31D, and MW-32DR. The detected methane concentrations ranged from 0.24 µg/L (MW-14D) to 0.82 µg/L (MW-21D). Methane is produced by the microbial reduction of carbon dioxide and concentrations above 500 µg/L can be used as an indicator of anaerobic conditions and the presence of methanogenic bacteria (Wiedemeier and others, 1998). However, the resulting methane concentrations indicate significant methane production is not occurring in the limestone aquifer.
- Manganese was detected in seven of the ten sampled monitoring wells including MW-3D, MW-13D, MW-14D, MW-21D, MW-22D, MW-30D, and MW-31D. The detected manganese concentrations ranged from 1.2 µg/L (MW-31D) to 39.7 µg/L (MW-14D). The presence of manganese oxides, similar to iron oxides, may function as electron acceptors during biodegradation of chlorinated solvents. However, the levels of total manganese in the limestone aquifer (less than 50 µg/L) would indicate inadequate levels of manganese to have an impact.

### 4.2.2 **Compound Specific Isotope Analysis Results**

CSIA measures isotope ratios such as carbon, $^{13}C/^{12}C$. The ratio is then compared to an international standard using the "delta" (δ) formula which is reported in units of parts per thousand or "*per mil*". A $\delta^{13}C$ value of -29 per mil means that the sample $^{13}C/^{12}C$ ratio is 29 per mil, or 2.9%, lower than the international standard ratio for $^{13}C/^{12}C$ of 0.01118. Isotope fractionation is the change in isotopic ratio over time and is most pronounced with breaking of chemical bonds (e.g., when PCE is biodegraded to TCE). Note that no significant fractionation occurs from dilution, diffusion, or volatilization processes. Since less energy is required to break light isotope bonds versus heavier, the lighter fraction ($^{12}C$) will degrade faster than the heavier fraction ($^{13}C$), so that the products of degradation are enriched with $^{12}C$ while the parent PCE is enriched with the heavier isotope $^{13}C$ (e.g., the isotope ratio becomes more positive).

CSIA can be used to compare carbon isotope ratios from groundwater samples collected at different locations along the plume (e.g., source area to toe). Measuring the differences in isotope ratios between PCE detected close to the source and cVOCs detected downgradient can help identify biotic and abiotic processes degrading the plume. For example, a ratio increase (e.g., ratio becomes more positive) of 2 per mil is typically used as the threshold for evidence of degradation (Hunkeler and others, 2008). The CSIA performed on the samples collected from the Site resulted in chlorine isotope ratio values ($\delta^{37}Cl$) ranging from 0.39 per mil (MW-14D) to 2.59 per mil (MW-31D) and $\delta^{13}C$ values ranging from -32.64 per mil (MW-3D) to -29.68 per mil (MW-30D). Note that MW-3D is the limestone aquifer monitoring located nearest to the former PCE UST source area and MW-30D is the most downgradient limestone aquifer monitoring well with PCE detections above the MCL. The resulting $\delta^{37}Cl$ values were inconclusive and did not provide significant evidence of degradation trends. However, the resulting $\delta^{13}C$ increase of 2.96 per mil between MW-3D and MW-30D suggests that some degradation is occurring within the upgradient portions of the plume but at a relatively low rate given the large distance traveled along the groundwater flow path. Note that most of the degradation occurs along the flowpath from MW-3D (-32.64) to MW-14D (-30.89) and MW-22D (-29.00). The remaining three wells further downgradient to the south have resulted in slightly lower $\delta^{13}C$ values, providing no significant evidence of biological degradation through this zone of the limestone aquifer. The CSIA results are summarized in **Table 5** and the associated laboratory analytical report is included in **Appendix B.**

### 4.2.3 Plume Stability Analysis Results

The Mann-Kendall test does not require assumptions as to the statistical distribution of the data (e.g., normal, lognormal, etc.) and can be used with data sets that include irregular sampling intervals and missing data. The Mann-Kendall analysis measures the trend in the data where positive values indicate an increase in constituent concentrations over time and negative values indicate a decrease in constituent concentrations over time. The strength of the trend is proportional to the magnitude of the Mann-Kendall Statistic (e.g., large magnitudes generally indicate a strong trend). The software also determines the “Confidence in Trend,” which is the statistical probability that the constituent concentration is actually increasing or decreasing. Trends identified with confidence values of 95-100 percent (%) are defined as “Increasing” or “Decreasing”. Trends with confidence values of 90-95% are defined as “Probably Increasing” or “Probably Decreasing.” Trends with confidence values below 90% are defined as either “No Trend” or “Stable” depending on the determined coefficient of variation, which may be biased subject to the constituent concentration levels and the site hydrogeological conditions.

A total of ten limestone aquifer wells were selected for the Mann-Kendall analysis which included three on-Site wells (MW-3D, MW-13D, and MW-21D) and seven off-Site wells (MW-14D, MW-22D, MW-25D, MW-26D, MW-30D, MW-31D, and MW-32DR). The analysis was performed on samples collected from these wells between the dates of November 5, 2009 and April 22, 2024. The Mann-Kendall analyses are provided in **Appendix C** and a summary of the results is provided in the table below.

| Well ID | PCE Concentration Trend |
|---|---|
| **On-Site** | |
| MW-3D | Decreasing |
| MW-13D | No Trend |
| MW-21D | Decreasing |
| **Off-Site** | |
| MW-14D | Decreasing |
| MW-22D | Decreasing |
| MW-25D | Decreasing |
| MW-26D | Decreasing |
| MW-30D | Decreasing |
| MW-31D | Probably Decreasing |
| MW-32DR | Decreasing |

Based on the Mann-Kendall analysis results, PCE concentrations in all limestone aquifer wells exhibited “Decreasing” trends with the exception of MW-31D, which was “Probably Decreasing”, and MW-13D, which exhibited “No Trend”. These results suggest that the off-Site PCE plume is not stable but decreasing prior to initiating any on-site groundwater remediation. AECOM notes that the three northern most limestone aquifer wells, located nearest to the source areas, have noted significant decreases since the soil vapor extraction system was turned on in June 2022. These monitoring wells include MW-3D and MW-21D, where the lowest detections on record have occurred since the SVE system was turned on, and MW-14D where PCE concentrations have recently dipped below 80 µg/L for the first time since 2018.

The combination of these results and lack of evidence for biological degradation suggests that the primary mechanism reducing concentrations in the off-Site PCE plume is likely physical processes (e.g., dilution, dispersion, sorption, and/or volatilization). However, some degradation is likely occurring within the upgradient portions of the plume, as evidenced by CSIA results. Concentration trend analysis should continue in future monitoring reports as on-Site remedies are implemented and begin to further impact the groundwater plume.

### 4.2.4 **Passive Flux Sampling Results**

Flux refers to the mass of water and contaminants flowing per unit area at a measured point in a well screen averaged over a period of time. For the five PFMs that were used to measure the local groundwater and contaminant mass flux at the Site, the time period consisted of 28 days. The ambient groundwater flux values are shown in terms of Darcy velocity, centimeter per day (cm/day), which is the volumetric water flux through a specified cross-sectional area. The contaminant flux values were determined as mass per unit area per time and is represented as milligrams per square meter per day (mg/m$^2$/day). The flux average concentration values were calculated based on the measured contaminant and Darcy fluxes. The contaminant mass flux values measured at the local scale of approximately 5-foot vertical intervals were integrated over the vertical profile and represented in terms of mass discharge per unit width of aquifer per time and is represented as milligrams per meter per day (mg/m/day).

The well with the highest average PCE concentration (21,678 µg/L) was MW-21, which is located nearest to the former PCE UST source area. MW-21 also resulted in the highest PCE discharge at approximately 1,871 mg/m/day. MW-37, which located near the former PCE degreaser source area, had the second highest average PCE concentration (6,666 µg/L) but had the third lowest PCE discharge (approximately 78 mg/m/day). MW-24, which is located near the western property boundary along the facility fence line, resulted in an average PCE concentration of 2,784 µg/L and a PCE discharge of approximately 434 mg/m/day, the second highest value. The higher PCE discharge of MW-24 despite having a lower concentration than MW-37 can be attributed to the differing Darcy velocities. The Darcy velocity for MW-37 (0.8 cm/day) is much lower than MW-24 (10.2 cm/day) likely due to the differing locations. MW-37 is located inside the facility and is protected from rain and surface runoff by the building footprint where MW-24 is located outside in an area more susceptible to infiltration as it is exposed to rain and surface runoff diverted from the facilities parking lots. This also explains the comparatively higher Darcy velocity for MW-21 (5.7 cm/day). The PCE discharge in the limestone aquifer wells, MW-13D and MW-14D, resulted in much lower values of 2.27 and 9.56 mg/m/day, respectively. The PFM results for PCE are summarized in **Table 6** and additional lab-provided charts and tables are included in **Appendix D.** The fact that PCE concentrations drop off precipitously in the shallow aquifer beyond wells MW-21 and MW-24 (**Figure 10**) indicates that the PCE flux moving through these monitoring points is discharging to the limestone aquifer. The much smaller flux result in the limestone aquifer wells (generally orders of magnitude less), demonstrate considerably less PCE is moving through the limestone aquifer at any given point. Thus, remedial efforts targeting the PCE in the shallow aquifer will have greater effect on removing contaminant mass overall and is likely the most effective way to expedite improvement to groundwater impacts in the limestone aquifer.

## 4.3 Surface Water Investigation

Additional surface water investigation was performed to better understand PCE fate and transport in the region and, specifically, determine how and where PCE is discharging into surface water features. Currently, surface water samples are routinely collected from Lemon Creek upgradient of the off-Site impacted area (SW-02-LC), from Halfmoon Branch upgradient of the off-Site impacted area (SW-03-HMB), from an unnamed tributary to Lemon Creek east of the off-Site impacted area (SW-04-TLC), and from two locations in Lemon Creek downgradient of the off-Site impacted area (SW-01-LC and SW-05-LC) during the semi-annual groundwater monitoring events. On December 13, 2023, surface water samples were collected upstream and downstream of the confluences for Halfmoon Branch, Lemon Creek, and the unnamed tributary to Lemon Creek. The December 2023 surface water sample locations (SW-04-TLC, SW-09-LC, SW-10-HMB, and SW-12-TLC) as well as the April 2024 sample locations (SW-01-LC, SW-02, LC, SW-03-HMB, SW-04-TLC, and SW-05-LC) are illustrated in **Figure 11.** Surface water samples were collected with a peristaltic pump and field parameters were recorded, at the time of sampling, on the field data logs included in **Appendix A**. The samples were then shipped under chain of custody protocols to SGS in Orlando, Florida for analysis of VOCs.

In an effort to identify where the PCE groundwater plume is entering surface water, AECOM utilized an unmanned aerial vehicle (UAV), or drone, outfitted with an infrared camera to perform an unmanned aerial survey (UAS). An infrared camera is capable of locating temperature differences in areas of the creek which are indicative of infiltrating groundwater. The UAS was intentionally performed during the winter (January 29 and 30, 2024) so that the creek area and tree canopy was clear of as much vegetation as possible. Additionally, performing the UAS in the winter guaranteed the largest gradient between the surface water temperature and groundwater temperature which needed to be at least a 10-degrees Fahrenheit difference.

### 4.3.1 Surface Water Sampling Results

Both surface water samples (SW-04-TLC and SW-12-TLC) collected from the unnamed tributary to Lemon Creek during the December 2023 sampling event were non-detect for PCE. However, the surface water sample (SW-09-LC) collected from Lemon Creek, just downstream of the unnamed tributary confluence, resulted in a PCE concentration of 2.7 µg/L. The surface water sample routinely collected at SW-03-HMB has historically been non-detect for PCE and was again during the April 2024 sampling event. However, the surface water sample (SW-10-HMB) collected from the midpoint of Halfmoon Branch resulted in a PCE concentration of 4.4 µg/L. This value exceeded the respective SCDHEC Water Classification Standard (WCS) of 3.3 µg/L but did not exceed the respective MCL (5 µg/L). The surface water sample locations and the resulting PCE concentrations are illustrated in **Figure 11.** The analytical results are summarized in **Table 7** and the associated laboratory analytical report is included in **Appendix B.**

This data provides further evidence that PCE impacted groundwater is discharging into Halfmoon Branch, with the entry point located somewhere in the vicinity of the SW-10-HMB surface water sampling location, or potentially, upstream between the SW-03-HMB and SW-10-HMB surface water sampling locations. Based on the results from the other surface water sample locations, this infiltration may be the primary source of the consistent PCE detections in the downstream surface water samples.

### 4.3.2 Infrared Unmanned Aerial Survey Results

During the first day of the UAS survey (January 29, 2024), the survey began later in the day which caused some heat interference due to the angle of the sunlight refracting from the trees above Halfmoon Branch. Additionally, the warmer temperatures later in the day did not provide as much temperature gradient between ground surface and surface water but it appeared that the surface water was uniform in temperature and much colder than the surrounding ground surface. These results were initially thought to be inconclusive and groundwater infiltration points could not be determined. The next morning on January 30, 2024, the UAS survey began early in the morning when the ambient temperature was around 36 degrees Fahrenheit which allowed for optimal temperature gradient between ground surface and surface water. The results of the UAS survey on the second day determined that all the surface water surveyed along Halfmoon Branch was again uniform in temperature and much warmer than the surrounding ground surface. Since true surface water is typically closer in temperature to the ground surface, these results suggest that Halfmoon Branch is acting as a gaining stream into which surrounding groundwater is draining.

The area immediately surrounding Halfmoon Branch can be described as low-lying wetland area, similar to Lemon Creek, with residential properties to the west and a property used for agricultural purposes (tree farm) to the east. Based on these surroundings, this section of Halfmoon Branch may have been man-made, or over-excavated at some point, to act as a dewatering feature so that the groundwater table was lowered enough that the area around could be used to support structures or agricultural activity. Further evidence of this may be provided by its uniform width and depth spanning from the culvert at Highway 301 to the confluence at Lemon Creek, or the man-made road that runs along the eastern edge and the berm that runs along the western edge which appears to consist of excavated material, or the established vegetation along the banks that have prevented scouring and have shown little to no meandering. Documentation of the UAS work including figures showing the flight path and photo locations is provided in **Appendix E.** A photo log showing the areas surrounding Halfmoon Branch and imagery produced by the UAS is also provided in **Appendix E.** Due to the large file sizes, only a small sample of the UAS imagery is provided. However, all imagery, including video, is available upon request.

## 4.4 Investigation-Derived Waste

Purge water generated during the off-Site RI activities was combined with the SVE condensate storage. The SVE condensate is disposed of on an “as needed” basis, dependent on accumulation, by an approved disposal facility under a non-hazardous waste profile.

## 4.5 Quality Assurance / Quality Control

The analytical data (**Appendix B**) collected during with the semi-annual sampling as part of the Off-Site RI was validated in accordance with the procedures outlined in the *Revised SAP* (AECOM, September 2022). Data assessment reports (DARs; **Appendix B**) explain data qualifiers added to the sample results as a result of the validation process. A summary of the data qualifiers and definitions are included in **Appendix B**.

# 5. Conclusions

The following conclusions are submitted based on the evaluation of the results discussed in this Off-Site RI Report:

- Results of the surface water investigation indicate that Halfmoon Branch acts as a drainage feature for the local groundwater table and receives PCE impacts near the surface water sampling location SW-10-HMB at levels below the MCL.
- Halfmoon Branch, in the area where it intersects the limestone plume, is likely an engineered, uniform channel. This design hinders identification of specific locations where groundwater is most likely discharging into the surface water branch. The slight concentrations of PCE below the MCL in this waterbody do not warrant further assessments to pinpoint groundwater to surface water discharge points.
- The presence of PCE in Halfmoon Branch and the downstream Lemon Creek, combined with the absence of PCE in sentinel wells beyond these drainage features indicates that the destination of PCE in the limestone aquifer is the surface water in Halfmoon Branch at concentrations below the MCL. There is no direct evidence that the trace PCE detected in residential well 546 LCR-A in November 2023 is derived from the Delavan site. Note that 546 LCR-A was the only PCE detection of nine residential wells sampled in November 2023.
- Non-parametric trend analysis using Mann-Kendall indicates PCE concentrations exhibit “Decreasing” trends in all limestone aquifer monitoring wells with the exception of MW-31D, which was “Probably Decreasing” and MW-13D which exhibited “No Trend”. Based upon these trends, the mass of PCE discharging into the Halfmoon Branch and downstream Lemon Creek is expected to also decrease over time.
- Results from the additional soil and groundwater investigation indicated insignificant amounts of either biotic or abiotic degradation occurring within the limestone aquifer, suggesting that the dominant processes for natural attenuation is likely dilution, dispersion, sorption, and/or volatilization. The CSIA results did indicate some degradation processes in areas closer to the source zone.
- Testing for ISCO treatability was hampered by insufficient concentrations of PCE in the limestone aquifer samples. To adequately evaluate ISCO at the bench scale, limestone soil samples had to be spiked with 200 µg/L of PCE. Results of the TOD and ISCO treatability testing indicated potassium permanganate will successfully oxidize PCE in groundwater within the limestone aquifer at a relatively low dosage rate (1.0 g/kg). AECOM notes that PCE has not been as high as 200 µg/L in the off-site limestone aquifer since 2019. Thus, further evaluation of ISCO may not be warranted due to already low PCE concentrations in the limestone aquifer.
- Results of the PFM analysis confirm a higher amount of cVOC mass flux in the shallow aquifer source areas compared to the limestone aquifer. Based on vertical gradients, groundwater from the shallow aquifer discharges to the deeper limestone aquifer. Therefore, preferentially focusing remediation on the on-Site source areas in the shallow aquifer would significantly mitigate the transport of cVOC impacts to off-Site areas.

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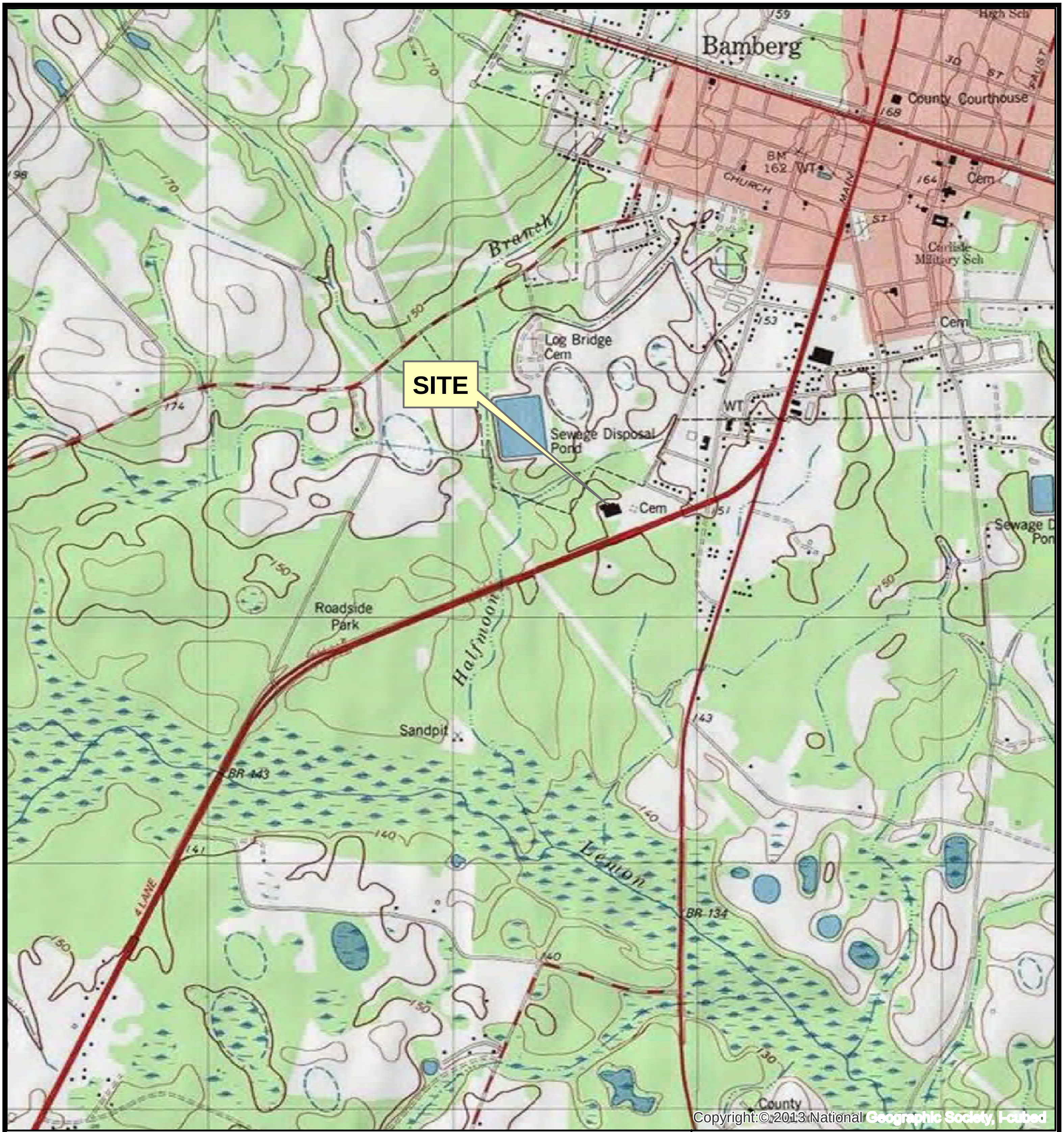
# Figures



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Feet

U.S.G.S. QUADRANGLE MAP

**BAMBERG, SC 1979 (PHOTO REVISED 1987)**

QUADRANGLE
7.5 MINUTE SERIES (TOPOGRAPHIC)

AECOM

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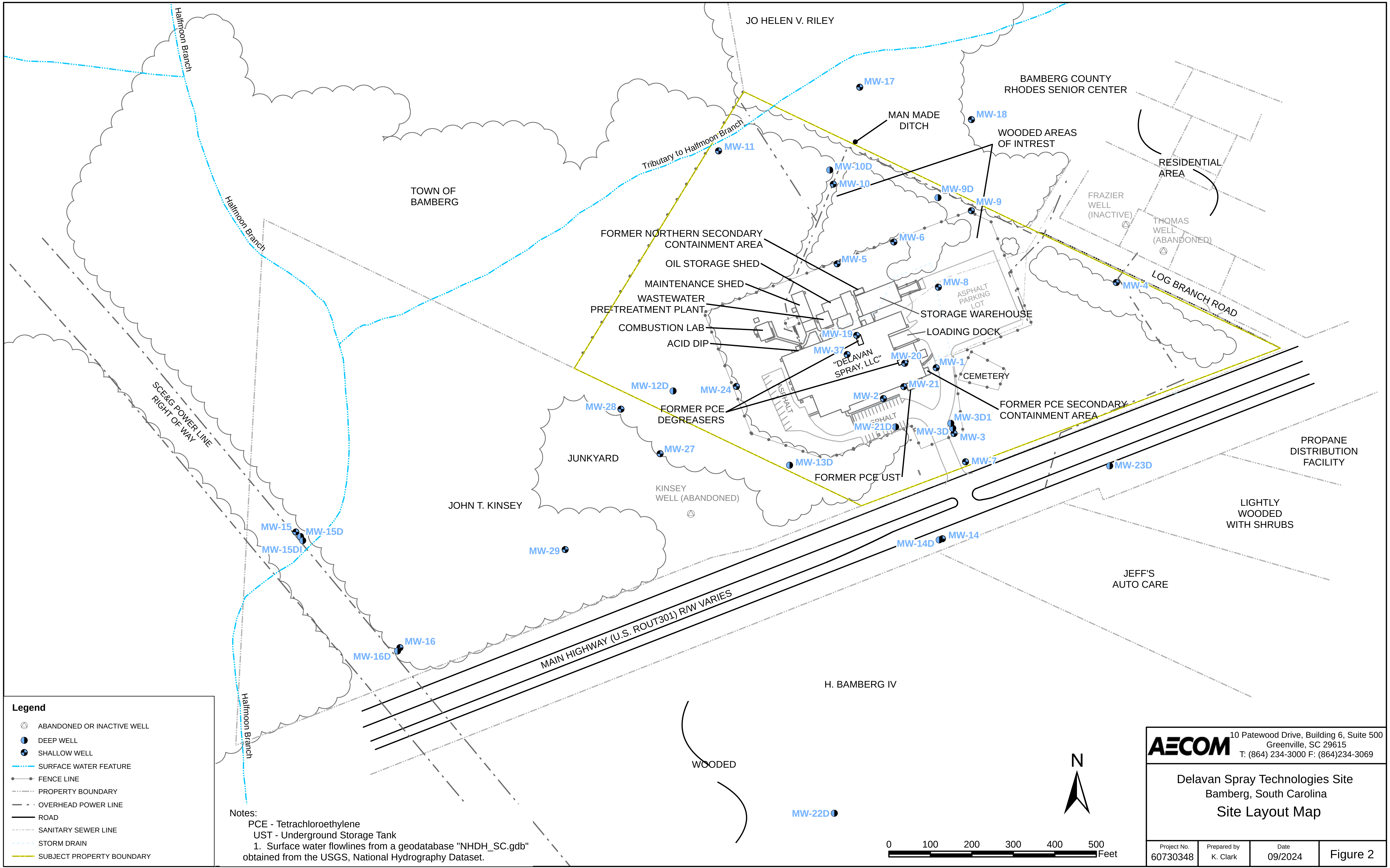
Delavan Spray Technologies Site
Bamberg, South Carolina

## Site Location Map

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60730348 | KCG | 09/2024 | Figure 1 |



**Legend**

- △ ABANDONED OR INACTIVE WELL
- ◐ DEEP WELL
- ● SHALLOW WELL
- SURFACE WATER FEATURE
- FENCE LINE
- PROPERTY BOUNDARY
- OVERHEAD POWER LINE
- ROAD
- SANITARY SEWER LINE
- STORM DRAIN
- SUBJECT PROPERTY BOUNDARY

Notes:
PCE - Tetrachloroethylene
UST - Underground Storage Tank
1. Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.

Path: L:\Legacy\Projects\60314964 - Bamberg\900-CAD-GIS\920 GIS-Graphics\Maps\Maps September 2024\Figure 2 Site Layout11x17.mxd

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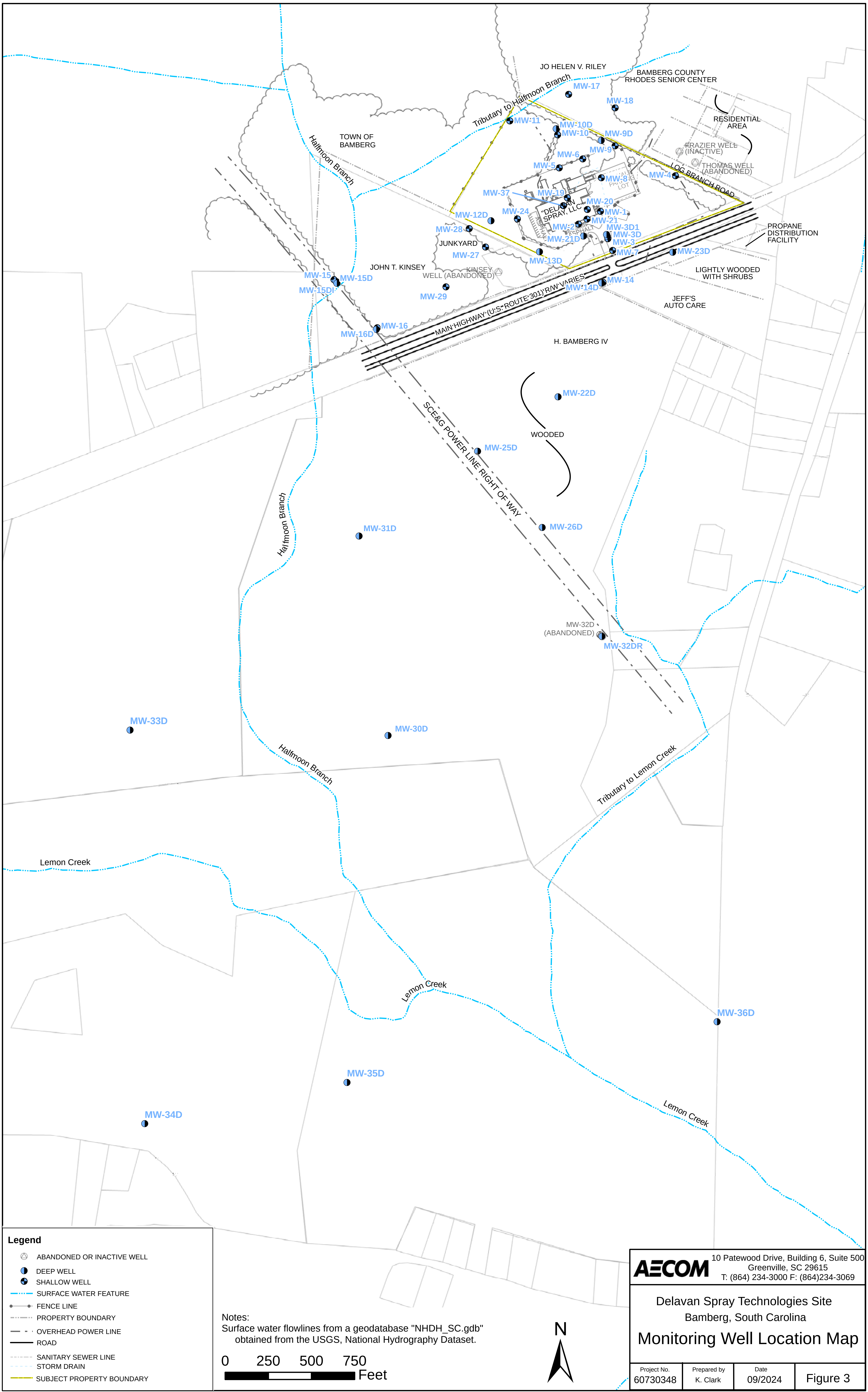
Delavan Spray Technologies Site
Bamberg, South Carolina
Site Layout Map

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60730348 | K. Clark | 09/2024 | Figure 2 |



**Legend**

- △ ABANDONED OR INACTIVE WELL
- ◐ DEEP WELL
- ⊕ SHALLOW WELL
- SURFACE WATER FEATURE
- FENCE LINE
- PROPERTY BOUNDARY
- OVERHEAD POWER LINE
- ROAD
- SANITARY SEWER LINE
- STORM DRAIN
- SUBJECT PROPERTY BOUNDARY

Notes:
Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.

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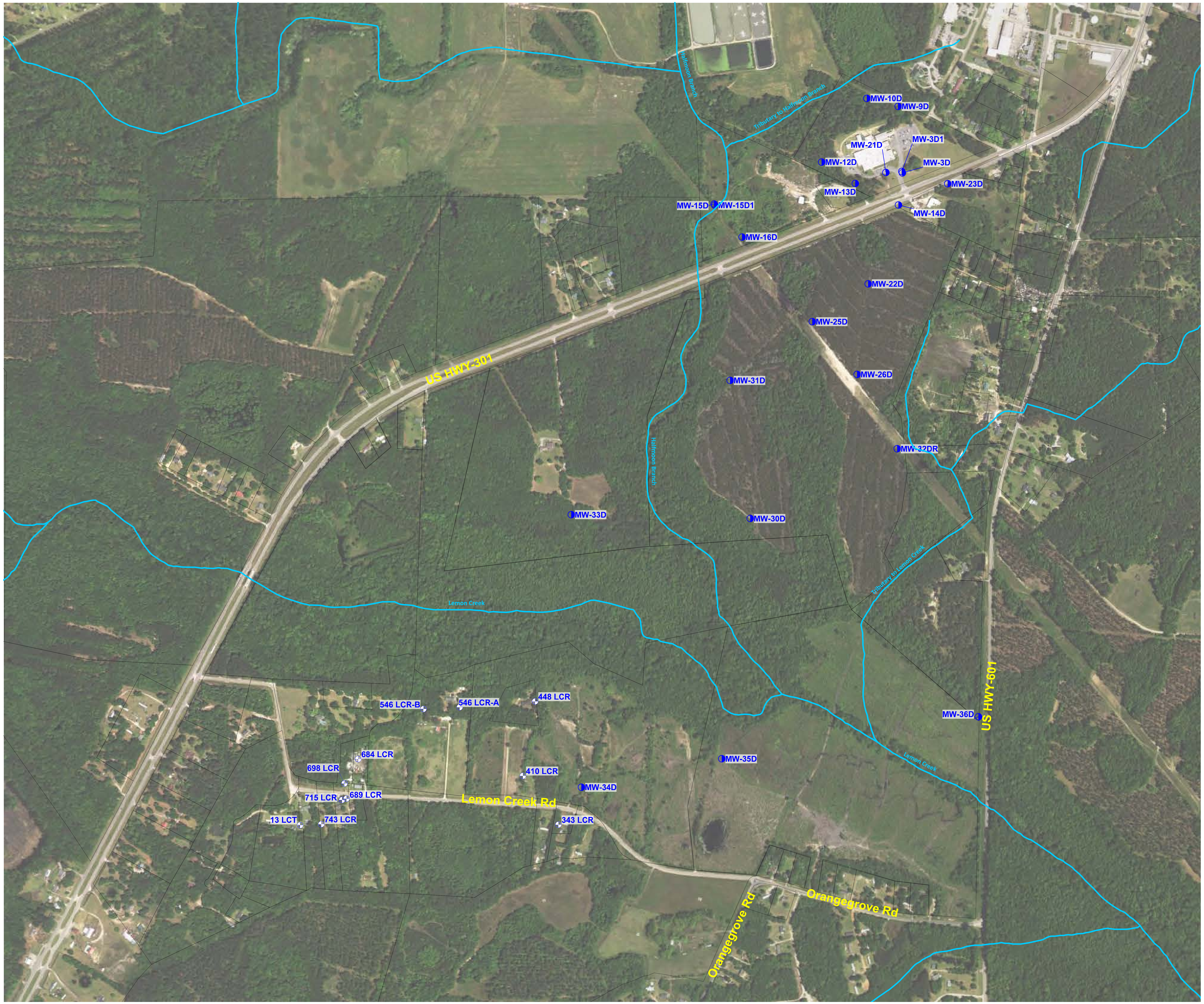
Delavan Spray Technologies Site
Bamberg, South Carolina

## Monitoring Well Location Map

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60730348 | K. Clark | 09/2024 | Figure 3 |

Path: L:\Legacy\Projects\60314964 - Bamberg\900-CAD-GIS\920 GIS-Graphics\Maps\Maps September 2024\Figure 3 Monitoring Well Locations11x17.mxd



LEGEND

| | |
|---|---|
| **410 LCR** | Well Sample ID |
| ◑ | Residential Well Sample Location |
| ◑ | Deep Monitoring Well |
| — | Property Boundary |
| — | Surface Water |

Notes:
1) Locations 343 LCR and 698 LCR were not sampled in November 2023 because there was no power to the pumps at these locations.
2) Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.
3) Imagery obtained from the USGS, The Nation map orthoimagery https://www.usgs.gov/core-science-systems/national-geospatial-program/national-map.

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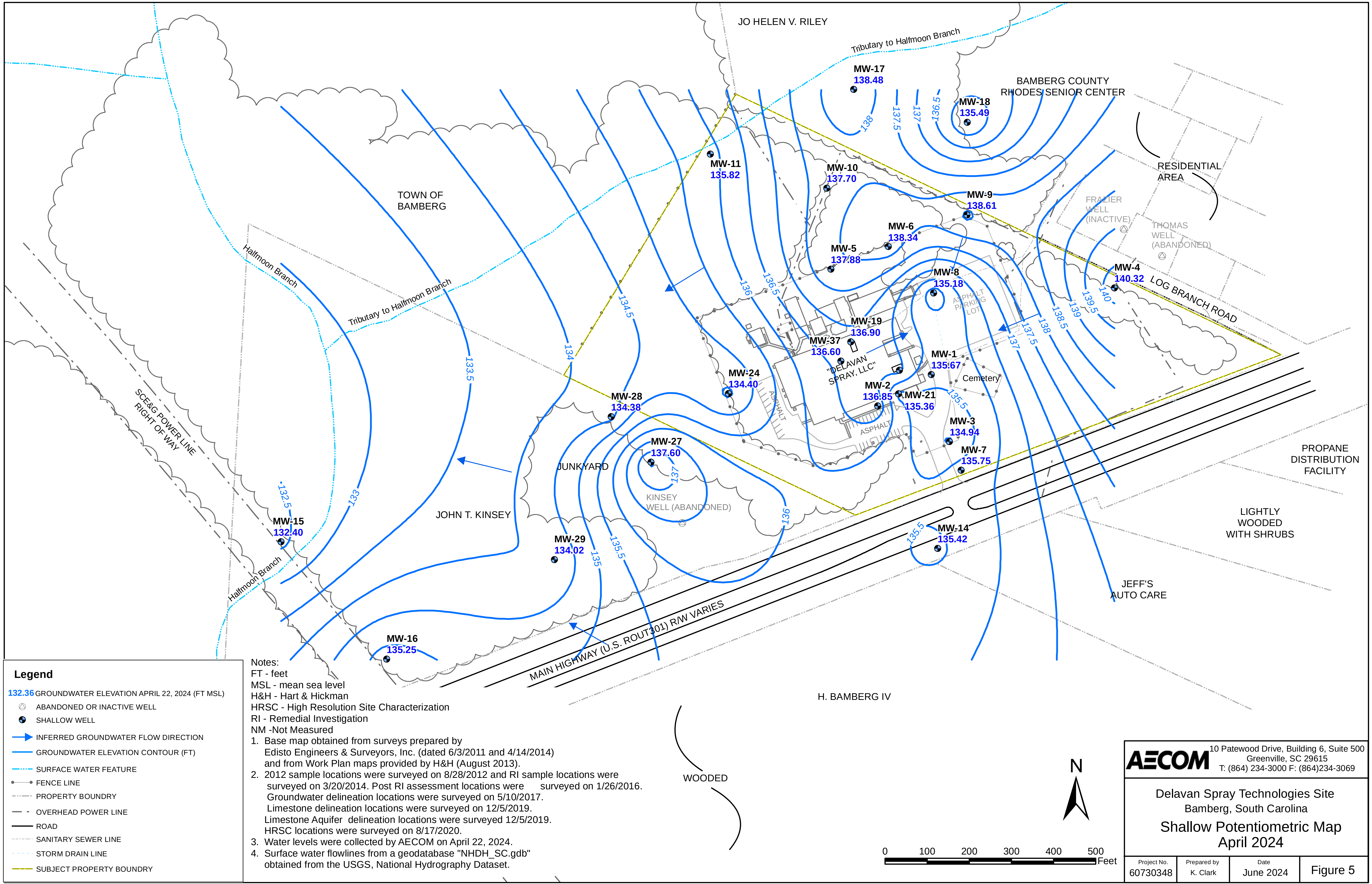
## Residential Well Sample Location Map

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60707644 | L. Alexander | December 2023 | Figure 4 |

L:\Projects\60314964\400-Technical\406 Surfer\For Oct 2023 Plume maps\Residential Properties Sampled Nov 2023.srf



**Legend**

132.36 GROUNDWATER ELEVATION APRIL 22, 2024 (FT MSL)

ABANDONED OR INACTIVE WELL

SHALLOW WELL

INFERRED GROUNDWATER FLOW DIRECTION

GROUNDWATER ELEVATION CONTOUR (FT)

SURFACE WATER FEATURE

FENCE LINE

PROPERTY BOUNDRY

OVERHEAD POWER LINE

ROAD

SANITARY SEWER LINE

STORM DRAIN LINE

SUBJECT PROPERTY BOUNDRY

Notes:
FT - feet
MSL - mean sea level
H&H - Hart & Hickman
HRSC - High Resolution Site Characterization
RI - Remedial Investigation
NM -Not Measured

1. Base map obtained from surveys prepared by Edisto Engineers & Surveyors, Inc. (dated 6/3/2011 and 4/14/2014) and from Work Plan maps provided by H&H (August 2013).
2. 2012 sample locations were surveyed on 8/28/2012 and RI sample locations were surveyed on 3/20/2014. Post RI assessment locations were surveyed on 1/26/2016. Groundwater delineation locations were surveyed on 5/10/2017. Limestone delineation locations were surveyed on 12/5/2019. Limestone Aquifer delineation locations were surveyed 12/5/2019. HRSC locations were surveyed on 8/17/2020.
3. Water levels were collected by AECOM on April 22, 2024.
4. Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.

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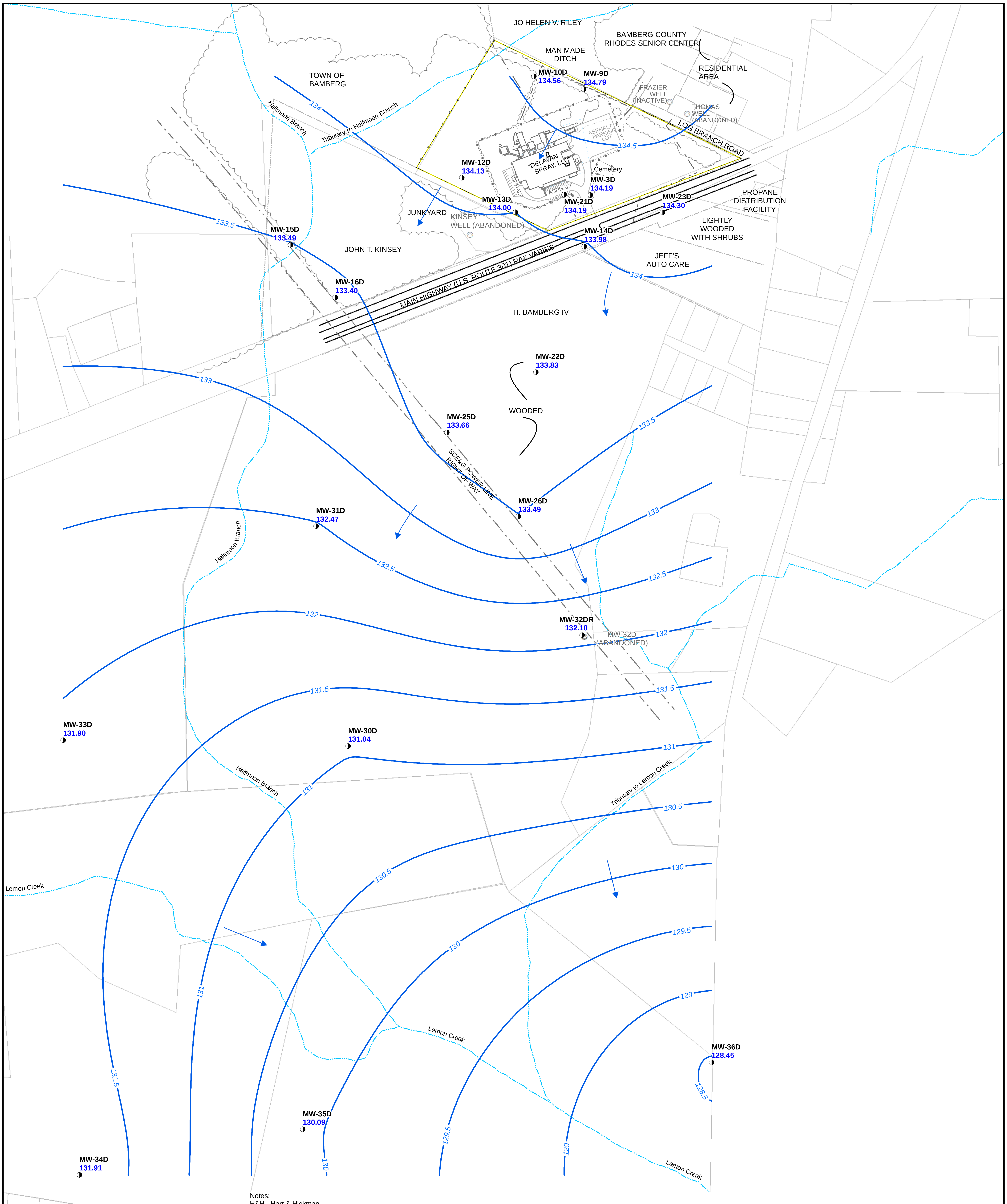
Delavan Spray Technologies Site
Bamberg, South Carolina

## Shallow Potentiometric Map
## April 2024

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60730348 | K. Clark | June 2024 | Figure 5 |

Path: \\na.aecomnet.com\lfs\AMER\Greenville-USGRN1\Legacy\Projects\60314964 - Bamberg\900-CAD-GIS\920 GIS-Graphics\Maps\Maps June 2024\Figure 4 ShallowPot.mxd



**Legend**

- 128.48 GROUNDWATER ELEVATION APRIL 22, 2024 (FT MSL)
- ABANDONED OR INACTIVE WELL
- ◑ DEEP WELL
- ➔ INFERRED GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR (FT)
- SURFACE WATER FEATURE
- FENCE LINE
- PROPERTY BOUNDRY
- OVERHEAD POWER LINE
- ROAD
- SANITARY SEWER LINE
- STORM DRAIN LINE
- SUBJECT PROPERTY BOUNDRY

Notes:
H&H - Hart & Hickman
RI - Remedial Investigation
HRSC - High Resolution Site Characterization
NM - Not Measured

1. Base map obtained from surveys prepared by Edisto Engineers & Surveyors, Inc. (dated 6/3/2011 and 4/14/2014) and from Work Plan maps provided by H&H (August 2013).
2. 2012 sample locations were surveyed on 8/28/2012 and RI sample locations were surveyed on 3/20/2014. Post RI assessment locations were surveyed on 1/26/2016. Groundwater delineation locations were surveyed on 5/10/2017. Limestone Aquifer delineation locations were surveyed 12/5/2019. HRSC locations were surveyed on 8/17/2020.
3. Water levels were collected by AECOM on April 22,2024.
4. Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.

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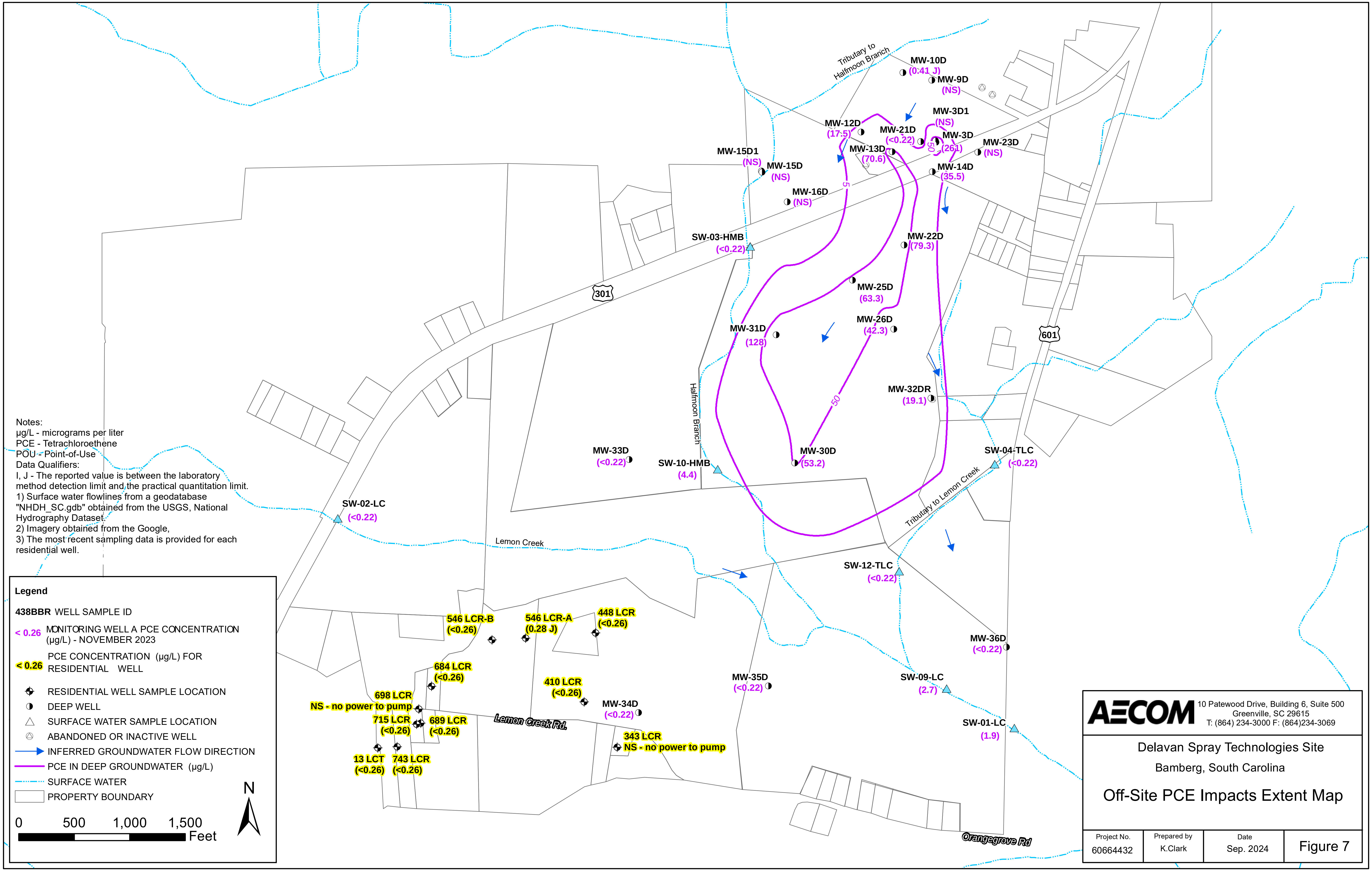
Delavan Spray Technologies Site
Bamberg, South Carolina

# Deep Potentiometric Map
# April 2024

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60730348 | K. Clark | June 2024 | Figure 6 |

Path: \\na.aecomnet.com\lfs\AMER\Greenville-USGRN1\Legacy\Projects\60314964 - Bamberg\900-CAD-GIS\920 GIS-Graphics\Maps\Maps June 2024\Figure 5 Deep Pot.mxd



Notes:
µg/L - micrograms per liter
PCE - Tetrachloroethene
POU - Point-of-Use
Data Qualifiers:
I, J - The reported value is between the laboratory method detection limit and the practical quantitation limit.
1) Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.
2) Imagery obtained from the Google,
3) The most recent sampling data is provided for each residential well.

**Legend**

| | |
|---|---|
| 438BBR | WELL SAMPLE ID |
| < 0.26 | MONITORING WELL A PCE CONCENTRATION (µg/L) - NOVEMBER 2023 |
| < 0.26 | PCE CONCENTRATION (µg/L) FOR RESIDENTIAL WELL |
| ⊕ | RESIDENTIAL WELL SAMPLE LOCATION |
| ◑ | DEEP WELL |
| △ | SURFACE WATER SAMPLE LOCATION |
| ⊗ | ABANDONED OR INACTIVE WELL |
| → | INFERRED GROUNDWATER FLOW DIRECTION |
| — | PCE IN DEEP GROUNDWATER (µg/L) |
| -·-·- | SURFACE WATER |
| ▭ | PROPERTY BOUNDARY |

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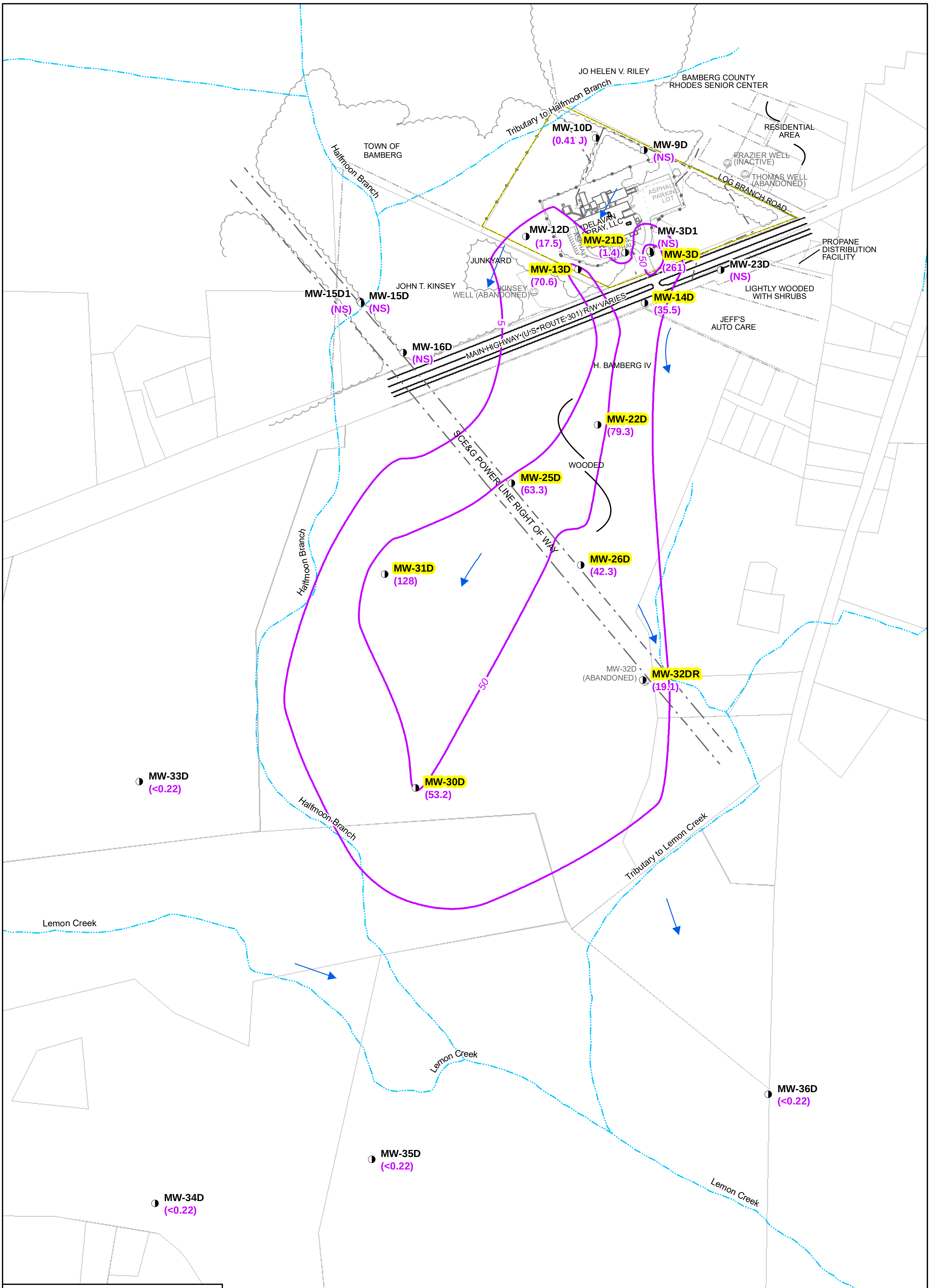
Delavan Spray Technologies Site
Bamberg, South Carolina

## Off-Site PCE Impacts Extent Map

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60664432 | K.Clark | Sep. 2024 | Figure 7 |



**Legend**

- ABANDONED OR INACTIVE WELL
- ◑ DEEP WELL
- → INFERRED GROUNDWATER FLOW DIRECTION
- PCE IN DEEP GROUNDWATER (µg/L)
- SURFACE WATER FEATURE
- FENCE LINE
- PROPERTY BOUNDARY
- OVERHEAD POWER LINE
- ROAD
- SANITARY SEWER LINE
- STORM DRAIN
- SUBJECT PROPERTY BOUNDARY

Notes:
µg/L – micrograms per liter
<0.22 - Below laboratory method detection limit
NS - Not Sampled
PCE - tetrachloroethylene
1. Data was contoured using log and anti-log grid math and natural neighbor gridding method in Surfer
2.Half the detection limit was used to contour results reported below the detection limit.
3. Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.
4. Highlighted monitoring wells indicate locations of monitored natural attenuation (MNA) parameter analysis.

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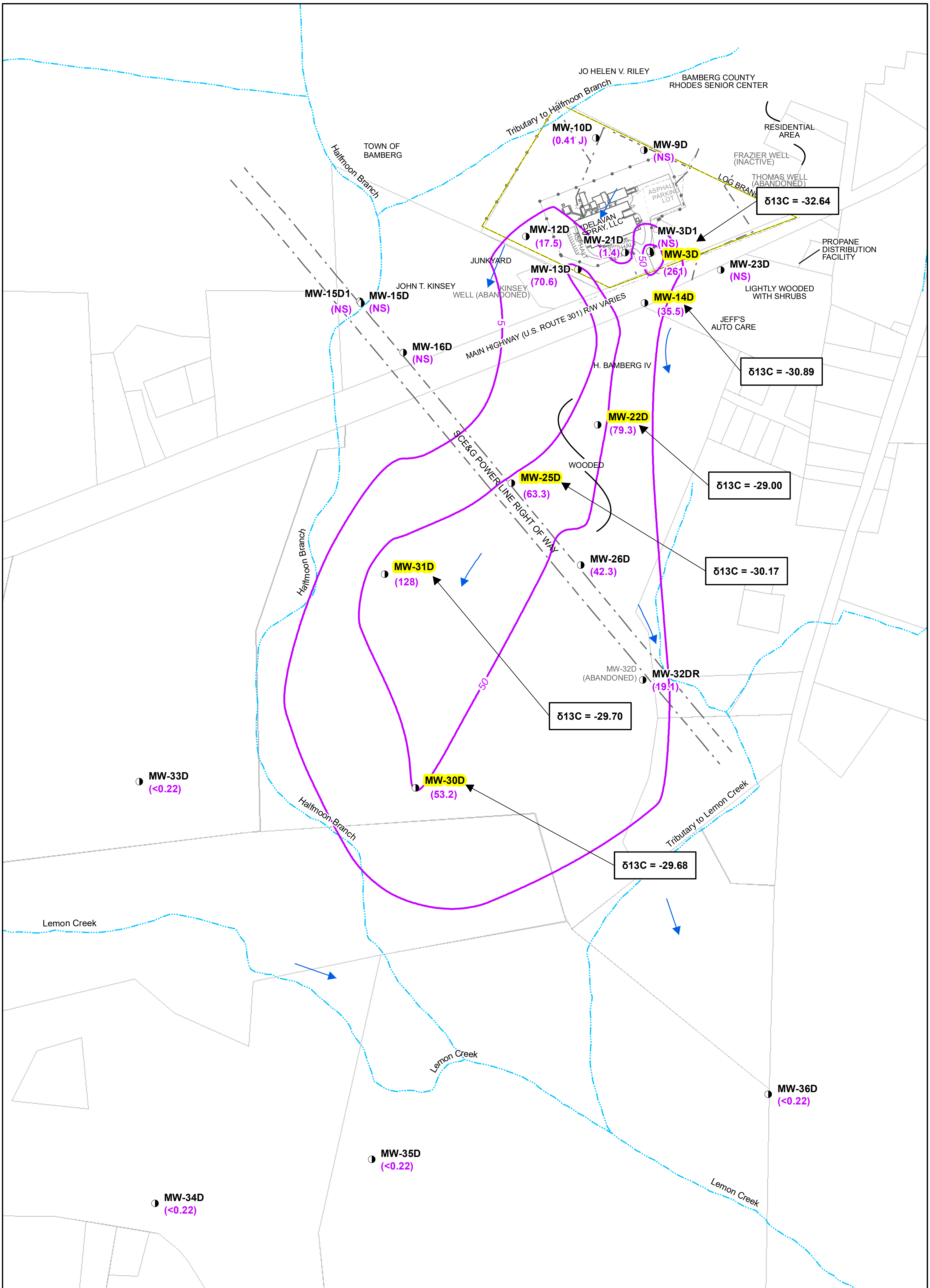
Delavan Spray Technologies Site
Bamberg, South Carolina

## MNA Sample Locations

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60707644 | K. Clark | Jan. 2024 | Figure 8 |

Path: \\na.aecomnet.com\lfs\AMER\Greenville-USGRN1\Legacy\Projects\60314964 - Bamberg\900-CAD-GIS\920 GIS-Graphics\Maps\Maps September 2024 FS\Figure 8 PCE_Deep_NAM.mxd



**Legend**

- ⊘ ABANDONED OR INACTIVE WELL
- ◑ DEEP WELL
- → INFERRED GROUNDWATER FLOW DIRECTION
- PCE IN DEEP GROUNDWATER (µg/L)
- SURFACE WATER FEATURE
- FENCE LINE
- PROPERTY BOUNDARY
- OVERHEAD POWER LINE
- ROAD
- SANITARY SEWER LINE
- STORM DRAIN
- SUBJECT PROPERTY BOUNDARY

Notes:
µg/L – micrograms per liter
<0.22 - Below laboratory method detection limit
NS - Not Sampled
PCE - tetrachloroethy lene
1. Data was contoured using log and anti-log grid math and natural neighbor gridding method in Surfer
2.Half the detection limit was used to contour results reported below the detection limit.
3. Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.
4. Highlighted monitoring wells indicate locations of Compound Specific Isotope Analysis (CSIA).

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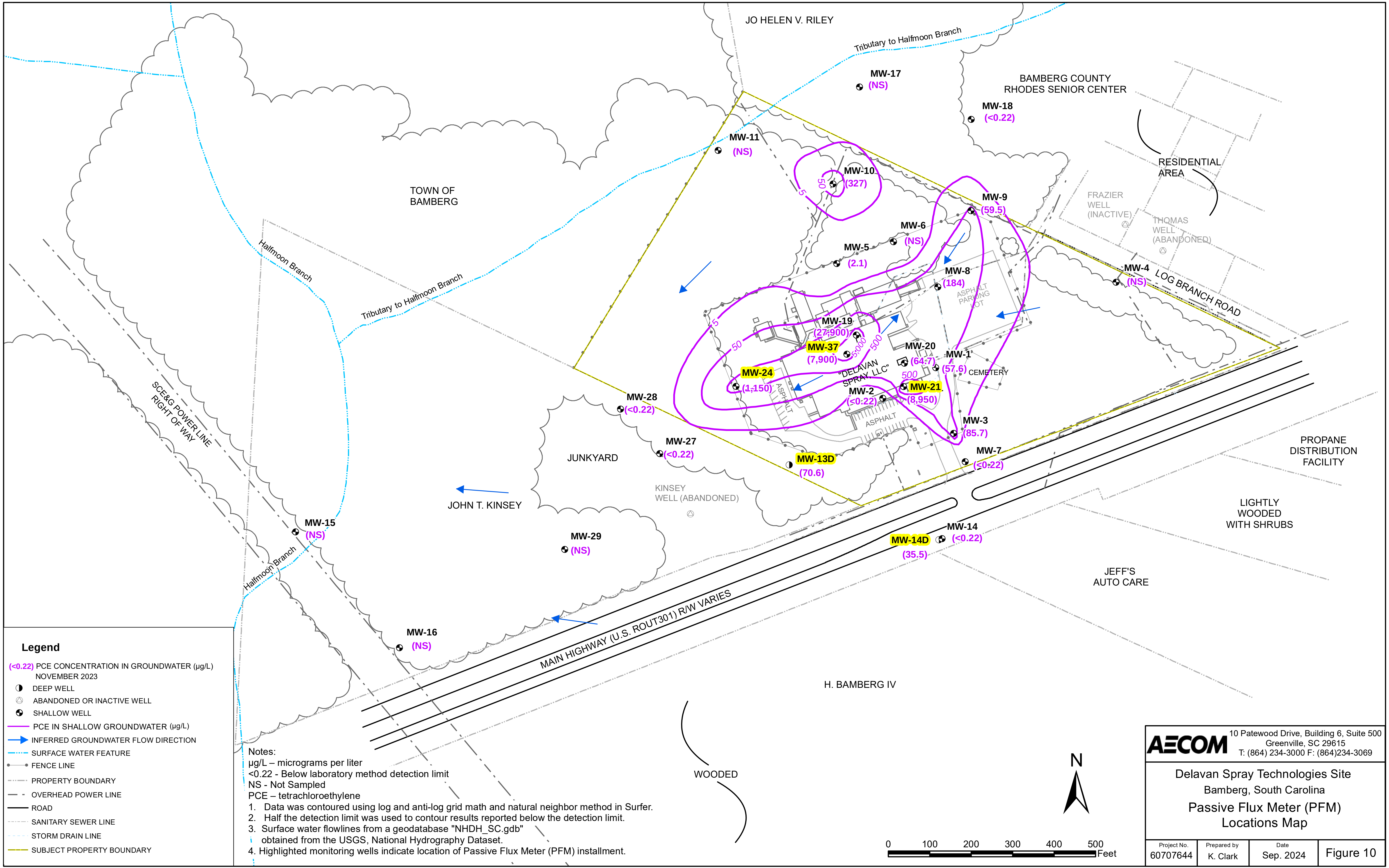
Delavan Spray Technologies Site
Bamberg, South Carolina

## Compound Specific Isotope Analysis (CSIA) Locations Map

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60707644 | K. Clark | Sep. 2024 | Figure 9 |

Path: \\na.aecomnet.com\lfs\AMER\Greenville-USGRN1\Legacy\Projects\60314964 - Bamberg\900-CAD-GIS\920 GIS-Graphics\Maps\Maps September 2024 FS\Figure 9 CSIA Locations.mxd



**Legend**

- (<0.22) PCE CONCENTRATION IN GROUNDWATER (µg/L) NOVEMBER 2023
- ◑ DEEP WELL
- △ ABANDONED OR INACTIVE WELL
- ● SHALLOW WELL
- — PCE IN SHALLOW GROUNDWATER (µg/L)
- → INFERRED GROUNDWATER FLOW DIRECTION
- SURFACE WATER FEATURE
- FENCE LINE
- PROPERTY BOUNDARY
- OVERHEAD POWER LINE
- ROAD
- SANITARY SEWER LINE
- STORM DRAIN LINE
- SUBJECT PROPERTY BOUNDARY

Notes:
µg/L – micrograms per liter
<0.22 - Below laboratory method detection limit
NS - Not Sampled
PCE – tetrachloroethylene

1. Data was contoured using log and anti-log grid math and natural neighbor method in Surfer.
2. Half the detection limit was used to contour results reported below the detection limit.
3. Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.
4. Highlighted monitoring wells indicate location of Passive Flux Meter (PFM) installment.

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Delavan Spray Technologies Site
Bamberg, South Carolina
Passive Flux Meter (PFM)
Locations Map

| Project No. | Prepared by | Date | |
|---|---|---|---|
| 60707644 | K. Clark | Sep. 2024 | Figure 10 |

Path: \\na.aecomnet.com\lfs\AMER\Greenville-USGRN1\Legacy\Projects\60314964 - Bamberg\900-CAD-GIS\920 GIS-Graphics\Maps\Maps September 2024 FS\Figure 10 PFM Locations Map11x17.mxd

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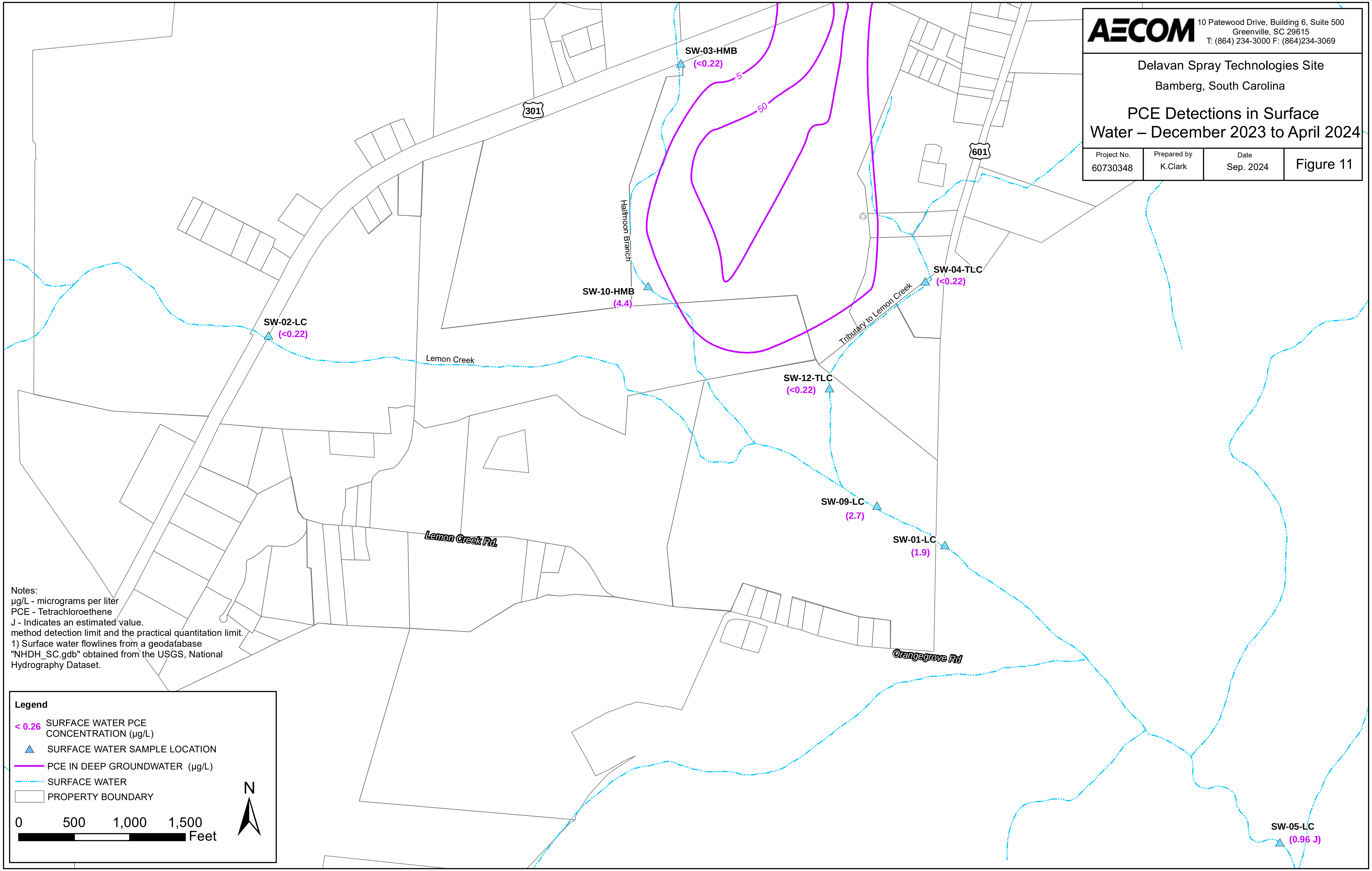
Delavan Spray Technologies Site
Bamberg, South Carolina

## PCE Detections in Surface Water – December 2023 to April 2024

| Project No. | Prepared by | Date | Figure 11 |
|---|---|---|---|
| 60730348 | K.Clark | Sep. 2024 | |



Notes:
µg/L - micrograms per liter
PCE - Tetrachloroethene
J - Indicates an estimated value.
method detection limit and the practical quantitation limit.
1) Surface water flowlines from a geodatabase "NHDH_SC.gdb" obtained from the USGS, National Hydrography Dataset.

**Legend**

| | |
|---|---|
| < 0.26 | SURFACE WATER PCE CONCENTRATION (µg/L) |
| ▲ | SURFACE WATER SAMPLE LOCATION |
| — | PCE IN DEEP GROUNDWATER (µg/L) |
| -·-·- | SURFACE WATER |
| ☐ | PROPERTY BOUNDARY |

# Tables

## Table 1
## Summary of Off-Site Remedial Investigation Sampling
## Delavan Spray Technologies Site
## Bamberg, South Carolina

| Media | Sample ID | TOD and ISCO Treatability | Degradation | | | | Field Measured Parameters[1] | MNA Parameters[2] | Passive Flux | VOC |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Magnetic Susceptibility | X-Ray Diffraction | AMIBA | CSIA | | | | |
| Soil | SB-25D | X | X | X | X | | | | | |
| | SB-31D | X | X | X | X | | | | | |
| Ground water | MW-3D | | | | | X | X | X | | |
| | MW-13D | | | | | | X | X | X | |
| | MW-14D | | | | | X | X | X | X | |
| | MW-21 | | | | | | | | X | |
| | MW-21D | | | | | | X | X | | |
| | MW-22D | | | | | X | X | X | | |
| | MW-24 | | | | | | | | X | |
| | MW-25D | | | | | X | X | X | | |
| | MW-26D | | | | | | X | X | | |
| | MW-30D | | | | | X | X | X | | |
| | MW-31D | | | | | X | X | X | | |
| | MW-32DR | | | | | | X | X | | |
| | MW-37 | | | | | | | | X | |
| Surface Water | SW-09-LC | | | | | | | | | X |
| | SW-04-TLC | | | | | | | | | X |
| | SW-12-TLC | | | | | | | | | X |
| | SW-10-HMB | | | | | | | | | X |

**Notes:**

TOD = total oxygen demand

ISCO = in-situ chemical oxidation

MNA = monitored natural attenuation

AMIBA = aqueous and mineralogical intrinsic bioremediation assessment

CSIA = compound specific isotope analysis

VOC = volatile organic compounds

[1] - Field measured parameters include water levels, pH, temperature, conductivity, dissolved oxygen (DO), and oxidation reduction potential (ORP)

[2] - MNA parameters include chloride, nitrate, sulfate, sulfide, methane, ethane, ethene, ferrous iron, ferric iron, manganese, and acetylene

# Table 2
# Soil Analytical Results - Abiotic Degradation
## Delavan Spray Technologies Site
## Bamberg, South Carolina

| Sample ID<br>Date Collected | | SB-25D<br>04/11/24 | SB-31D<br>04/11/24 |
|---|---|---|---|
| **Magnetic Susceptibility ($m^3$/kg)** | | | |
| Magnetite ($Fe_3O_4$) | | ND | ND |
| **XRD (Relative Abundance %)** | | | |
| Quartz ($SiO_2$) | | 19 | 2 |
| Calcite ($CaCO_3$) | | 81 | 98 |
| Total | | 100 | 100 |
| **AMIBA (mg/kg)** | | | |
| Weak Acid Soluble | Ferrous Iron (Fe2+) | <1.8 | <1.8 |
| | Ferric Iron (Fe3+) | 0 | 0 |
| | Total Iron (Total Fe) | <1.8 | <1.8 |
| Strong Acid Soluble | Ferrous Iron (Fe2+) | <5.2 | <5.1 |
| | Ferric Iron (Fe3+) | 0 | 0 |
| | Total Iron (Total Fe) | <5.2 | <5.1 |
| Acid Volatile Sulfide | | <0.4 | <0.4 |
| Chromium-Extractable Sulfide | | 0.7 | 0.9 |

**Notes:**
$m^3$/kg = cubic meter per kilogram
mg/kg = milligrams per kilogram
ND = results not detected
Strong Acid Soluble Fe includes Weak Acid Soluble Fe
Fe3+ is calculated from the raw data as it is the difference between Total Fe and Fe2+.
Discrepancies are due to rounding.

# Table 3
# Soil Analytical Results - Total Oxidant Demand and ISCO Treatability
# Delavan Spray Technologies Site
# Bamberg, South Carolina

| Sample | Dose (g/kg) | Total Oxidant Demand (g/kg soil) |
|---|---|---|
| SB-25D-3g/kg | 3.00 | 0.89 |
| SB-25D-5g/kg | 4.98 | 0.84 |
| SB-31D-3g/kg | 3.00 | 0.54 |
| SB-31D-5g/kg | 4.95 | 0.78 |

**Notes:**
g/kg = grams per kilogram
Oxidant = potassium permanganate

| Sample | Control Spike PCE Concentration (ug/L) | Treated PCE Concentration (ug/L) | PCE Destruction Rate (%) |
|---|---|---|---|
| SB-25D | 93.4 | 1.01 | 98.9% |
| SB-31D | 56.5 | 1.97 | 96.5% |

**Notes:**
µg/L = micrograms per liter
Oxidant = potassium permanganate
Spike concentration = 200 ug/L PCE
Oxidant dosage rate = 1.0 g/kg soil

# Table 4
# Groundwater Analytical Results - MNA Parameters
## Delavan Spray Technologies Site
## Bamberg, South Carolina

| Sample ID<br>Lab Sample ID<br>Date Collected | MW-3D<br>FC11040-8<br>11/07/23 | MW-13D<br>FC11040-2<br>11/07/23 | MW-14D<br>FC11040-4<br>11/07/23 | MW-21D<br>FC11040-6<br>11/07/23 | MW-22D<br>FC11040-10<br>11/07/23 |
|---|---|---|---|---|---|
| **Metals by 6010D (µg/L)** | | | | | |
| Iron | **411** | **233** J// | **678** | **393** | **63.8** J// |
| Manganese | **15.1** | **5.3** J// | **39.7** | **10.5** J// | **2** J// |
| **Ferric Iron by SM3500 Fe B-11 (mg/L)** | | | | | |
| Iron, Ferric | **0.41** | **0.23** J// | **0.58** | **0.35** J// | **0.064** J// |
| **Ferrous Iron by SM3500 Fe B-11 (mg/L)** | | | | | |
| Iron, Ferrous | < 0.03 | < 0.03 | **0.098** J// | **0.047** J// | < 0.03 |
| **Anions by 9056A (mg/L)** | | | | | |
| Chloride | **8.5** | **10.7** | **5.1** | **4.5** | **8.3** |
| Nitrogen, Nitrate | **1** | **1.6** | **0.22** | **0.15** | **1.5** |
| Sulfate | **2.7** | **2.3** | **4.4** | **2.6** | **3.7** |
| **Sulfide by SM4500S2 F-11 (mg/L)** | | | | | |
| Sulfide | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| **Dissolved Gases by RSK-175 (µg/L)** | | | | | |
| Acetylene | < 1.5 | < 1.5 | < 1.5 | < 1.5 | < 1.5 |
| Ethane | < 0.32 | < 0.32 | < 0.32 | < 0.32 | < 0.32 |
| Ethene | < 0.43 | < 0.43 | < 0.43 | < 0.43 | < 0.43 |
| Methane | **0.42** J// | **0.36** J// | **0.24** J// | **0.82** | **0.4** J// |

| Sample ID<br>Lab Sample ID<br>Date Collected | MW-25D<br>FC11040-7<br>11/07/23 | MW-26D<br>FC11040-9<br>11/07/23 | MW-30D<br>FC11040-1<br>11/07/23 | MW-31D<br>FC11040-3<br>11/07/23 | MW-32DR<br>FC11040-5<br>11/07/23 |
|---|---|---|---|---|---|
| **Metals by 6010D (µg/L)** | | | | | |
| Iron | **35.5** J// | **29.4** J// | **74.9** J// | **50.1** J// | **18** J// |
| Manganese | < 1 | < 1 | **2.9** J// | **1.2** J// | < 1 |
| **Ferric Iron by SM3500 Fe B-11 (mg/L)** | | | | | |
| Iron, Ferric | < 0.047 | < 0.047 | **0.075** J// | **0.05** J// | < 0.047 |
| **Ferrous Iron by SM3500 Fe B-11 (mg/L)** | | | | | |
| Iron, Ferrous | < 0.03 | < 0.03 | < 0.03 | < 0.03 | < 0.03 |
| **Anions by 9056A (mg/L)** | | | | | |
| Chloride | **10.1** | **10.4** | **9.6** | **9.9** | **8.8** |
| Nitrogen, Nitrate | **1.2** | **1.3** | **1.3** | **1.6** | **1** |
| Sulfate | **3.2** | **3.8** | **3.6** | **2.3** | **2.4** |
| **Sulfide by SM4500S2 F-11 (mg/L)** | | | | | |
| Sulfide | < 0.2 | < 0.2 | < 0.2 | < 0.2 | < 0.2 |
| **Dissolved Gases by RSK-175 (µg/L)** | | | | | |
| Acetylene | < 1.5 | < 1.5 | < 1.5 | < 1.5 | < 1.5 |
| Ethane | < 0.32 | < 0.32 | < 0.32 | < 0.32 | < 0.32 |
| Ethene | < 0.43 | < 0.43 | < 0.43 | < 0.43 | < 0.43 |
| Methane | < 0.16 | < 0.16 | < 0.16 | **0.32** J// | **0.5** |

**Notes:**

mg/L - milligrams per liter (parts per million)

µg/L - micrograms per liter (parts per billion)

Bold value indicate detected concentrations.

See Appendix B for explanation of data qualifiers.

# Table 5
# Summary of Groundwater Analytical Results - CSIA
## Delavan Spray Technologies Site
## Bamberg, South Carolina

| Sample ID | Date Collected | PCE | | | | TCE | | | | 1,1-DCE | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Concentration (ug/L) | $\delta^{13}C$ | $\delta^{37}Cl$ | Stdv | Concentration (ug/L) | $\delta^{13}C$ | $\delta^{37}Cl$ | Stdv | Concentration (ug/L) | $\delta^{13}C$ | $\delta^{37}Cl$ | Stdv |
| MW-3D | 3/13/2024 | 261 | -32.64 | 2.33 | 0.77 | 8.1 | -33.87 | 2.50 | 0.15 | 5.7 | BAL | 2.10 | 0.31 |
| MW-14D | 3/13/2024 | 35.5 | -30.89 | 0.39 | 0.34 | <0.35 | BAL | BAL | -- | 0.4 | BAL | BAL | -- |
| MW-22D | 3/13/2024 | 79.3 | -29.00 | 1.69 | 0.23 | <0.35 | BAL | BAL | -- | 1.5 | BAL | 1.89 | 0.15 |
| MW-25D | 3/13/2024 | 63.3 | -30.17 | 1.19 | 0.41 | <0.35 | BAL | BAL | -- | 1.2 | BAL | 2.07 | -- |
| MW-31D | 3/13/2024 | 128 | -29.70 | 2.59 | 0.45 | <0.35 | BAL | BAL | -- | 3.7 | BAL | 1.93 | 0.01 |
| MW-30D | 3/13/2024 | 53.2 | -29.68 | 1.11 | 0.16 | 0.73 | BAL | 4.68 | -- | 1.2 | BAL | 1.52 | 0.22 |

**Notes:**

Sample results are arranged in order, top to bottom, from most upgradient (known source area) to most downgradient along the groundwater flow path.

µg/L = micrograms per liter

BAL= below analytical limit

$\delta^{13}C$ = delta carbon isotope ratio in parts per thousand (per mil)

$\delta^{37}Cl$ = delta chlorine isotope ratio in parts per thousand (per mil)

$\delta^{13}C$ analysis precision ± 0.3‰ VPDB

$\delta^{37}Cl$ analysis precision ± 0.2‰ SMOC

VPDB = international reference standard for carbon isotopes, Vienna Pee Dee Belemnite

SMOC = standard mean ocean chloride

Stdv = standard deviation

# Table 6
# Summary of PFM Analytical Results - PCE
# Delavan Spray Technologies Site
# Bamberg, South Carolina

| Well ID | Darcy Velocity[1] (cm/day) | PCE[2] (ug/L) | PCE flux[3] (mg/m$^2$/day) | PCE Discharge[4] (mg/m/day) |
|---|---|---|---|---|
| MW-13D | 1.8 | 83 | 1.5 | 2.27 |
| MW-14D | 2.3 | 270 | 6.3 | 9.56 |
| MW-21 | 5.7 | 21,678 | 1,227.5 | 1,870.68 |
| MW-24 | 10.2 | 2,784 | 284.8 | 434.06 |
| MW-37 | 0.8 | 6,666 | 50.9 | 77.63 |

**Notes:**

[1] - Darcy velocity vlaues reported as centimeters per day (cm/day)

[2] - Flux average contaminant concentration of PFMs reported as micrograms per liter (µg/L)

[3] - Well average values of mass flux based on PFMs reported as milligrams per square meter per day (mg/m$^2$/day)

[4] - Mass discharge per unit width for aquifer of each well reported as milligrams per meter per day (mg/m/day)

# Table 7
# Summary of Detections in Surface Water Samples
# Delavan Spray Technologies Site
# Bamberg, South Carolina

| Sample ID<br>Date Collected<br>Lab Sample ID | USEPA MCL | SCDHEC WCS | SW-04-TLC<br>FC11990-2<br>12/13/23 | SW-09-LC<br>FC11990-1<br>12/13/23 | SW-10-HMB<br>FC11990-4<br>12/13/23 | SW-12-TLC<br>FC11990-3<br>12/13/23 |
|---|---|---|---|---|---|---|
| **Volatile Organic Compounds by Method 8260D (ug/L)** | | | | | | |
| Tetrachloroethylene | 5 | 3.3 | < 0.22 | **2.7** | **4.4** | < 0.22 |

**Notes:**

µg/L - micrograms per liter (parts per billion)

USEPA MCL - United States Environmental Protection Agency Maximum Contaminant Level (March 2018).

Bold font indicates the detections.

# Appendix A

## Field Documentation

Soil Sampling Field Notes
Field Data Logs for Groundwater Sampling
Field Data Logs for Surface Water Sampling

AECOM

## DAILY REPORT

PROJECT NUMBER: 60707644 DATE: 4/11/24 REPORT NUMBER:

PROJECT & LOCATION: ~~Soil drilling + sampling~~ RTX Bebvan, Bamberg SC

CLIENT: Raytheon Technologies AECOM FIELD REPRESENTATIVE: Justin Butler

SUBCONTRACTOR: Redox Tech

SUBCONTRACTOR PERSONNEL ON SITE: Chris Lacko, Jeremy Ray, Theseus Taylor

BRIEF SUMMARY OF WORK PERFORMED: soil sampling

| START TIME | STOP TIME | DESCRIPTION OF ACTIVTIES: REMARKS |
|---|---|---|
| 0700 | | Arrive on site, H+S meeting, scope locations and logistics to bring the rig in |
| 0845 | | unload rig @ entrance to MW-31D, fill totes with water |
| 0915 | | mobe rig into location, 8150LS Geoprobe |
| 0950 | | Begin drilling @ MW-31D |
| 1040 | | Sample taken from interval 54-56' @ SB-31D |
| 1120 | | Pull rods + grout |
| 1140 | | Mob rig to next location |
| 1210 | | Begin drilling @ MW-25D |
| 1255 | | Sample taken from interval 56-58' @ SB-25D |
| 1305 | | Pull rods + grout |
| 1330 | | mobe equipment out of work area |
| 1540 | | Leave site |
| 1700 | | Relinquish samples @ Fed Ex |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

FIELD REPRESENTATIVES SIGNATURE: DATE: 4/11/24

AECOM

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page 1 of 2

Date (mo/day/yr) 11/7/23
Field Personnel Justin Butler
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-3D
____ Upgradient ____ Downgradient ____ Sidegradient ____ Source
Weather Conditions Clear
Air Temperature 60 °F
Total Well Depth (TWD) = 49.00 1/100 ft
Depth to Ground Water (DGW) = 14.90 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 34.1 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 5.56 gal
3 Casing Volumes = 16.68 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection Peristaltic Pump ~~Reverse Flow for VOC'S~~
Total Volume of Water Removed ____ gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation 148.12 1/100 ft
Height of Riser (above land surface) -0.23 1/100 ft
Land Surface Elevation -0.16 1/100 ft
Screened Interval 44 - 49 1/100 ft
Dedicated Pump or Bailer YES ____ NO ✓ Type ____
Steel Guard Pipe Around Casing YES ✓ NO ____
Locking Cap YES ✓ NO ____
Protective Post/Abutment YES ____ NO ✓
Well Integrity Satisfactory YES ✓ NO ____
Yield LOW ____ MODERATE ____ HIGH X
Comments/Observations
Sample Time: 1150
Sample Analytes: MNA
Hack Fe Kit: NA mg/L

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.
Volume (in gallons) = $\pi r^2 h$ (7.48), where r is the radius (ft) and h is the height (ft).

## FIELD ANALYSES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | ~~Initial~~ 1.0 | 1.35 | 1.70 | 2.05 | 2.40 | 2.75 | | | | | |
| TIME (Military) | 1121 | 1126 | 1131 | 1136 | 1141 | 1146 | | | | | |
| Water Level (ft BTOC) | 14.90 | 14.90 | 14.90 | 14.90 | 14.90 | 14.90 | | | | | |
| pH (S.U.) | 7.51 | 7.49 | 7.52 | 7.53 | 7.53 | 7.53 | | | | | |
| Sp. Cond. (mS/cm) | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | | | | | |
| Water Temp. (°C) | 30.47 | 30.55 | 30.36 | 30.41 | 30.24 | 30.26 | | | | | |
| Turbidity (NTUs) | 146.27 | 86.12 | 56.23 | 42.96 | 33.65 | 34.21 | | | | | |
| DO - (mg/L) | 1.92 | 1.93 | 1.92 | 1.91 | 1.91 | 1.91 | | | | | |
| Salinity (ppt) | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | | | | | |
| ORP (mV) | 51.2 | 56.2 | 58.6 | 61.0 | 63.4 | 66.2 | | | | | |

COMMENTS/OBSERVATIONS Began purging at NA Purging rate: NA ml/min Breathing Zone: NA ppm
Well Head: NA ppm

Delavan - GW sample logs

AECOM

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page ____ of ____

Date (mo/day/yr) 11/2/23
Field Personnel Justin Butler
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-13D
____ Upgradient ____ Downgradient ____ Sidegradient ____ Source
Weather Conditions Clear
Air Temperature 50 ° F
Total Well Depth (TWD) = 50.00 1/100 ft
Depth to Ground Water (DGW) = 13.14 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 36.86 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 5.90 gal
3 Casing Volumes = 17.7 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection Peristaltic Pump ~~Reverse Flow for VOC'S~~
Total Volume of Water Removed 3.0 gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation 146.23 1/100 ft
Height of Riser (above land surface) -0.18 1/100 ft
Land Surface Elevation 146.41 1/100 ft
Screened Interval 40 - 50 1/100 ft
Dedicated Pump or Bailer YES ____ NO ✓ Type ____
Steel Guard Pipe Around Casing YES ✓ NO ____
Locking Cap YES ✓ NO ____
Protective Post/Abutment YES ____ NO ✓
Well Integrity Satisfactory YES ✓ NO ____
Yield LOW ____ MODERATE ____ HIGH X
Comments/Observations
Sample Time: 0820
Sample Analytes: MNA
Hack Fe Kit: NA mg/L

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.

Volume (in gallons) = $\pi r^2 h$ (7.48), where r is the radius (ft) and h is the height (ft).

FIELD ANALYSES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | 1.0 | 1.4 | 1.8 | 2.2 | 2.6 | 3.0 | | | | | |
| TIME (Military) | 0751 | 0756 | 0801 | 0806 | 0811 | 0816 | | | | | |
| Water Level (ft BTOC) | 13.15 | 13.15 | 13.15 | 13.15 | 13.15 | 13.15 | | | | | |
| pH (S.U.) | 7.84 | 7.76 | 7.74 | 7.72 | 7.71 | 7.70 | | | | | |
| Sp. Cond. (mS/cm) | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | | | | | |
| Water Temp. (°C) | 26.22 | 26.37 | 26.44 | 26.45 | ~~25.64~~ 26.40 | 26.35 | | | | | |
| Turbidity (NTUs) | 66.38 | 46.00 | 34.58 | 26.39 | 24.85 | 25.11 | | | | | |
| DO - (mg/L) | 3.42 | 3.42 | 3.41 | 3.42 | 3.41 | 3.40 | | | | | |
| Salinity (ppt) | 0.15 | 0.15 | 0.15 | 0.15 | 0.16 | 0.16 | | | | | |
| ORP (mV) | 96.6 | 97.3 | 97.7 | 97.9 | 97.9 | 98.3 | | | | | |

COMMENTS/OBSERVATIONS Began purging at NA Purging rate: NA ml/min Breathing Zone: NA ppm
Well Head: NA ppm

AECOM

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page ____ of ____

Date (mo/day/yr) 11/7/23
Field Personnel Justin Butler
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-14D
____ Upgradient ____ Downgradient ____ Sidegradient ____ Source
Weather Conditions Clear
Air Temperature 51 °F
Total Well Depth (TWD) = 50.00 1/100 ft
Depth to Ground Water (DGW) = 13.81 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 36.19 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 5.90 gal
3 Casing Volumes = 17.7 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection Peristaltic Pump ~~Reverse Flow for VOC'S~~
Total Volume of Water Removed 2.75 gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation 146.88 1/100 ft
Height of Riser (above land surface) -0.23 1/100 ft
Land Surface Elevation 147.11 1/100 ft
Screened Interval 40 - 50 1/100 ft
Dedicated Pump or Bailer YES ____ NO ✓ Type ____
Steel Guard Pipe Around Casing YES ✓ NO ____
Locking Cap YES ✓ NO ____
Protective Post/Abutment YES ____ NO ✓
Well Integrity Satisfactory YES ✓ NO ____
Yield LOW ____ MODERATE ____ HIGH X
Comments/Observations
Sample Time: 0930
Sample Analytes: MNA
Hack Fe Kit: NA mg/L

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.

Volume (in gallons) = $\pi r^2 h (7.48)$, where r is the radius (ft) and h is the height (ft).

## FIELD ANALYSES

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | ~~Initial~~ 1.0 | 1.35 | 1.70 | 2.05 | 2.40 | 2.75 | | | | |
| TIME (Military) | 0904 | 0909 | 0914 | 0919 | 0924 | 0929 | | | | |
| Water Level (ft BTOC) | 13.84 | 13.84 | 13.84 | 13.84 | 13.84 | 13.84 | | | | |
| pH (S.U.) | 7.60 | 7.60 | 7.59 | 7.59 | 7.58 | 7.58 | | | | |
| Sp. Cond. (mS/cm) | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | 0.31 | | | | |
| Water Temp. (°C) | 28.48 | 28.57 | 28.46 | 28.50 | 28.48 | 28.46 | | | | |
| Turbidity (NTUs) | 98.76 | 91.70 | 87.79 | 75.31 | 67.61 | 73.06 | | | | |
| DO - (mg/L) | 0.17 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | | | | |
| Salinity (ppt) | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | | | | |
| ORP (mV) | -59.1 | -58.6 | -57.5 | -54.9 | -51.1 | -46.9 | | | | |

COMMENTS/OBSERVATIONS Began purging at NA Purging rate: NA ml/min Breathing Zone: NA ppm
Well Head: NA ppm

AECOM

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page ____ of ____

Date (mo/day/yr) 11/7/23
Field Personnel Joshn Butler
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-21D
____ Upgradient ____ Downgradient ____ Sidegradient ____ Source
Weather Conditions Clear
Air Temperature 58 °F
Total Well Depth (TWD) = 53.00 1/100 ft
Depth to Ground Water (DGW) = 13.68 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 39.32 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 6.41 gal
3 Casing Volumes = 19.23 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection Peristaltic Pump ~~Reverse Flow for VOC'S~~
Total Volume of Water Removed 1.80 gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation 146.92 1/100 ft
Height of Riser (above land surface) -0.31 1/100 ft
Land Surface Elevation 147.23 1/100 ft
Screened Interval 43 - 53 1/100 ft
Dedicated Pump or Bailer YES ____ NO ✓ Type ____
Steel Guard Pipe Around Casing YES ✓ NO ____
Locking Cap YES ✓ NO ____
Protective Post/Abutment YES ____ NO ✓
Well Integrity Satisfactory YES ✓ NO ____
Yield LOW ____ MODERATE ____ HIGH X
Comments/Observations
Sample Time: 1045
Sample Analytes: MNA
Hack Fe Kit: NA mg/L

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.
Volume (in gallons) = π $r^2$ h (7.48), where r is the radius (ft) and h is the height (ft).

## FIELD ANALYSES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | ~~Initial~~ 0.05 | 0.60 | 0.95 | 1.20 | 1.55 | 1.90 | | | | | |
| TIME (Military) | 1017 | 1022 | 1027 | 1032 | 1037 | 1042 | | | | | |
| Water Level (ft BTOC) | 13.71 | 13.71 | 13.71 | 13.71 | 13.71 | 13.71 | | | | | |
| pH (S.U.) | 7.74 | 7.67 | 7.62 | 7.61 | 7.58 | 7.60 | | | | | |
| Sp. Cond. (mS/cm) | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | | | | | |
| Water Temp. (°C) | 29.54 | 29.56 | 29.50 | 29.57 | 29.59 | 29.59 | | | | | |
| Turbidity (NTUs) | 62.20 | 38.67 | 30.60 | 36.76 | 36.96 | 37.48 | | | | | |
| DO - (mg/L) | 0.27 | 0.21 | 0.18 | 0.18 | 0.16 | 0.17 | | | | | |
| Salinity (ppt) | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | | | | | |
| ORP (mV) | -71.5 | -86.1 | -87.9 | -90.8 | -92.8 | -93.5 | | | | | |

COMMENTS/OBSERVATIONS Began purging at NA Purging rate: NA ml/min Breathing Zone: NA ppm
Well Head: NA ppm

AECOM

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page 1 of 1

Date (mo/day/yr) 11/7/23
Field Personnel G. Collins
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-22D
____ Upgradient X Downgradient ____ Sidegradient ____ Source
Weather Conditions Clear
Air Temperature 79 °F
Total Well Depth (TWD) = 48.00 1/100 ft
Depth to Ground Water (DGW) = 13.01 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 34.99 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 5.70 gal
3 Casing Volumes = 17.11 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection ~~Peristaltic Pump Reverse Flow for VOC'S~~
Total Volume of Water Removed gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation 145.96 1/100 ft
Height of Riser (above land surface) -0.1 1/100 ft
Land Surface Elevation 146.06 1/100 ft
Screened Interval 38 - 48 1/100 ft
Dedicated Pump or Bailer YES ____ NO X Type ____
Steel Guard Pipe Around Casing YES X NO ____
Locking Cap YES X NO ____
Protective Post/Abutment YES X NO ____
Well Integrity Satisfactory YES X NO ____
Yield LOW ____ MODERATE ____ HIGH X
Comments/Observations
Sample Time: 1505
Sample Analytes: MNA
Hack Fe Kit: mg/L

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.
Volume (in gallons) = $\pi r^2 h$ (7.48), where r is the radius (ft) and h is the height (ft).

## FIELD ANALYSES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | Initial | 0.5 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 |
| TIME (Military) | 1410 | 1415 | 1420 | 1425 | 1430 | 1435 | 1440 | 1445 | 1450 | 1455 | 1500 |
| Water Level (ft BTOC) | 13.03 | 13.03 | 13.03 | 13.03 | 13.03 | 13.03 | 13.03 | 13.03 | 13.03 | 13.03 | 13.03 |
| pH (S.U.) | 7.63 | 7.68 | 7.71 | 7.71 | 7.75 | 7.76 | 7.74 | 7.72 | 7.62 | 7.61 | 7.60 |
| Sp. Cond. (mS/cm) | 0.27 | 0.27 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 | 0.29 | 0.29 | 0.29 |
| Water Temp. (°C) | 23.53 | 23.21 | 23.11 | 22.98 | 23.26 | 23.14 | 23.20 | 23.09 | 23.64 | 23.53 | 23.60 |
| Turbidity (NTUs) | 24.65 | 95.80 | 181.76 | 179.6 | 148.55 | 130.75 | 132.25 | 130.20 | 7.84 | 6.63 | 0.96 |
| DO - (mg/L) | 2.98 | 2.71 | 2.63 | 2.62 | 2.57 | 2.56 | 2.61 | 2.74 | 3.21 | 3.10 | 3.06 |
| Salinity (ppt) | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.14 | 0.14 | 0.14 | 0.14 |
| ORP (mV) | 133.5 | 129.1 | 125.3 | 124.2 | 120.5 | 118.8 | 118.5 | 118.9 | 128.8 | 125.9 | 125.0 |

COMMENTS/OBSERVATIONS Began purging at 1405 Purging rate: 200 ml/min Breathing Zone: ppm
Well Head: ppm
Clear flow cell @ 1445 (purge water appeared clear) sediment trapped in flow cell.

**AECOM**

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page 1 of 1

Date (mo/day/yr) 11/7/2023
Field Personnel G. Collins
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-25D
______ Upgradient X Downgradient ______ Sidegradient ______ Source
Weather Conditions Clear
Air Temperature 73 °F
Total Well Depth (TWD) = 50.00 1/100 ft
Depth to Ground Water (DGW) = 6.39 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 43.61 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 7.10 gal
3 Casing Volumes = 21.3 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection ~~Peristaltic Pump Reverse Flow for VOC'S~~
Total Volume of Water Removed 1.25 gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation ______ 1/100 ft
Height of Riser (above land surface) ______ 1/100 ft
Land Surface Elevation ______ 1/100 ft
Screened Interval 40 - 50 1/100 ft
Dedicated Pump or Bailer YES ______ NO X Type ______
Steel Guard Pipe Around Casing YES X NO ______
Locking Cap YES X NO ______
Protective Post/Abutment YES X NO ______
Well Integrity Satisfactory YES X NO ______
Yield LOW ______ MODERATE ______ HIGH X
Comments/Observations
Sample Time: 1150
Sample Analytes: MNA PARMETERS
~~Hack Fe Kit: mg/L~~

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.
Volume (in gallons) = $\pi r^2 h$ (7.48), where r is the radius (ft) and h is the height (ft).

## FIELD ANALYSES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | Initial | 0.5 | 0.75 | 1.00 | 1.25 | | | | | | |
| TIME (Military) | 1125 | 1130 | 1135 | 1140 | 1145 | | | | | | |
| Water Level (ft BTOC) | 6.44 | 6.44 | 6.44 | 6.44 | 6.44 | | | | | | |
| pH (S.U.) | 6.94 | 6.91 | 6.91 | 6.92 | 6.96 | | | | | | |
| Sp. Cond. (mS/cm) | 0.28 | 0.28 | 0.28 | 0.28 | 0.29 | | | | | | |
| Water Temp. (°C) | 22.51 | 22.76 | 22.76 | 22.70 | 22.72 | | | | | | |
| Turbidity (NTUs) | 3.76 | 2.86 | 2.24 | 2.13 | 1.89 | | | | | | |
| DO - (mg/L) | 0.55 | 0.49 | 0.43 | 0.45 | 0.48 | | | | | | |
| Salinity (ppt) | 0.13 | 0.13 | 0.13 | 0.13 | 0.14 | | | | | | |
| ORP (mV) | 126.8 | 124.7 | 123.5 | 122.0 | 119.1 | | | | | | |

COMMENTS/OBSERVATIONS Began purging at 1120 Purging rate: 200 ml/min Breathing Zone: ppm
Well Head: ppm

AECOM

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page 1 of 1

Date (mo/day/yr) 11/7/2023
Field Personnel G. Collins
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-26D
____ Upgradient X Downgradient ____ Sidegradient ____ Source
Weather Conditions Clear
Air Temperature 77 °F
Total Well Depth (TWD) = 50.00 1/100 ft
Depth to Ground Water (DGW) = 10.26 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 39.74 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 6.48 gal
3 Casing Volumes = 19.4 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection ~~Peristaltic Pump Reverse Flow for VOC's~~
Total Volume of Water Removed ____ gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation ____ 1/100 ft
Height of Riser (above land surface) ____ 1/100 ft
Land Surface Elevation ____ 1/100 ft
Screened Interval 40 - 50 1/100 ft
Dedicated Pump or Bailer YES ____ NO X Type ____
Steel Guard Pipe Around Casing YES X NO ____
Locking Cap YES X NO ____
Protective Post/Abutment YES X NO ____
Well Integrity Satisfactory YES X NO ____
Yield LOW ____ MODERATE ____ HIGH X
Comments/Observations
Sample Time: 1325
Sample Analytes: MNA
Hack Fe ~~Kit~~ ____ mg/L

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.
Volume (in gallons) = π $r^2$ h (7.48), where r is the radius (ft) and h is the height (ft).

## FIELD ANALYSES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | Initial | 0.5 | 0.75 | 1.00 | 1.25 | 1.50 | | | | | |
| TIME (Military) | 1255 | 1300 | 1305 | 1310 | 1315 | 1320 | | | | | |
| Water Level (ft BTOC) | 10.96 | 10.98 | 10.98 | 10.98 | 10.98 | 10.98 | | | | | |
| pH (S.U.) | 7.12 | 7.16 | 7.20 | 7.30 | 7.36 | 7.39 | | | | | |
| Sp. Cond. (mS/cm) | 0.29 | 0.29 | 0.30 | 0.30 | 0.30 | 0.30 | | | | | |
| Water Temp. (°C) | 24.02 | 24.29 | 23.83 | 23.85 | 24.02 | 23.88 | | | | | |
| Turbidity (NTUs) | 30.43 | 31.27 | 29.77 | 28.56 | 29.72 | 31.64 | | | | | |
| DO - (mg/L) | 3.62 | 3.54 | 3.01 | 2.57 | 2.34 | 2.33 | | | | | |
| Salinity (ppt) | 0.14 | 0.14 | 0.14 | 0.15 | 0.14 | 0.14 | | | | | |
| ORP (mV) | 141.0 | 162.0 | 154.9 | 149.4 | 139.9 | 139.0 | | | | | |

COMMENTS/OBSERVATIONS Began purging at 1250 Purging rate: 200 ml/min Breathing Zone: ____ ppm
Well Head: ____ ppm

AECOM

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page 1 of 1

Date (mo/day/yr) 11/7/2023
Field Personnel G. Collins
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-30D
_____ Upgradient X Downgradient _____ Sidegradient _____ Source
Weather Conditions Clear
Air Temperature 49 °F
Total Well Depth (TWD) = 60 1/100 ft
Depth to Ground Water (DGW) = 5.22 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 54.78 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 8.93 gal
3 Casing Volumes = 26.8 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection Peristaltic Pump Reverse Flow for VOC'S
Total Volume of Water Removed 1.25 gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation _____ 1/100 ft
Height of Riser (above land surface) _____ 1/100 ft
Land Surface Elevation _____ 1/100 ft
Screened Interval 50 - 60 1/100 ft
Dedicated Pump or Bailer YES _____ NO X Type _____
Steel Guard Pipe Around Casing YES X NO _____
Locking Cap YES X NO _____
Protective Post/Abutment YES X NO ~~X~~
Well Integrity Satisfactory YES X NO _____
Yield LOW _____ MODERATE _____ HIGH X
Comments/Observations
Sample Time: 0815
Sample Analytes: MNA(Chloride, Nitrate, Sulfate, Sulfide, MEE, Ferrous Iron, Ferric iron, manganese Acetylene
Hack Fe Kit: ~~0 mg/L~~

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.
Volume (in gallons) = $\pi r^2 h (7.48)$, where r is the radius (ft) and h is the height (ft).

## FIELD ANALYSES

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | Initial | 0.25 | 0.50 | 0.75 | 1.00 | 1.25 | | | | |
| TIME (Military) | 0745 | 0750 | 0755 | 0800 | 0865 | 0810 | | | | |
| Water Level (ft BTOC) | 5.24 | 5.25 | 5.25 | 5.25 | 5.25 | 5.25 | | | | |
| pH (S.U.) | 7.54 | 7.58 | 7.61 | 7.62 | 7.63 | 7.63 | | | | |
| Sp. Cond. (mS/cm) | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 | | | | |
| Water Temp. (°C) | 16.84 | 17.27 | 17.52 | 17.50 | 17.48 | 17.72 | | | | |
| Turbidity (NTUs) | 5.81 | 3.36 | 1.24 | 0.76 | 0.38 | 0.29 | | | | |
| DO - (mg/L) | 3.83 | 3.80 | 3.76 | 3.73 | 3.75 | 3.74 | | | | |
| Salinity (ppt) | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | | | | |
| ORP (mV) | 89.2 | 90.5 | 93.6 | 95.2 | 97.0 | 97.7 | | | | |

COMMENTS/OBSERVATIONS Began purging at 0740 Purging rate: 200 ml/min Breathing Zone: 0 ppm
~~Well Head:~~ ppm

**AECOM**

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page 1 of 1

Date (mo/day/yr) 11/7/2023
Field Personnel G. Collins
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-31D
____ Upgradient X Downgradient ____ Sidegradient ____ Source
Weather Conditions Clear
Air Temperature 58 °F
Total Well Depth (TWD) = 60 1/100 ft
Depth to Ground Water (DGW) = 9.42 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 50.58 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 8.24 gal
3 Casing Volumes = 24.7 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection Peristaltic Pump Reverse Flow for VOC'S
Total Volume of Water Removed 1.25 gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation ____ 1/100 ft
Height of Riser (above land surface) ____ 1/100 ft
Land Surface Elevation ____ 1/100 ft
Screened Interval 50 - 60 1/100 ft
Dedicated Pump or Bailer YES ____ NO X Type ____
Steel Guard Pipe Around Casing YES X NO ____
Locking Cap YES X NO ____
Protective Post/Abutment YES X NO ____
Well Integrity Satisfactory YES X NO ____
Yield LOW ____ MODERATE ____ HIGH X
Comments/Observations
Sample Time: 0925
Sample Analytes: MNA PARAMETERS
~~Hack Fe Kit~~ mg/L

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.
Volume (in gallons) = π $r^2$ h (7.48), where r is the radius (ft) and h is the height (ft).

## FIELD ANALYSES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | Initial | 0.5 | 0.75 | 1.00 | 1.25 | | | | | | |
| TIME (Military) | 0900 | 0905 | 0910 | 0915 | 0920 | | | | | | |
| Water Level (ft BTOC) | 9.46 | 9.47 | 9.48 | 9.48 | 9.48 | | | | | | |
| pH (S.U.) | 7.65 | 7.65 | 7.64 | 7.64 | 7.64 | | | | | | |
| Sp. Cond. (mS/cm) | 0.29 | 0.29 | 0.29 | 0.28 | 0.28 | | | | | | |
| Water Temp. (°C) | 18.79 | 19.07 | 19.14 | 19.33 | 19.45 | | | | | | |
| Turbidity (NTUs) | 1.93 | 1.47 | 1.12 | 1.03 | 0.96 | | | | | | |
| DO - (mg/L) | 3.94 | 3.83 | 3.78 | 3.68 | 3.66 | | | | | | |
| Salinity (ppt) | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | | | | | | |
| ORP (mV) | 100.4 | 101.3 | 102.0 | 102.9 | 103.3 | | | | | | |

COMMENTS/OBSERVATIONS Began purging at 0855 Purging rate: 200 ml/min ~~Breathing Zone: ppm~~
~~Well Head: ppm~~

AECOM

# FIELD DATA LOG FOR GROUNDWATER SAMPLING

Page 1 of 1

Date (mo/day/yr) 11/7/2023
Field Personnel C. Collins
Site Name Delavan Spray Technologies Site
AECOM Job # 60656814
Sample ID* MW-32DR
___ Upgradient X Downgradient ___ Sidegradient ___ Source
Weather Conditions Clear
Air Temperature 67 °F
Total Well Depth (TWD) = 60 1/100 ft
Depth to Ground Water (DGW) = 7.41 1/100 ft
Length of Water Column (LWC) = TWD - DGW = 52.59 1/100 ft
1 Casing Volume (OCV)* = LWC x 0.163 = 8.57 gal
3 Casing Volumes = 25.7 gal = Standard Evacuation Volume
Method of Sample Evacuation Purge with Peristaltic Pump
Method of Sample Collection Peristaltic Pump Reverse Flow for VOC'S
Total Volume of Water Removed ___ gal

Casing Diameter 2.0 inches
Casing Material PVC
Measuring Point Elevation ___ 1/100 ft
Height of Riser (above land surface) ___ 1/100 ft
Land Surface Elevation ___ 1/100 ft
Screened Interval 50 - 60 1/100 ft
Dedicated Pump or Bailer YES ___ NO X Type ___
Steel Guard Pipe Around Casing YES X NO ___
Locking Cap YES X NO ___
Protective Post/Abutment YES X NO ___
Well Integrity Satisfactory YES X NO ___
Yield LOW ___ MODERATE ___ HIGH X
Comments/Observations
Sample Time: 1040
Sample Analytes: MNA PARAMETERS
Hack Fe Kit ___ mg/L

* - One casing volume (gallons) for a 0.5 inch well is 0.0102XLWC; for a 2 inch well is 0.163 X LWC; for a 4 inch well is 0.652 X LWC and for a 6 inch well is 1.468 X LWC.
Volume (in gallons) = π $r^2$ h (7.48), where r is the radius (ft) and h is the height (ft).

## FIELD ANALYSES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VOLUME PURGED (gallons) | Initial | 0.50 | 0.75 | 1.00 | 1.25 | | | | | | |
| TIME (Military) | 1015 | 1020 | 1025 | 1030 | 1035 | | | | | | |
| Water Level (ft BTOC) | 7.46 | 7.46 | 7.46 | 7.46 | 7.46 | | | | | | |
| pH (S.U.) | 7.47 | 7.41 | 7.48 | 7.50 | 7.51 | | | | | | |
| Sp. Cond. (mS/cm) | 0.26 | 0.30 | 0.31 | 0.31 | 0.31 | | | | | | |
| Water Temp. (°C) | 20.14 | 20.31 | 20.52 | 20.56 | 20.69 | | | | | | |
| Turbidity (NTUs) | 4.66 | 4.68 | 4.21 | 3.43 | 2.89 | | | | | | |
| DO - (mg/L) | 3.06 | 1.40 | 1.81 | 1.83 | 1.81 | | | | | | |
| Salinity (ppt) | 0.13 | 0.14 | 0.15 | 0.15 | 0.15 | | | | | | |
| ORP (mV) | 114.6 | 110.1 | 107.3 | 106.3 | 105.1 | | | | | | |

COMMENTS/OBSERVATIONS Began purging at 1010 Purging rate: 200 ml/min Breathing Zone: ___ ppm
Well Head: ___ ppm

*Delavan - GW sample logs*

# FIELD DATA LOG FOR SURFACE WATER/SEDIMENT SAMPLING

Page 1 of 1

Date (yr/mo/day) 2023-12-13

Field Personnel Griffin Collins / Randy Morgan

Site Name RTX Delavan Bamberg SC

AECOM Job No.

Sample Station ID SW-04-TLC

Surface Water X Sediment

Weather Conditions

Air Temperature (°C)

| | *Surface Water* | | *Sediment* |
|---|---|---|---|
| Bailer | | Stainless-Steel Scoop | |
| Bottle | X | Stainless-Steel Scoop | |
| Other (Specify) | | Other (Specify) | |

Sample Container

| | Surface Water | Preservative (Y/N, Type) | Sediment |
|---|---|---|---|
| VOCs | X | | |
| SVOCs | | | |
| Pest/PCBs | | | |
| Metals | | | |
| TPH | | | |
| Other (cyanide) | | | |

(PPT) - Parts Per Thousand
(NTU) - Nephelometric Turbidity Units
(MV) - Millivolts
(umhos/cm) - Micro mhos Per Centimeter

**Field Analysis**

| | *Surface Water* | *Sediment* |
|---|---|---|
| Time (Military) | 1305 | |
| pH (S.U.) | 6.11 | |
| ORP (mV) | 139.7 | |
| Specific Conductivity (mS/cm) | 59.5 | |
| Water temperature (°C) | 9.7 | |
| Dissolved Oxygen (mg/L) | 4.97 | |
| Turbidity (NTU) | 5.66 | |
| Salinity (PPT) | 0.03 | |
| Ferrous Iron | | |

*(1) Clear (2) Slight (3) Moderate (4) High

Comments/Observations:

# FIELD DATA LOG FOR SURFACE WATER/SEDIMENT SAMPLING

Page 1 of 1

Date (yr/mo/day) 2023-12-13

Field Personnel Griffin Collins / Randy Morgan

Site Name RTX Delavan Bamberg SC

AECOM Job No.

Sample Station ID SW-12-TLC

Surface Water X Sediment

Weather Conditions

Air Temperature (°C)

| | *Surface Water* | | *Sediment* | |
|---|---|---|---|---|
| Bailer | | Stainless-Steel Scoop | | |
| Bottle | X | Stainless-Steel Scoop | | |
| Other (Specify) | | Other (Specify) | | |

Sample Container

| | Surface Water | Preservative (Y/N, Type) | Sediment |
|---|---|---|---|
| VOCs | X | | |
| SVOCs | | | |
| Pest/PCBs | | | |
| Metals | | | |
| TPH | | | |
| Other (cyanide) | | | |

(PPT) - Parts Per Thousand
(NTU) - Nephelometric Turbidity Units
(MV) - Millivolts
(umhos/cm) - Micro mhos Per Centimeter

**Field Analysis**

| | *Surface Water* | *Sediment* |
|---|---|---|
| Time (Military) | 1330 | |
| pH (S.U.) | 6.16 | |
| ORP (mV) | 109.8 | |
| Specific Conductivity (mS/cm) | 50.7 | |
| Water temperature (°C) | 8.7 | |
| Dissolved Oxygen (mg/L) | 5.27 | |
| Turbidity (NTU) | 6.32 | |
| Salinity (PPT) | 0.02 | |
| Ferrous Iron | | |

*(1) Clear (2) Slight (3) Moderate (4) High

Comments/Observations:

# FIELD DATA LOG FOR SURFACE WATER/SEDIMENT SAMPLING

Page 1 of 1

Date (yr/mo/day) 2023-12-13

Field Personnel Griffin Collins / Randy Morgan

Site Name RTX Delavan Bamberg SC

AECOM Job No.

Sample Station ID SW-09-LC

Surface Water X Sediment

Weather Conditions

Air Temperature (°C)

| | *Surface Water* | | *Sediment* |
|---|---|---|---|
| Bailer | | Stainless-Steel Scoop | |
| Bottle | X | Stainless-Steel Scoop | |
| Other (Specify) | | Other (Specify) | |

Sample Container

| | Surface Water | Preservative (Y/N, Type) | Sediment |
|---|---|---|---|
| VOCs | X | | |
| SVOCs | | | |
| Pest/PCBs | | | |
| Metals | | | |
| TPH | | | |
| Other (cyanide) | | | |

(PPT) - Parts Per Thousand
(NTU) - Nephelometric Turbidity Units
(MV) - Millivolts
(umhos/cm) - Micro mhos Per Centimeter

**Field Analysis**

| | *Surface Water* | *Sediment* |
|---|---|---|
| Time (Military) | ~~[illegible]~~ 1155 | |
| pH (S.U.) | 7.40 | |
| ORP (mV) | 168.8 | |
| Specific Conductivity (mS/cm) | 217.5 | |
| Water temperature (°C) | 5.0 | |
| Dissolved Oxygen (mg/L) | 9.53 | |
| Turbidity (NTU) | 5.84 | |
| Salinity (PPT) | 0.10 | |
| Ferrous Iron | | |

*(1) Clear (2) Slight (3) Moderate (4) High

Comments/Observations:

# FIELD DATA LOG FOR SURFACE WATER/SEDIMENT SAMPLING

Page 1 of 1

Date (yr/mo/day) 2023-12-13

Field Personnel Griffin Collins / Randy Morgan

Site Name RTX Delavan Bamberg SC

AECOM Job No.

Sample Station ID SW-10 HMB

Surface Water X Sediment

Weather Conditions

Air Temperature (°C)

| | *Surface Water* | | *Sediment* | |
|---|---|---|---|---|
| Bailer | | Stainless-Steel Scoop | | |
| Bottle | X | Stainless-Steel Scoop | | |
| Other (Specify) | | Other (Specify) | | |

Sample Container

| | Surface Water | Preservative (Y/N, Type) | Sediment |
|---|---|---|---|
| VOCs | X | | |
| SVOCs | | | |
| Pest/PCBs | | | |
| Metals | | | |
| TPH | | | |
| Other (cyanide) | | | |

(PPT) - Parts Per Thousand
(NTU) - Nephelometric Turbidity Units
(MV) - Millivolts
(umhos/cm) - Micro mhos Per Centimeter

**Field Analysis**

| | *Surface Water* | *Sediment* |
|---|---|---|
| Time (Military) | 1500 | |
| pH (S.U.) | 6.79 | |
| ORP (mV) | 640 | |
| Specific Conductivity (mS/cm) | 277.3 | |
| Water temperature (°C) | 10.9 | |
| Dissolved Oxygen (mg/L) | 6.42 | |
| Turbidity (NTU) | 6.05 | |
| Salinity (PPT) | 0.13 | |
| Ferrous Iron | | |

*(1) Clear (2) Slight (3) Moderate (4) High

Comments/Observations:

# Appendix B

## Analytical Data

Laboratory Reports – Microbial Insights

Laboratory Reports – Redox Tech

Laboratory Reports – SGS

Laboratory Reports - CSIA

Data Assessment Reports
Definitions of Data Qualifiers Summary

microbialinsights

10515 Research Drive
Knoxville, TN 37932
Phone: 865.573.8188
Fax: 865.573.8133
Web: www.microbe.com

# SITE LOGIC Report

*Abiotic Potential*

**Contact:** Conan Fitzgerald

**Phone:** 919-461-1100

**Address:**
AECOM
5438 Wade Park Blvd
Suite 200
Raleigh, NC 27607

**Email:** conan.fitzgerald@aecom.com

**MI Identifier:** **032VD**

**Report Date:** April 16, 2024

**Project Name:** RTX Delavon, 60707644.5B

**Comments:** This report has been revised to change the names of samples 1 and 2 to SB.

# Overview

Although not always fully considered, abiotic degradation can be a substantial or even the primary process for chlorinated hydrocarbon destruction at sites undergoing or transitioning to monitored natural attenuation (MNA). A variety of iron-bearing minerals including iron sulfides (mackinawite and pyrite), iron oxides (magnetite), green rust, and iron-bearing clays are capable of complete or nearly complete degradation of PCE, TCE, and carbon tetrachloride (He et al. 2009). Some iron-bearing minerals also catalyze the degradation of chlorinated ethanes and the lesser chlorinated ethenes cis-dichloroethene (DCE) and vinyl chloride. While the quantities and types will vary, these reactive iron minerals are frequently identified in subsurface environments under iron reducing and sulfate reducing conditions.

Brown et al. (2007) recommend four avenues for evaluating the role of abiotic processes in contaminant attenuation. First, examining contaminant concentrations along the flow path - decreasing parent compound concentrations with no evidence of accumulation of chlorinated transformation products like cis-DCE and vinyl chloride suggest abiotic degradation. Performing compound specific isotope analysis (CSIA) or monitoring for products unique to abiotic reactions such as acetylene can also provide a strong line of evidence. Microcosm studies with native sediment and killed controls can also be performed. Finally, Brown et al. (2007) suggest performing mineralogical analyses on aquifer sediment to characterize reactive minerals such as magnetite or iron monosulfides.

**Magnetic Susceptibility – Magnetite**

Magnetite ($Fe_3O_4$) is a mixed valence iron mineral shown to react with PCE, TCE, and carbon tetrachloride. Furthermore, Ferrey et al. (2004) conclusively linked the observed degradation of cis-DCE at a former ammunition plant to magnetite in the subsurface. No direct chemical test is available for quantification of magnetite. However, magnetite is the most abundant mineral in natural sediments that exhibits magnetic behavior. Therefore, magnetic susceptibility provides an inexpensive and valuable estimate of the quantity of magnetite in environmental samples.

**X-ray Diffraction (XRD) – Mackinawite, Pyrite, Magnetite and Green Rust**

XRD is one of the primary techniques used to identify unknown crystalline materials. Most minerals are crystalline and will scatter X-rays in a regular, characteristic manner dependent on their crystal structure.

- Mackinawite is the most reactive of the iron-bearing minerals and a crystalline form (tetragonal FeS) can be detected by XRD. Mackinawite will transform PCE and TCE primarily by elimination to acetylene. Carbon tetrachloride is transformed mainly to chloroform but carbon dioxide, formate, and carbon disulfide have also been detected. Finally, the more heavily chlorinated ethanes including hexachloroethane, pentachloroethane, and tetrachloroethanes react to form chlorinated ethenes which can be further degraded.
- Pyrite ($FeS_2$) catalyzes beta elimination transforming PCE, TCE, and cis-DCE to acetylene and ethene. Vinyl chloride is transformed to ethene and ethane. Pyrite is also capable of degradation of carbon tetrachloride potentially forming a number of products including chloroform, carbon dioxide, carbon disulfide, and formate depending on reaction conditions.
- While not quantitative like the magnetic susceptibility test, XRD can also detect magnetite when present at between 2% and 5% on a weight basis.
- Green rusts have been reported to transform a number of common chlorinated contaminants including cis-DCE, vinyl chloride, trichloroethanes, and tetrachloroethanes. While special sample care to prevent oxidation would be needed, XRD can be used to detect green rust.

**Percent Clay**

Clays have large surface areas, balanced by exchangeable cations, which can bind a large number of both organic and inorganic molecules impacting their availability and reactivity in the subsurface. While less well studied than the other iron-bearing minerals, various phyllosilicate clays have been shown to be capable of degradation of PCE, TCE, cis-DCE, vinyl chloride, and carbon tetrachloride.

# Results

**Table 1.** Summary of the magnetic susceptibility results for soil samples.

| Sample Name<br>Sample Type<br>Sample Date | SB-31D<br>Soil<br>4/11/2024 | SB-25D<br>Soil<br>4/11/2024 |
|---|---|---|
| **Magnetic Susceptibility Analysis** | | |
| Magnetic Susceptibility ($m^3/kg$) | ND | ND |

Legend: NA = Not analyzed NS = Not sampled J = Estimated result below PQL but above LQL I = Inhibited
ND= Result not detected

* Analysis performed in triplicate and results reported as the mean followed by +/- standard deviation

# References

Brown, R. A., J. T. Wilson and M. Ferrey (2007). "Monitored natural attenuation forum: The case for abiotic MNA." Remediation Journal **17**(2): 127-137.

Ferrey, M. L., R. T. Wilkin, R. G. Ford and J. T. Wilson (2004). "Nonbiological Removal of cis-Dichloroethylene and 1,1-Dichloroethylene in Aquifer Sediment Containing Magnetite." Environmental Science & Technology **38**(6): 1746-1752.

He, Y., C. Su, J. T. Wilson, R. T. Wilkin, C. Adair, T. Lee, P. Bradley and M. Ferrey (2009). Identification and characterization of methods for reactive minerals respnsible for natural attenuation of chlorinated organic compounds in ground water, US EPA.

Liu, Y., S. A. Majetich, R. D. Tilton, D. S. Sholl and G. V. Lowry (2005). "TCE Dechlorination Rates, Pathways, and Efficiency of Nanoscale Iron Particles with Different Properties." Environmental Science & Technology **39**(5): 1338-1345.

Song, H. and E. R. Carraway (2005). "Reduction of Chlorinated Ethanes by Nanosized Zero-Valent Iron: Kinetics, Pathways, and Effects of Reaction Conditions." Environmental Science & Technology **39**(16): 6237-6245.

**Abiotic Reactions of Chlorinated Compounds with Iron Bearing Minerals and Zero Valent Iron (ZVI).** Summaries for iron bearing minerals are based on He et al. (2009) and references therein. He et al. available at http://nepis.epa.gov/. Summary of ZVI based on Liu et al. (2005) and Song et al. (2005).

| Contaminant | Mineral | Degradation | Reported Degradation Intermediates and Products[1] |
|---|---|---|---|
| PCE | FeS | Yes | Acetylene, TCE, cis-DCE, 1,1-DCE, ethene |
| | Pyrite | Yes | TCE, acetylene, ethene |
| | Magnetite | Yes | Unknown[2] |
| | [3]GR(SO$_4$) | Reports Differ | |
| | phyllosilicate | Yes | TCE, 1,1-DCE, vinyl chloride, 1,1,2-TCA, 1,1-DCA, chloroacetylene, acetylene, ethene, ethane |
| | ZVI | Yes | Ethene and ethane |
| TCE | FeS | Yes | Acetylene, cis-DCE, vinyl chloride, 1,1-DCE |
| | Pyrite | Yes | Acetylene, ethene, cis-DCE, (organic acids with DO present) |
| | Magnetite | Yes | Unknown[1] |
| | GR(SO$_4$), | No | Only observed degradation when Cu(II) added |
| | phyllosilicate | Yes | cDCE, vinyl chloride, acetylene, ethene, ethane |
| | ZVI | Yes | Ethane, ethene, acetylene with minor amounts of DCE, VC depending on conditions |
| cis-DCE | FeS | No | None detected |
| | Pyrite | Yes | Acetylene, ethene |
| | Magnetite | Yes | Unknown[2] |
| | GR(SO$_4$) | Yes | |
| | phyllosilicate | Yes | |
| | ZVI | Yes | Primarily acetylene and ethene but also much lesser amounts of ethane and VC and traces of methane, propane, propene, butane and butene |
| Vinyl chloride | FeS | Unknown | |
| | Pyrite | Yes | Ethene, ethane |
| | Magnetite | Yes | Unknown[2] |
| | GR(SO$_4$) | Yes | |
| | phyllosilicate | Yes | |
| | ZVI | Yes | Ethene, ethane, (no evidence of acetylene) |

| Contaminant | Mineral | Degradation | Reported Degradation Intermediates and Products[1] |
|---|---|---|---|
| 1,1-DCA | FeS | Not Significant | None detected |
| 1,1-DCA | GR($SO_4$) | Low conversion | Ethene and ethane (w/ Cu or Ag) |
| 1,1-DCA | ZVI | Yes (low) | Ethane |
| 1,2-DCA | FeS | Not Significant | None detected |
| 1,2-DCA | FeS (Biogenic) | Yes | Not monitored |
| 1,2-DCA | GR($SO_4$) | No | |
| 1,2-DCA | ZVI | No | |
| 1,1,1-TCA | FeS | Yes | 1,1-DCA, ethene, 2-butyne |
| 1,1,1-TCA | GR($SO_4$) | Yes | 1,1-DCA, CA, ethene ethane |
| 1,1,1-TCA | ZVI | Yes | 1,1-DCA, ethane |
| 1,1,2-TCA | FeS | Rate not significant | Small amounts of 1,1-DCE and vinyl chloride but rate not significant |
| 1,1,2-TCA | GR($SO_4$) | Yes | Vinyl chloride, 1,1-DCE, ethene, ethane |
| 1,1,2-TCA | ZVI | Yes | Ethane |
| 1,1,1,2-TeCA | FeS | Yes | 1,1-DCE |
| 1,1,1,2-TeCA | GR($SO_4$) | Yes | 1,1-DCE and minor (<1%) vinyl chloride, ethene, ethane |
| 1,1,1,2-TeCA | phyllosilicate | Yes | 1,1-DCE |
| 1,1,1,2-TeCA | ZVI | Yes | TCE, 1,1-DCE |
| 1,1,2,2-TeCA | FeS | Yes | TCE, cis-DCE, trans-DCE, acetylene |
| 1,1,2,2-TeCA | GR($SO_4$) | Yes | TCE (major), cis-DCE, trans-DCE |
| 1,1,2,2-TeCA | phyllosilicate | Yes | TCE |
| 1,1,2,2-TeCA | ZVI | Yes | TCE, trans-DCE, cis-DCE |
| Carbon | FeS | Yes | Chloroform, carbon disulfide, possibly methane, ethene, ethane |
| CT | Pyrite | Yes | Chloroform , $CO_2$, carbon disulfide, formate (highly dependent on conditions) |
| CT | Magnetite | Yes | Chloroform , carbon monoxide, methane, formate (highly dependent on conditions) |
| CT | GR($SO_4$) | Yes | Chloroform and hexachloroethane; Chloroform, DCM, methane, ethene |
| CT | phyllosilicate | Yes | Chloroform |
| CT | ZVI | Yes | Chloroform, dichloromethane, methane (depending on conditions) |

**Notes:** GR($SO_4$) sulfate green rust. GR($CO_3$) carbonate green rust. ZVI zero valent iron

[1] Compilation of reported degradation products. Mass recovery of products typically low - additional undetected and unreported products are likely. Reported reaction products or proportions of reaction products were often a function of environmental conditions.

[2] No published studies that identify the transformation products of PCE, TCE, cis-DCE or vinyl chloride with magnetite. Ferrey et al (2004) analyzed for products of cis-DCE dechlorination including vinyl chloride, ethene, and ethane and did not find them. If $Fe^{2+}$ sorbed to magnetite stabilizes carbene ions, the ultimate degradation product of cis-DCE on magnetite would be $CO_2$.

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# SITE LOGIC Report

*Abiotic Potential*

**Contact:** Conan Fitzgerald

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**Address:**
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**Email:** conan.fitzgerald@aecom.com

**MI Identifier:** 032VD

**Report Date:** May 17, 2024

**Project Name:** RTX Delavon, 60707644.5B

**Comments:** This report has been revised to change the names of samples 1 and 2 to SB.

# Overview

Although not always fully considered, abiotic degradation can be a substantial or even the primary process for chlorinated hydrocarbon destruction at sites undergoing or transitioning to monitored natural attenuation (MNA). A variety of iron-bearing minerals including iron sulfides (mackinawite and pyrite), iron oxides (magnetite), green rust, and iron-bearing clays are capable of complete or nearly complete degradation of PCE, TCE, and carbon tetrachloride (He et al. 2009). Some iron-bearing minerals also catalyze the degradation of chlorinated ethanes and the lesser chlorinated ethenes cis-dichloroethene (DCE) and vinyl chloride. While the quantities and types will vary, these reactive iron minerals are frequently identified in subsurface environments under iron reducing and sulfate reducing conditions.

Brown et al. (2007) recommend four avenues for evaluating the role of abiotic processes in contaminant attenuation. First, examining contaminant concentrations along the flow path - decreasing parent compound concentrations with no evidence of accumulation of chlorinated transformation products like cis-DCE and vinyl chloride suggest abiotic degradation. Performing compound specific isotope analysis (CSIA) or monitoring for products unique to abiotic reactions such as acetylene can also provide a strong line of evidence. Microcosm studies with native sediment and killed controls can also be performed. Finally, Brown et al. (2007) suggest performing mineralogical analyses on aquifer sediment to characterize reactive minerals such as magnetite or iron monosulfides.

**Magnetic Susceptibility – Magnetite**

Magnetite ($Fe_3O_4$) is a mixed valence iron mineral shown to react with PCE, TCE, and carbon tetrachloride. Furthermore, Ferrey et al. (2004) conclusively linked the observed degradation of cis-DCE at a former ammunition plant to magnetite in the subsurface. No direct chemical test is available for quantification of magnetite. However, magnetite is the most abundant mineral in natural sediments that exhibits magnetic behavior. Therefore, magnetic susceptibility provides an inexpensive and valuable estimate of the quantity of magnetite in environmental samples.

**X-ray Diffraction (XRD) – Mackinawite, Pyrite, Magnetite and Green Rust**

XRD is one of the primary techniques used to identify unknown crystalline materials. Most minerals are crystalline and will scatter X-rays in a regular, characteristic manner dependent on their crystal structure.

- Mackinawite is the most reactive of the iron-bearing minerals and a crystalline form (tetragonal FeS) can be detected by XRD. Mackinawite will transform PCE and TCE primarily by elimination to acetylene. Carbon tetrachloride is transformed mainly to chloroform but carbon dioxide, formate, and carbon disulfide have also been detected. Finally, the more heavily chlorinated ethanes including hexachloroethane, pentachloroethane, and tetrachloroethanes react to form chlorinated ethenes which can be further degraded.
- Pyrite ($FeS_2$) catalyzes beta elimination transforming PCE, TCE, and cis-DCE to acetylene and ethene. Vinyl chloride is transformed to ethene and ethane. Pyrite is also capable of degradation of carbon tetrachloride potentially forming a number of products including chloroform, carbon dioxide, carbon disulfide, and formate depending on reaction conditions.
- While not quantitative like the magnetic susceptibility test, XRD can also detect magnetite when present at between 2% and 5% on a weight basis.
- Green rusts have been reported to transform a number of common chlorinated contaminants including cis-DCE, vinyl chloride, trichloroethanes, and tetrachloroethanes. While special sample care to prevent oxidation would be needed, XRD can be used to detect green rust.

**Percent Clay**

Clays have large surface areas, balanced by exchangeable cations, which can bind a large number of both organic and inorganic molecules impacting their availability and reactivity in the subsurface. While less well studied than the other iron-bearing minerals, various phyllosilicate clays have been shown to be capable of degradation of PCE, TCE, cis-DCE, vinyl chloride, and carbon tetrachloride.

# Results

**Table 1.** Summary of X-Ray Diffraction Results.

| | Sample ID<br>Sample Date<br>MI ID | SB-31D<br>4/11/2024<br>032VD-1 | SB-25D<br>4/11/2024<br>032VD-2 |
|---|---|---|---|
| **Mineral Constituent** | **Chemical Formula** | **Relative Abundance (%)** | |
| Quartz | $SiO_2$ | **2** | **19** |
| Calcite | $CaCO_3$ | **98** | **81** |
| | **Total** | **100** | **100** |

Legend: NA = Not analyzed NS = Not sampled J = Estimated result below PQL but above LQL I = Inhibited
ND= Result not detected

# References

Brown, R. A., J. T. Wilson and M. Ferrey (2007). "Monitored natural attenuation forum: The case for abiotic MNA." Remediation Journal **17**(2): 127-137.

Ferrey, M. L., R. T. Wilkin, R. G. Ford and J. T. Wilson (2004). "Nonbiological Removal of cis-Dichloroethylene and 1,1-Dichloroethylene in Aquifer Sediment Containing Magnetite." Environmental Science & Technology **38**(6): 1746-1752.

He, Y., C. Su, J. T. Wilson, R. T. Wilkin, C. Adair, T. Lee, P. Bradley and M. Ferrey (2009). Identification and characterization of methods for reactive minerals respnsible for natural attenuation of chlorinated organic compounds in ground water, US EPA.

Liu, Y., S. A. Majetich, R. D. Tilton, D. S. Sholl and G. V. Lowry (2005). "TCE Dechlorination Rates, Pathways, and Efficiency of Nanoscale Iron Particles with Different Properties." Environmental Science & Technology **39**(5): 1338-1345.

Song, H. and E. R. Carraway (2005). "Reduction of Chlorinated Ethanes by Nanosized Zero-Valent Iron: Kinetics, Pathways, and Effects of Reaction Conditions." Environmental Science & Technology **39**(16): 6237-6245.

**Abiotic Reactions of Chlorinated Compounds with Iron Bearing Minerals and Zero Valent Iron (ZVI).** Summaries for iron bearing minerals are based on He et al. (2009) and references therein. He et al. available at http://nepis.epa.gov/. Summary of ZVI based on Liu et al. (2005) and Song et al. (2005).

| Contaminant | Mineral | Degradation | Reported Degradation Intermediates and Products[1] |
|---|---|---|---|
| PCE | FeS | Yes | Acetylene, TCE, cis-DCE, 1,1-DCE, ethene |
| | Pyrite | Yes | TCE, acetylene, ethene |
| | Magnetite | Yes | Unknown[2] |
| | [3]GR(SO$_4$) | Reports Differ | |
| | phyllosilicate | Yes | TCE, 1,1-DCE, vinyl chloride, 1,1,2-TCA, 1,1-DCA, chloroacetylene, acetylene, ethene, ethane |
| | ZVI | Yes | Ethene and ethane |
| TCE | FeS | Yes | Acetylene, cis-DCE, vinyl chloride, 1,1-DCE |
| | Pyrite | Yes | Acetylene, ethene, cis-DCE, (organic acids with DO present) |
| | Magnetite | Yes | Unknown[1] |
| | GR(SO$_4$), | No | Only observed degradation when Cu(II) added |
| | phyllosilicate | Yes | cDCE, vinyl chloride, acetylene, ethene, ethane |
| | ZVI | Yes | Ethane, ethene, acetylene with minor amounts of DCE, VC depending on conditions |
| cis-DCE | FeS | No | None detected |
| | Pyrite | Yes | Acetylene, ethene |
| | Magnetite | Yes | Unknown[2] |
| | GR(SO$_4$) | Yes | |
| | phyllosilicate | Yes | |
| | ZVI | Yes | Primarily acetylene and ethene but also much lesser amounts of ethane and VC and traces of methane, propane, propene, butane and butene |
| Vinyl chloride | FeS | Unknown | |
| | Pyrite | Yes | Ethene, ethane |
| | Magnetite | Yes | Unknown[2] |
| | GR(SO$_4$) | Yes | |
| | phyllosilicate | Yes | |
| | ZVI | Yes | Ethene, ethane, (no evidence of acetylene) |

| Contaminant | Mineral | Degradation | Reported Degradation Intermediates and Products[1] |
|---|---|---|---|
| 1,1-DCA | FeS | Not Significant | None detected |
| 1,1-DCA | GR(SO$_4$) | Low conversion | Ethene and ethane (w/ Cu or Ag) |
| 1,1-DCA | ZVI | Yes (low) | Ethane |
| 1,2-DCA | FeS | Not Significant | None detected |
| 1,2-DCA | FeS (Biogenic) | Yes | Not monitored |
| 1,2-DCA | GR(SO$_4$) | No | |
| 1,2-DCA | ZVI | No | |
| 1,1,1-TCA | FeS | Yes | 1,1-DCA, ethene, 2-butyne |
| 1,1,1-TCA | GR(SO$_4$) | Yes | 1,1-DCA, CA, ethene ethane |
| 1,1,1-TCA | ZVI | Yes | 1,1-DCA, ethane |
| 1,1,2-TCA | FeS | Rate not significant | Small amounts of 1,1-DCE and vinyl chloride but rate not significant |
| 1,1,2-TCA | GR(SO$_4$) | Yes | Vinyl chloride, 1,1-DCE, ethene, ethane |
| 1,1,2-TCA | ZVI | Yes | Ethane |
| 1,1,1,2-TeCA | FeS | Yes | 1,1-DCE |
| 1,1,1,2-TeCA | GR(SO$_4$) | Yes | 1,1-DCE and minor (<1%) vinyl chloride, ethene, ethane |
| 1,1,1,2-TeCA | phyllosilicate | Yes | 1,1-DCE |
| 1,1,1,2-TeCA | ZVI | Yes | TCE, 1,1-DCE |
| 1,1,2,2-TeCA | FeS | Yes | TCE, cis-DCE, trans-DCE, acetylene |
| 1,1,2,2-TeCA | GR(SO$_4$) | Yes | TCE (major), cis-DCE, trans-DCE |
| 1,1,2,2-TeCA | phyllosilicate | Yes | TCE |
| 1,1,2,2-TeCA | ZVI | Yes | TCE, trans-DCE, cis-DCE |
| Carbon | FeS | Yes | Chloroform, carbon disulfide, possibly methane, ethene, ethane |
| CT | Pyrite | Yes | Chloroform , CO$_2$, carbon disulfide, formate (highly dependent on conditions) |
| CT | Magnetite | Yes | Chloroform , carbon monoxide, methane, formate (highly dependent on conditions) |
| CT | GR(SO$_4$) | Yes | Chloroform and hexachloroethane; Chloroform, DCM, methane, ethene |
| CT | phyllosilicate | Yes | Chloroform |
| CT | ZVI | Yes | Chloroform, dichloromethane, methane (depending on conditions) |

**Notes:** GR(SO$_4$) sulfate green rust. GR(CO$_3$) carbonate green rust. ZVI zero valent iron

[1] Compilation of reported degradation products. Mass recovery of products typically low - additional undetected and unreported products are likely. Reported reaction products or proportions of reaction products were often a function of environmental conditions.

[2] No published studies that identify the transformation products of PCE, TCE, cis-DCE or vinyl chloride with magnetite. Ferrey et al (2004) analyzed for products of cis-DCE dechlorination including vinyl chloride, ethene, and ethane and did not find them. If Fe$^{2+}$ sorbed to magnetite stabilizes carbene ions, the ultimate degradation product of cis-DCE on magnetite would be CO$_2$.

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# SITE LOGIC Report

*Min-Trap Study*

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**Phone:** 919-461-1100

**Email:** conan.fitzgerald@aecom.com

**MI Identifier:** 032VD

**Report Date:** May 8, 2024

**Project:** RTX Delavon, 60707644.5B

**Comments:** It is important to note that these samples foamed excessively upon addition of acid at both the WAS and SAS/AVS extraction steps and neutralized the acid. By the end of the extraction (after completion of the CrES step), the pH was about 6 when checked with pH paper; typically, the pH is below 1.

This report has been revised to change the names of samples 1 and 2 to SB.

# Overview

Weak Acid Soluble ferrous and ferric iron (WAS-Fe), Acid Volatile Sulfide (AVS), Strong Acid Soluble ferrous and ferric iron (SAS-Fe), and Chromium-Extractable Sulfide (CrES) were obtained via sequential extraction of soil based on methods from Microseeps, Inc. In order to minimize exposure of the soil or extraction fluid to oxygen, the soil samples were transferred to the extraction vessel while in the glove box and the extractions were carried out on the bench top under a flow of nitrogen. A brief description of the extraction procedure is provided below.

**WAS-Fe.** Approximately 10 g of soil is extracted with 1 N hydrochloric acid (HCl) for 30 minutes at room temperature (approximately 20° C), after which an aliquot of the HCl is withdrawn and analyzed for ferrous iron and total iron colorimetrically using a Hach DR2800 spectrophotometer and appropriate Hach test kit reagents. Dilutions are made as needed using deoxygenated, deionized (DO/DI) water.

**AVS.** Hydrogen sulfide generated during the WAS extraction step is collected in a trap filled with 1.25 N sodium hydroxide (NaOH). After collection of the WAS Fe sample, concentrated HCl is added to the soil and the mixture is heated for 30 minutes. The concentration of sulfide in trap is then measured using the methylene blue method via a Hach DR2800 spectrophotometer and appropriate Hach test kit reagents. Dilutions are made as needed using DO/DI water.

**SAS-Fe.** Upon completion of the AVS step, an aliquot of the HCl solution is withdrawn from the extraction flask and analyzed for ferrous iron and total iron in the same manner as for WAS-Fe.

**CrES.** After completion of the AVS step, the trap is cleaned and fresh solution added. After removal of an aliquot for SAS-Fe measurement, chromous chloride is added to the soil and the mixture is heated for 30 minutes. The concentration of sulfide in the trap is then measured in the same manner as for AVS.

# Results

| Sample Information<br>Sample Date<br>MI ID | SB-31D<br>4/11/2024<br>032VD-1 | SB-25D<br>4/11/2024<br>032VD-2 |
|---|---|---|
| **WAS Fe (mg/kg)** | | |
| Fe2+ | <1.8 | <1.8 |
| Fe3+ | 0 | 0 |
| Total Fe | <1.8 | <1.8 |
| **SAS Fe (mg/kg)** | | |
| Fe2+ | <5.1 | <5.2 |
| Fe3+ | 0 | 0 |
| Total Fe | <5.1 | <5.2 |
| **AVS, (mg/kg)** | | |
| AVS | <0.4 | <0.4 |
| **CrES, (mg/kg)** | | |
| CrES | **0.9** | **0.7** |

**Notes:**
-SAS Fe includes WAS Fe
-Fe3+ is calculated from the raw data – it is the difference between Total Fe and Fe2+. Discrepancies are due to rounding.

# QC Results

| | Results | Units |
|---|---|---|
| **Blank*** | | |
| WAS-Fe(II) | <2 | mg/L |
| WAS-Fe(total) | <4 | mg/L |
| SAS-Fe(II) | <4 | mg/L |
| SAS-Fe(total) | <8 | mg/L |
| AVS | <0.025 | mg/L |
| CrES | <0.025 | mg/L |
| **FeS Standard** | | |
| Fe concentration | 635 | g/kg |
| SAS-Fe | 720 | g/kg |
| % Recovered as SAS | 113 | % |
| Sulfide concentration | 365 | g/kg |
| AVS | 363 | g/kg |
| % Recovered as AVS | 99 | % |

*A blank was run in the absence of a solid material. Therefore, values are concentrations in the extraction fluids or traps.

**REPORT TO:**

Reports will be provided to the contact(s) listed below. Parties other than the contact(s) listed below will require prior approval.

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**Phone:**
**Fax:**

**Project Manager:**
**Project Name:** RTX Delavan
**Project No.:** 60707644.5D

**INVOICE TO:**

For Invoices **paid by a third party** it is imperative that contact information & corresponding reference No. be provided.

**Name:** SAME
**Company:**
**Address:**
**email:**
**Phone:**
**Fax:**

**Purchase Order No.**
**Subcontract No.**
**Quote No.**

**microbialinsights**

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Please Check One:
☐ More samples to follow
☐ No Additional Samples

Saturday Delivery
Please see sampling protocol for instructions

**Report Type:** ☑ Standard (default) ☐ Comprehensive (15% surcharge) ☐ Historical (35% surcharge)

Please contact us prior to submitting samples regarding questions about the analyses you are requesting at (865) 573-8188 (9:00 am to 5:00 pm M-F). After hours email: customerservice@microbe.com

| Sample Information | | | | | | Analysis | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MI ID (Laboratory Use Only) | Sample Name | Date Sampled | Time Sampled | # of Containers | Matrix | Magnetic Susceptibility | XRD | AMIBA | | | | | | | | | | | | | |
| 032VD 1 | SB1-31D | 4/11/24 | 1040 | 3 | S | X | X | X | | | | | | | | | | | | | |
| 2 | SB-25D | 4/11/24 | 1255 | 3 | S | X | X | X | | | | | | | | | | | | | |
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Relinquished by: Date 4/11/24 1700 Received by: Date 4/12/24

It is vital that chain of custody is filled out correctly & that all relative information is provided.

Failure to provide sufficient and/or correct information regarding reporting, invoicing & analyses requested information may result in delays for which MI will not be liable.

**Saturday delivery: See sampling protocol for alternate shipping address.

REDOX TECH, LLC
"Providing Innovative In Situ Soil and Groundwater Treatment"

# TOTAL OXIDANT DEMAND (TOD) SAMPLE ANALYSIS

**Company: AECOM**
**Project: Bamberg SC**

**Sample Preparation Date: 4/17/2024**
**TOD Testing Date: 4/19/2024**
**Oxidant:** Potassium Permanganate
**Analysis Performed by:** MRM

| Sample | Dose (g/Kg) | Total Oxidant Demand (g/Kg Soil) |
|---|---|---|
| SB-31D-3g/kg | 3.00 | 0.54 |
| SB-31D-5g/kg | 4.95 | 0.78 |
| SB-25D-3g/kg | 3.00 | 0.89 |
| SB-25D-5g/kg | 4.98 | 0.84 |

| Sample | Dose (g/L) | Measured Permanganate Concentration (g/L) |
|---|---|---|
| Low Control | 3.00 | 2.75 |
| High Control | 10.10 | 9.95 |
| Sample Blank | 0.00 | 0.00 |

TOD is reported in grams of oxidant per kilogram of groundwater sample. TOD testing for persulfate completed per Haselow *et al., 2003.* Estimating the Total Oxidant Demand for In Situ Chemical Oxidation Design, Remediation, Autumn, 2003. Variation in permanganate concentration values for control samples is attributed to autoxidation and analytical uncertainty.

REDOX TECH

# BENCH TESTING FOR IN-SITU OXIDATION OF TETRACHLOROETHYLENE (PCE) WITH POTASSIUM PERMANGANATE

**Client:** AECOM
**Project:** Bamberg, SC

**Sample Preparation Date:** 06/04/2024
**Sample Quench Date:** 06/07/2024
**Oxidant:** Potassium Permanganate
**Samples Prepared By:** Markus MacNamara
**Analysis:** 8260 VOC
**Laboratory:** GEL Laboratories

## BENCH TESTING SUMMARY

The following summarizes bench testing performed to determine the effectiveness of In-Situ Chemical Oxidation (ISCO) of Tetrachloroethylene (PCE) in sediment collected from the Delvan Spray Technologies Remediation Site in Bamberg, SC.

Sediment samples were collected in May 2024 and shipped to Redox Tech's Cary NC offices. On June 4, 2024 four PCE spiked samples were prepared using distilled water and sediment collected near MW-25D and MW-31D. Sediment from each sampling location was homogenized by hand in a 1 L glass beaker and split into 100 g subsamples stored in glass sample jars with airtight plastic lids. Each sample jar received 100.0 ml of distilled water that was spiked with PCE at approximately 0.2 mg/L.

For each sampling location, one sub-sample was treated with Potassium Permanganate ($KMnO_4$) dosed at 1.0 g/kg soil, and one control-spike was left untreated. For treated samples, 0.11 g of $KMnO_4$ was measured in a weigh boat using an analytical balance and added directly to the sample jar. Both the treated and control-spike sample jars were shaken for 60 seconds and placed in a darkened, room temperature reactor and allowed to react for approximately 90 hours. At the end of the reaction period, each of the two samples treated with $KMnO_4$ had a dark purple color, indicating that excess oxidant remained in solution.

Prior to shipping for analysis, treated samples were quenched by adding sodium thiosulfate until they no longer exhibited purple coloration (< 0.1 g sodium thiosulfate per sample). All sample jars were sealed in airtight bags and shipped on ice to GEL Laboratories in Charleston SC where they were analyzed for volatile organic carbon species using EPA method 8260.

Analytical results indicate that treatment with $KMnO_4$ successfully oxidized PCE in the sediment-water mixtures for both sediment mixtures. For sediment collected near MW-25D, the control spike contained 93.4 µg/L PCE, and the sample treated with 1 g/kg $KMnO_4$ contained 1.01 µg/L. This indicates a 98.9 % PCE destruction rate for sample 25-D. For sediment collected near MW-31D, the control spike contained 56.5 µg/L PCE, and the sample treated with 1 g/kg $KMnO_4$ contained 1.97 µg/L, indicating a 96.5 % PCE destruction rate for this sample. Figure

Results of VOC analysis showed the presence of acetone and toluene in the samples. These constituents may be a product of incomplete oxidation of PCE. Given the excess oxidant remaining in sample jars at the end of the reaction period, it is possible that, given more time, these species would be oxidized by the $KMnO_4$ remaining in solution. Results of VOC analysis are shown in figure 1 below. One sample (SB-25D – Control Spike) was also found to contain 5 µg/L 2-Butanone.

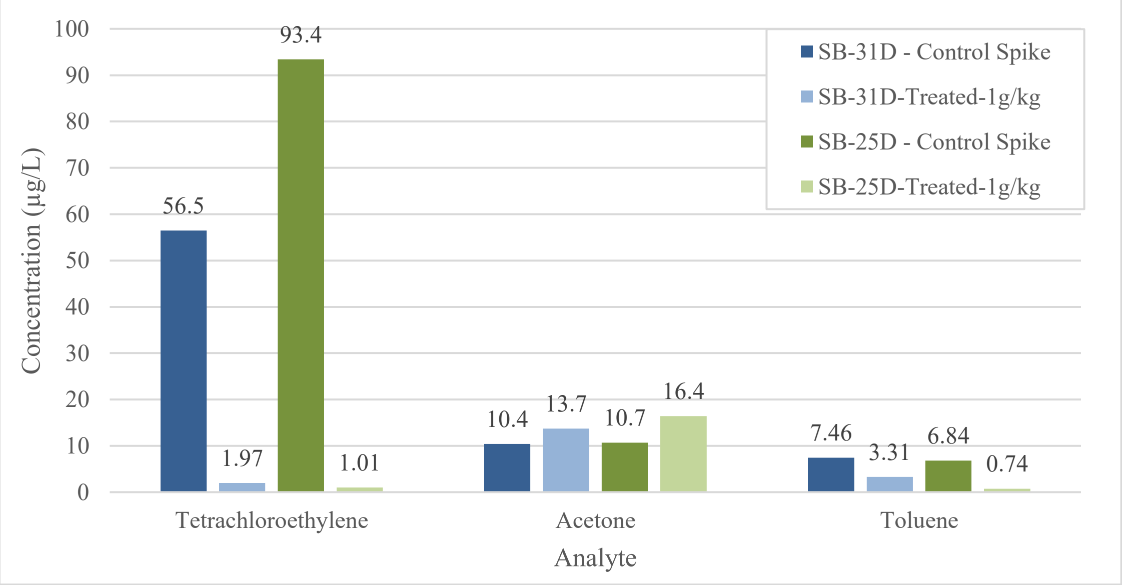

**Figure 1.** Graph of analytical results.

SGS

Orlando, FL

11/21/23

The results set forth herein are provided by SGS North America Inc.

*e-Hardcopy 2.0*
*Automated Report*

# Technical Report for

## Raytheon Technologies

AECOMSCG: Delavan Spray Technologies; Bamberg, SC

60656814/TASK 1A

SGS Job Number: FC11040

Sampling Date: 11/07/23

Report to:

AECOM Environment
10 Patewood Dr Bldg VI, Suite 500
Greenville, SC 29615
leslee.alexander@aecom.com; doria.cullom@aecom.com

ATTN: Doria Cullom

Total number of pages in report: 63

NELAP ACCREDITED TNI LABORATORY

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable unless noted in the narrative, comments or footnotes.

Norm Farmer

Norm Farmer
Technical Director

Client Service contact: Muna Mohammed 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), NC(573), NJ(FL002), NY(12022), SC(96038001)
DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177),
AL, AK, AR, CT, IA, KY, MA, MI. MS, ND, NH, NV, OK, OR, IL, UT, VT, WA, WI, WV

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Test results relate only to samples analyzed.

# Table of Contents

# Sample Summary

Raytheon Technologies

**Job No:** FC11040

AECOMSCG: Delavan Spray Technologies; Bamberg, SC
Project No: 60656814/TASK 1A

| Sample Number | Collected Date | Time | By | Received | Matrix Code | Type | Client Sample ID |
|---|---|---|---|---|---|---|---|
| This report contains results reported as ND = Not detected. The following applies:<br>Organics ND = Not detected above the MDL | | | | | | | |
| FC11040-1 | 11/07/23 | 08:15 | GCJB | 11/08/23 | AQ | Ground Water | MW-30D |
| FC11040-2 | 11/07/23 | 08:20 | GCJB | 11/08/23 | AQ | Ground Water | MW-13D |
| FC11040-3 | 11/07/23 | 09:25 | GCJB | 11/08/23 | AQ | Ground Water | MW-31D |
| FC11040-4 | 11/07/23 | 09:30 | GCJB | 11/08/23 | AQ | Ground Water | MW-14D |
| FC11040-5 | 11/07/23 | 10:40 | GCJB | 11/08/23 | AQ | Ground Water | MW-32DR |
| FC11040-6 | 11/07/23 | 10:45 | GCJB | 11/08/23 | AQ | Ground Water | MW-21D |
| FC11040-7 | 11/07/23 | 11:50 | GCJB | 11/08/23 | AQ | Ground Water | MW-25D |
| FC11040-8 | 11/07/23 | 11:50 | GCJB | 11/08/23 | AQ | Ground Water | MW-3D |
| FC11040-9 | 11/07/23 | 13:25 | GCJB | 11/08/23 | AQ | Ground Water | MW-26D |
| FC11040-10 | 11/07/23 | 15:05 | GCJB | 11/08/23 | AQ | Ground Water | MW-22D |

# SAMPLE DELIVERY GROUP CASE NARRATIVE

| | | | |
|---|---|---|---|
| **Client:** | Raytheon Technologies | **Job No:** | FC11040 |
| **Site:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | **Report Date** | 11/21/2023 9:26:08 AM |

On 11/08/2023, 10 Sample(s), 0 Trip Blank(s), 0 Equip. Blank(s) and 0 Field Blank(s) were received at SGS North America Inc - Orlando. at a maximum corrected temperature of 2.4 C. Samples were intact and chemically preserved, unless noted below. A SGS North America Inc. - Orlando Job Number of FC11040 was assigned to the project.

Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section. Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

## GC Volatiles By Method RSKSOP-147/175

**Matrix:** AQ **Batch ID:** GLL2992

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FC11034-4DUP, FC11034-4MS were used as the QC samples indicated.

FC11040-1 for Acetylene: Associated CCV outside of control limits high, sample was ND.

FC11040-2 for Acetylene: Associated CCV outside of control limits high, sample was ND.

FC11040-3 for Acetylene: Associated CCV outside of control limits high, sample was ND.

FC11040-4 for Acetylene: Associated CCV outside of control limits high, sample was ND.

FC11040-5 for Acetylene: Associated CCV outside of control limits high, sample was ND.

FC11040-6 for Acetylene: Associated CCV outside of control limits high, sample was ND.

**Matrix:** AQ **Batch ID:** GLL2993

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FC11044-8DUP, FC11044-8MS were used as the QC samples indicated.

FC11040-10: Sample was not preserved to a pH < 2.

## Metals Analysis By Method SW846 6010D

**Matrix:** AQ **Batch ID:** MP43117

All samples were digested within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FC11041-4DUP, FC11041-4MS, FC11041-4MSD, FC11041-4PS, FC11041-4SDL were used as the QC samples for metals.

## General Chemistry By Method EPA 300/SW846 9056A

**Matrix:** AQ **Batch ID:** GP39356

All samples were prepped within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FC11034-4MS, FC11034-4MSD were used as the QC samples for Sulfate, Chloride, Nitrogen, Nitrate,

Matrix Spike Recovery(s) for Chloride, Nitrogen, Nitrate are outside control limits. Spike recovery indicates possible matrix interference.

**Matrix:** AQ **Batch ID:** GP39357

All samples were prepped within the recommended method holding time.

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FC11040-4MS, FC11040-4MSD were used as the QC samples for Chloride, Nitrogen, Nitrate, Sulfate.

## Genera Chemistry By Method SM3500FE B-11

**Matrix:** AQ **Batch ID:** GN95878

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FC11040-1DUP were used as the QC samples for Iron, Ferrous.

FC11040-1 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

FC11040-2 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

FC11040-3 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

FC11040-4 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

FC11040-5 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

FC11040-6 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

FC11040-7 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

FC11040-8 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

FC11040-9 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

FC11040-10 for Iron, Ferrous: Field analysis required. Received out of hold time and analyzed by request.

**Matrix:** AQ **Batch ID:** R61513

FC11040-2 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

**Matrix:** AQ **Batch ID:** R61514

FC11040-3 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

**Matrix:** AQ **Batch ID:** R61515

FC11040-4 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

**Matrix:** AQ **Batch ID:** R61516

FC11040-5 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

**Matrix:** AQ **Batch ID:** R61517

FC11040-6 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

**Matrix:** AQ **Batch ID:** R61518

FC11040-7 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

**Matrix:** AQ **Batch ID:** R61519

FC11040-8 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

**Matrix:** AQ **Batch ID:** R61520

FC11040-9 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

**Matrix:** AQ **Batch ID:** R61521

FC11040-10 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

**Matrix:** AQ **Batch ID:** R61522

FC11040-1 for Iron, Ferric: Calculated as: (Iron) - (Iron, Ferrous)

## General Chemistry By Method SM4500S2- F-11

**Matrix:** AQ **Batch ID:** GN95853

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Sample(s) FC11040-1MS, FC11040-1MSD were used as the QC samples for Sulfide.

SGS North America Inc. - Orlando certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting the Quality System precision, accuracy and completeness objectives except as noted. Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria. SGS North America Inc.- Orlando is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety.

Narrative prepared by:

________________________________________

Kim Benham, Client Services *(Signature on File)*

# Summary of Hits

**Job Number:** FC11040
**Account:** Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC
**Collected:** 11/07/23

| Lab Sample ID<br>Analyte | Client Sample ID | Result/<br>Qual | RL | MDL | Units | Method |
|---|---|---|---|---|---|---|
| **FC11040-1** | **MW-30D** | | | | | |
| Iron | | 74.9 J | 300 | 17 | ug/l | SW846 6010D |
| Manganese | | 2.9 J | 15 | 1.0 | ug/l | SW846 6010D |
| Chloride | | 9.6 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |
| Iron, Ferric [a] | | 0.075 J | 0.40 | 0.047 | mg/l | SM3500FE B-11 |
| Nitrogen, Nitrate | | 1.3 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | | 3.6 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |
| **FC11040-2** | **MW-13D** | | | | | |
| Methane | | 0.36 J | 0.50 | 0.16 | ug/l | RSKSOP-147/175 |
| Iron | | 233 J | 300 | 17 | ug/l | SW846 6010D |
| Manganese | | 5.3 J | 15 | 1.0 | ug/l | SW846 6010D |
| Chloride | | 10.7 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |
| Iron, Ferric [a] | | 0.23 J | 0.40 | 0.047 | mg/l | SM3500FE B-11 |
| Nitrogen, Nitrate | | 1.6 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | | 2.3 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |
| **FC11040-3** | **MW-31D** | | | | | |
| Methane | | 0.32 J | 0.50 | 0.16 | ug/l | RSKSOP-147/175 |
| Iron | | 50.1 J | 300 | 17 | ug/l | SW846 6010D |
| Manganese | | 1.2 J | 15 | 1.0 | ug/l | SW846 6010D |
| Chloride | | 9.9 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |
| Iron, Ferric [a] | | 0.050 J | 0.40 | 0.047 | mg/l | SM3500FE B-11 |
| Nitrogen, Nitrate | | 1.6 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | | 2.3 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |
| **FC11040-4** | **MW-14D** | | | | | |
| Methane | | 0.24 J | 0.50 | 0.16 | ug/l | RSKSOP-147/175 |
| Iron | | 678 | 300 | 17 | ug/l | SW846 6010D |
| Manganese | | 39.7 | 15 | 1.0 | ug/l | SW846 6010D |
| Chloride | | 5.1 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |
| Iron, Ferric [a] | | 0.58 | 0.40 | 0.047 | mg/l | SM3500FE B-11 |
| Iron, Ferrous [b] | | 0.098 J | 0.10 | 0.030 | mg/l | SM3500FE B-11 |
| Nitrogen, Nitrate | | 0.22 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | | 4.4 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |
| **FC11040-5** | **MW-32DR** | | | | | |
| Methane | | 0.50 | 0.50 | 0.16 | ug/l | RSKSOP-147/175 |
| Iron | | 18.0 J | 300 | 17 | ug/l | SW846 6010D |
| Chloride | | 8.8 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |

# Summary of Hits

**Job Number:** FC11040
**Account:** Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC
**Collected:** 11/07/23

| Lab Sample ID<br>Analyte | Client Sample ID | Result/ Qual | RL | MDL | Units | Method |
|---|---|---|---|---|---|---|
| Nitrogen, Nitrate | | 1.0 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | | 2.4 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |
| **FC11040-6** | **MW-21D** | | | | | |
| Methane | | 0.82 | 0.50 | 0.16 | ug/l | RSKSOP-147/175 |
| Iron | | 393 | 300 | 17 | ug/l | SW846 6010D |
| Manganese | | 10.5 J | 15 | 1.0 | ug/l | SW846 6010D |
| Chloride | | 4.5 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |
| Iron, Ferric [a] | | 0.35 J | 0.40 | 0.047 | mg/l | SM3500FE B-11 |
| Iron, Ferrous [b] | | 0.047 J | 0.10 | 0.030 | mg/l | SM3500FE B-11 |
| Nitrogen, Nitrate | | 0.15 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | | 2.6 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |
| **FC11040-7** | **MW-25D** | | | | | |
| Iron | | 35.5 J | 300 | 17 | ug/l | SW846 6010D |
| Chloride | | 10.1 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |
| Nitrogen, Nitrate | | 1.2 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | | 3.2 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |
| **FC11040-8** | **MW-3D** | | | | | |
| Methane | | 0.42 J | 0.50 | 0.16 | ug/l | RSKSOP-147/175 |
| Iron | | 411 | 300 | 17 | ug/l | SW846 6010D |
| Manganese | | 15.1 | 15 | 1.0 | ug/l | SW846 6010D |
| Chloride | | 8.5 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |
| Iron, Ferric [a] | | 0.41 | 0.40 | 0.047 | mg/l | SM3500FE B-11 |
| Nitrogen, Nitrate | | 1.0 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | | 2.7 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |
| **FC11040-9** | **MW-26D** | | | | | |
| Iron | | 29.4 J | 300 | 17 | ug/l | SW846 6010D |
| Chloride | | 10.4 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |
| Nitrogen, Nitrate | | 1.3 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | | 3.8 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |
| **FC11040-10** | **MW-22D** | | | | | |
| Methane [c] | | 0.40 J | 0.50 | 0.16 | ug/l | RSKSOP-147/175 |
| Iron | | 63.8 J | 300 | 17 | ug/l | SW846 6010D |
| Manganese | | 2.0 J | 15 | 1.0 | ug/l | SW846 6010D |
| Chloride | | 8.3 | 2.0 | 0.80 | mg/l | EPA 300/SW846 9056A |
| Iron, Ferric [a] | | 0.064 J | 0.40 | 0.047 | mg/l | SM3500FE B-11 |

# Summary of Hits

**Job Number:** FC11040
**Account:** Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC
**Collected:** 11/07/23

| Lab Sample ID Client Sample ID<br>Analyte | Result/<br>Qual | RL | MDL | Units | Method |
|---|---|---|---|---|---|
| Nitrogen, Nitrate | 1.5 | 0.10 | 0.040 | mg/l | EPA 300/SW846 9056A |
| Sulfate | 3.7 | 2.0 | 0.60 | mg/l | EPA 300/SW846 9056A |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.
(c) Sample was not preserved to a pH < 2.

## Section 4

# Sample Results

## Report of Analysis

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-30D | | |
| **Lab Sample ID:** | FC11040-1 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | LL86381.D | 1 | 11/16/23 14:52 | SS | n/a | n/a | GLL2992 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 5.0 ml | 500 ul | 20 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | ND | 0.50 | 0.16 | ug/l | |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene [a] | ND | 5.0 | 1.5 | ug/l | |

(a) Associated CCV outside of control limits high, sample was ND.

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-30D | | |
| **Lab Sample ID:** | FC11040-1 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## Total Metals Analysis

| Analyte | Result | RL | MDL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 74.9 J | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |
| Manganese | 2.9 J | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

SGS North America Inc.

# Report of Analysis

Page 1 of 1

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-30D | | |
| **Lab Sample ID:** | FC11040-1 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 9.6 | 2.0 | 0.80 | mg/l | 1 | 11/08/23 20:27 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.075 J | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.030 U | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 1.3 | 0.10 | 0.040 | mg/l | 1 | 11/08/23 20:27 | JB | EPA 300/SW846 9056A |
| Sulfate | 3.6 | 2.0 | 0.60 | mg/l | 1 | 11/08/23 20:27 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.71 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)

(b) Field analysis required.  Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-13D | | |
| **Lab Sample ID:** | FC11040-2 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | LL86382.D | 1 | 11/16/23 15:00 | SS | n/a | n/a | GLL2992 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 5.0 ml | 500 ul | 20 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 0.36 | 0.50 | 0.16 | ug/l | J |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene [a] | ND | 5.0 | 1.5 | ug/l | |

(a) Associated CCV outside of control limits high, sample was ND.

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-13D | | |
| **Lab Sample ID:** | FC11040-2 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## Total Metals Analysis

| Analyte | Result | RL | MDL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 233 J | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D (1) | SW846 3010A (2) |
| Manganese | 5.3 J | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D (1) | SW846 3010A (2) |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

**Client Sample ID:** MW-13D
**Lab Sample ID:** FC11040-2
**Matrix:** AQ - Ground Water
**Date Sampled:** 11/07/23
**Date Received:** 11/08/23
**Percent Solids:** n/a
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 10.7 | 2.0 | 0.80 | mg/l | 1 | 11/08/23 20:47 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.23 J | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.030 U | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 1.6 | 0.10 | 0.040 | mg/l | 1 | 11/08/23 20:47 | JB | EPA 300/SW846 9056A |
| Sulfate | 2.3 | 2.0 | 0.60 | mg/l | 1 | 11/08/23 20:47 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.73 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-31D | | |
| **Lab Sample ID:** | FC11040-3 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | LL86383.D | 1 | 11/16/23 15:07 | SS | n/a | n/a | GLL2992 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 5.0 ml | 500 ul | 20 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 0.32 | 0.50 | 0.16 | ug/l | J |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene [a] | ND | 5.0 | 1.5 | ug/l | |

(a) Associated CCV outside of control limits high, sample was ND.

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-31D | | |
| **Lab Sample ID:** | FC11040-3 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## Total Metals Analysis

| Analyte | Result | RL | MDL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 50.1 J | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D (1) | SW846 3010A (2) |
| Manganese | 1.2 J | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D (1) | SW846 3010A (2) |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

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# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-31D | | |
| **Lab Sample ID:** | FC11040-3 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 9.9 | 2.0 | 0.80 | mg/l | 1 | 11/08/23 21:08 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.050 J | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.030 U | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 1.6 | 0.10 | 0.040 | mg/l | 1 | 11/08/23 21:08 | JB | EPA 300/SW846 9056A |
| Sulfate | 2.3 | 2.0 | 0.60 | mg/l | 1 | 11/08/23 21:08 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.71 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-14D | | |
| **Lab Sample ID:** | FC11040-4 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | LL86384.D | 1 | 11/16/23 15:15 | SS | n/a | n/a | GLL2992 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 5.0 ml | 500 ul | 20 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 0.24 | 0.50 | 0.16 | ug/l | J |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene [a] | ND | 5.0 | 1.5 | ug/l | |

(a) Associated CCV outside of control limits high, sample was ND.

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-14D | | |
| **Lab Sample ID:** | FC11040-4 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## Total Metals Analysis

| Analyte | Result | RL | MDL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 678 | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |
| Manganese | 39.7 | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

**Client Sample ID:** MW-14D
**Lab Sample ID:** FC11040-4
**Matrix:** AQ - Ground Water
**Date Sampled:** 11/07/23
**Date Received:** 11/08/23
**Percent Solids:** n/a
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 5.1 | 2.0 | 0.80 | mg/l | 1 | 11/08/23 22:10 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.58 | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.098 J | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 0.22 | 0.10 | 0.040 | mg/l | 1 | 11/08/23 22:10 | JB | EPA 300/SW846 9056A |
| Sulfate | 4.4 | 2.0 | 0.60 | mg/l | 1 | 11/08/23 22:10 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.73 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

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# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-32DR | | |
| **Lab Sample ID:** | FC11040-5 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | LL86385.D | 1 | 11/16/23 15:22 | SS | n/a | n/a | GLL2992 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 5.0 ml | 500 ul | 20 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 0.50 | 0.50 | 0.16 | ug/l | |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene [a] | ND | 5.0 | 1.5 | ug/l | |

(a) Associated CCV outside of control limits high, sample was ND.

---

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-32DR | | |
| **Lab Sample ID:** | FC11040-5 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## Total Metals Analysis

| Analyte | Result | RL | MDL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 18.0 J | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |
| Manganese | 1.0 U | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-32DR | | |
| **Lab Sample ID:** | FC11040-5 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 8.8 | 2.0 | 0.80 | mg/l | 1 | 11/08/23 23:52 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.047 U | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.030 U | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 1.0 | 0.10 | 0.040 | mg/l | 1 | 11/08/23 23:52 | JB | EPA 300/SW846 9056A |
| Sulfate | 2.4 | 2.0 | 0.60 | mg/l | 1 | 11/08/23 23:52 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.71 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-21D | | |
| **Lab Sample ID:** | FC11040-6 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | LL86386.D | 1 | 11/16/23 15:30 | SS | n/a | n/a | GLL2992 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 5.0 ml | 500 ul | 20 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 0.82 | 0.50 | 0.16 | ug/l | |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene [a] | ND | 5.0 | 1.5 | ug/l | |

(a) Associated CCV outside of control limits high, sample was ND.

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-21D | | |
| **Lab Sample ID:** | FC11040-6 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## Total Metals Analysis

| **Analyte** | **Result** | **RL** | **MDL** | **Units** | **DF** | **Prep** | **Analyzed** | **By** | **Method** | **Prep Method** |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 393 | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |
| Manganese | 10.5 J | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-21D | | |
| **Lab Sample ID:** | FC11040-6 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 4.5 | 2.0 | 0.80 | mg/l | 1 | 11/09/23 00:13 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.35 J | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.047 J | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 0.15 | 0.10 | 0.040 | mg/l | 1 | 11/09/23 00:13 | JB | EPA 300/SW846 9056A |
| Sulfate | 2.6 | 2.0 | 0.60 | mg/l | 1 | 11/09/23 00:13 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.73 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-25D | | |
| **Lab Sample ID:** | FC11040-7 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | LL86398.D | 1 | 11/17/23 10:46 | SS | n/a | n/a | GLL2993 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 4.9 ml | 500 ul | 21 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | ND | 0.50 | 0.16 | ug/l | |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene | ND | 5.0 | 1.5 | ug/l | |

---

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-25D | | |
| **Lab Sample ID:** | FC11040-7 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

**Total Metals Analysis**

| Analyte | Result | RL | MDL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 35.5 J | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |
| Manganese | 1.0 U | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

**Client Sample ID:** MW-25D
**Lab Sample ID:** FC11040-7
**Matrix:** AQ - Ground Water
**Date Sampled:** 11/07/23
**Date Received:** 11/08/23
**Percent Solids:** n/a
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 10.1 | 2.0 | 0.80 | mg/l | 1 | 11/09/23 00:33 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.047 U | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.030 U | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 1.2 | 0.10 | 0.040 | mg/l | 1 | 11/09/23 00:33 | JB | EPA 300/SW846 9056A |
| Sulfate | 3.2 | 2.0 | 0.60 | mg/l | 1 | 11/09/23 00:33 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.70 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

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# Report of Analysis

Page 1 of 1

| | | | | |
|---|---|---|---|---|
| **Client Sample ID:** | MW-3D | | | |
| **Lab Sample ID:** | FC11040-8 | | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | LL86399.D | 1 | 11/17/23 10:53 | SS | n/a | n/a | GLL2993 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 5.0 ml | 500 ul | 21 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 0.42 | 0.50 | 0.16 | ug/l | J |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene | ND | 5.0 | 1.5 | ug/l | |

---

ND = Not detected  MDL = Method Detection Limit  J = Indicates an estimated value
RL = Reporting Limit  B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range  N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | | |
|---|---|---|---|---|
| **Client Sample ID:** | MW-3D | | | |
| **Lab Sample ID:** | FC11040-8 | | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | | **Date Received:** | 11/08/23 |
| | | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | | |

## Total Metals Analysis

| Analyte | Result | RL | MDL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 411 | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |
| Manganese | 15.1 | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-3D | | |
| **Lab Sample ID:** | FC11040-8 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 8.5 | 2.0 | 0.80 | mg/l | 1 | 11/09/23 00:54 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.41 | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.030 U | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 1.0 | 0.10 | 0.040 | mg/l | 1 | 11/09/23 00:54 | JB | EPA 300/SW846 9056A |
| Sulfate | 2.7 | 2.0 | 0.60 | mg/l | 1 | 11/09/23 00:54 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.73 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

SGS North America Inc.

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-26D | | |
| **Lab Sample ID:** | FC11040-9 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | LL86400.D | 1 | 11/17/23 11:00 | SS | n/a | n/a | GLL2993 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 5.0 ml | 500 ul | 21 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | ND | 0.50 | 0.16 | ug/l | |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene | ND | 5.0 | 1.5 | ug/l | |

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-26D | | |
| **Lab Sample ID:** | FC11040-9 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## Total Metals Analysis

| Analyte | Result | RL | MDL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 29.4 J | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |
| Manganese | 1.0 U | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

**Client Sample ID:** MW-26D
**Lab Sample ID:** FC11040-9
**Matrix:** AQ - Ground Water
**Date Sampled:** 11/07/23
**Date Received:** 11/08/23
**Percent Solids:** n/a
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 10.4 | 2.0 | 0.80 | mg/l | 1 | 11/09/23 01:14 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.047 U | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.030 U | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 1.3 | 0.10 | 0.040 | mg/l | 1 | 11/09/23 01:14 | JB | EPA 300/SW846 9056A |
| Sulfate | 3.8 | 2.0 | 0.60 | mg/l | 1 | 11/09/23 01:14 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.71 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | | |
|---|---|---|---|---|
| **Client Sample ID:** | MW-22D | | | |
| **Lab Sample ID:** | FC11040-10 | | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | | **Date Received:** | 11/08/23 |
| **Method:** | RSKSOP-147/175 | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 [a] | LL86401.D | 1 | 11/17/23 11:07 | SS | n/a | n/a | GLL2993 |
| Run #2 | | | | | | | |

| | Initial Volume | Headspace Volume | Volume Injected | Temperature |
|---|---|---|---|---|
| Run #1 | 38.0 ml | 5.0 ml | 500 ul | 21 Deg. C |
| Run #2 | | | | |

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 0.40 | 0.50 | 0.16 | ug/l | J |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene | ND | 5.0 | 1.5 | ug/l | |

(a) Sample was not preserved to a pH < 2.

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-22D | | |
| **Lab Sample ID:** | FC11040-10 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## Total Metals Analysis

| Analyte | Result | RL | MDL | Units | DF | Prep | Analyzed | By | Method | Prep Method |
|---|---|---|---|---|---|---|---|---|---|---|
| Iron | 63.8 J | 300 | 17 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |
| Manganese | 2.0 J | 15 | 1.0 | ug/l | 1 | 11/09/23 | 11/10/23 | LM | SW846 6010D [1] | SW846 3010A [2] |

(1) Instrument QC Batch: MA19827
(2) Prep QC Batch: MP43117

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | MW-22D | | |
| **Lab Sample ID:** | FC11040-10 | **Date Sampled:** | 11/07/23 |
| **Matrix:** | AQ - Ground Water | **Date Received:** | 11/08/23 |
| | | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## General Chemistry

| Analyte | Result | RL | MDL | Units | DF | Analyzed | By | Method |
|---|---|---|---|---|---|---|---|---|
| Chloride | 8.3 | 2.0 | 0.80 | mg/l | 1 | 11/09/23 01:35 | JB | EPA 300/SW846 9056A |
| Iron, Ferric [a] | 0.064 J | 0.40 | 0.047 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Iron, Ferrous [b] | 0.030 U | 0.10 | 0.030 | mg/l | 1 | 11/12/23 15:21 | FN | SM3500FE B-11 |
| Nitrogen, Nitrate | 1.5 | 0.10 | 0.040 | mg/l | 1 | 11/09/23 01:35 | JB | EPA 300/SW846 9056A |
| Sulfate | 3.7 | 2.0 | 0.60 | mg/l | 1 | 11/09/23 01:35 | JB | EPA 300/SW846 9056A |
| Sulfide | 0.20 U | 0.73 | 0.20 | mg/l | 1 | 11/09/23 10:00 | CC | SM4500S2- F-11 |

(a) Calculated as: (Iron) - (Iron, Ferrous)
(b) Field analysis required. Received out of hold time and analyzed by request.

---

RL = Reporting Limit
MDL = Method Detection Limit
U = Indicates a result < MDL
J = Indicates a result > = MDL but < RL

# Misc. Forms

## Custody Documents and Other Forms

---

Includes the following where applicable:

- Chain of Custody

# SGS North America Inc - Orlando

## Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 FAX: 407-425-0707
www.sgs.com

FC11040

SGS - ORLANDO JOB # :

PAGE 1 OF 1

SGS - ORLANDO Quote #

SKIFF #

**Client / Reporting Information**

Company Name: AECOM
Address: 10 Patewood Dr. Bldg VI Ste 500
City: Greenville State: SC Zip: 29615
Project Contact:
Email:
Phone #:
Sampler(s) Name(s) (Printed)
Sampler 1: Justin Butler Sampler 2: Griffin Collings

**Project Information**

Project Name: Delavan Spray Technologies
Street 4334 Main Hwy
City Bamberg State SC
Project #
Fax #
Client Purchase Order #

**Analytical Information**

**Matrix Codes**

- DW - Drinking Water
- GW - Ground Water
- WW - Water
- SW - Surface Water
- SO - Soil
- SL- Sludge
- OI - Oil
- LIQ - Other Liquid
- AIR - Air
- SOL - Other Solid

| SGS Orlando Sample # | Field ID / Point of Collection | COLLECTION<br>DATE | TIME | SAMPLED BY: | CONTAINER INFORMATION<br>MATRIX | TOTAL # OF BOTTLES | OTHER | NONE | HCl | NaOH | HNO3 | H2SO4 | NAOH+ZNA | DI WATER | MEOH | VRSK147DGMEE[VGC+ACETY] | SO4, FE2, NO2, CHL, FE3 | S | MN | LAB USE ONLY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | MW-30D | 11/7/23 | 0815 | GC | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |
| 2 | MW-13D | 11/7/23 | 0820 | JB | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |
| 3 | MW-31D | 11/7/23 | 0925 | GC | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |
| 4 | MW-14D | 11/7/23 | 0930 | JB | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |
| 5 | MW-32DR | 11/7/23 | 1040 | GC | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |
| 6 | MW-21D | 11/7/23 | 1045 | JB | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |
| 7 | MW-25D | 11/7/23 | 1150 | GC | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |
| 8 | MW-3D | 11/7/23 | 1150 | JB | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |
| 9 | MW-26D | 11/7/23 | 1325 | GC | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |
| 10 | MW-22D | 11/7/23 | 1505 | GC | GW | 10 |  | 3 | 3 |  | 1 |  | 3 |  |  | X | X | X | X |  |

**Turnaround Time ( Business days)**

- [✓ 10 Day (Business)]
- 7 Day
- 5 Day
- 3 Day *RUSH*
- 2 Day *RUSH*
- 1 Day *RUSH*
- Other

Approved By: / Date:

Rush T/A Data Available VIA Email or Lablink

**Data Deliverable Information**

- ☐ COMMERCIAL "A" (RESULTS ONLY)
- ☐ COMMERCIAL "B" (RESULTS PLUS QC)
- ☐ REDT1 (EPA LEVEL 3)
- ☐ FULLT1 (EPA LEVEL 4)
- ☐ EDD'S

**Comments / Remarks**

INITIAL ASSESSMENT ZD

LABEL VERIFICATION

Sample Custody must be documented below each time samples change possession, including courier delivery.

| | | | | | |
|---|---|---|---|---|---|
| Relinquished by Sampler/Affiliation<br>1 AECOM | Date Time:<br>11/7/23 1900 | Received By/Affiliation<br>2 945 11/8/23 | Relinquished By/Affiliation<br>3 | Date Time: | Received By/Affiliation<br>4 |
| Relinquished by/Affiliation<br>5 | Date Time: | Received By/Affiliation<br>6 | Relinquished By/Affiliation<br>7 | Date Time: | Received By/Affiliation<br>8 |

**Lab Use Only :** Cooler Temperature (s) Celsius (corrected): 1.4 IR#1
2.0

http://www.sgs.com/en/terms-and-conditions

ORLD-SMT-0001-03-FORM-COC (4).xls Rev 031318

# SGS Sample Receipt Summary

**Job Number:** fc11040 **Client:** AECOM **Project:** DELAVON SPRAY TECHNOLOGIES

**Date / Time Received:** 11/8/2023 9:45:00 AM **Delivery Method:** FEDEX **Airbill #'s:** 786077987930

**Cooler Temps (Raw Measured) °C:** Cooler 1: (1.4); Cooler 2: (2.0);

**Cooler Temps (Corrected) °C:** Cooler 1: (1.8); Cooler 2: (2.4);

| Cooler Information | Y | or N |
|---|---|---|
| 1. Custody Seals Present: | ☑ | ☐ |
| 2. Custody Seals Intact: | ☑ | ☐ |
| 3. Temp criteria achieved: | ☑ | ☐ |
| 4. Cooler temp verification: | IR Gun | |
| 5. Cooler media: | Ice (Bag) | |

| Trip Blank Information | Y | or N | N/A |
|---|---|---|---|
| 1. Trip Blank present / cooler: | ☐ | ☐ | ☑ |
| 2. Trip Blank listed on COC: | ☐ | ☐ | ☑ |
| | **W** | **or S** | **N/A** |
| 3. Type of TB Received | ☐ | ☐ | ☐ |

| Sample Information | Y | or N | N/A |
|---|---|---|---|
| 1. Sample labels present on bottles: | ☑ | ☐ | |
| 2. Samples presented properly | ☑ | ☐ | |
| 3. Suffiient volume/containers recv'd for analysis | ☑ | ☐ | |
| 4. Condition of sample: | Intact | | |
| 5. Sample recv'd within HT | ☑ | ☐ | |
| 6. Dates/Times/IDs on COC match sample label | ☐ | ☐ | |
| 7. VOCs have headspace | ☐ | ☑ | ☐ |
| 8. Bottles received for unspecified tests | ☐ | ☑ | |
| 9. Compositing instructions clear | ☐ | ☐ | ☑ |
| 10. Voa Soil Kits/Jars received past 48hrs? | ☐ | ☐ | ☐ |
| 11. % Solids Jar Received? | ☐ | ☐ | ☐ |
| 12. Residual Chlorine Present? | ☐ | ☐ | ☐ |

**Misc Information**

Number of Encores: 25 Gram 5 Gram Number of Lab Filtered Metals:

Test Strip Lot #s: pH 0-3: 226422 pH 10-12: Other: (Specify) pH 1.0 - 12.0 222221

Residual Chlorine Test Strip Lot #

Comments

SM001
Rev. Date 05/04/17

Technician: SHAYLAP Date: 11/8/2023 12:21:04 PM Reviewer: Date:

FC11040: Chain of Custody
Page 2 of 2

# GC Volatiles

## QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

# Method Blank Summary

**Job Number:** FC11040
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| GLL2992-MB | LL86358.D | 1 | 11/16/23 | SS | n/a | n/a | GLL2992 |

**The QC reported here applies to the following samples:** **Method:** RSKSOP-147/175

FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | ND | 0.50 | 0.16 | ug/l | |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene | ND | 5.0 | 1.5 | ug/l | |

# Method Blank Summary

**Job Number:** FC11040
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| GLL2993-MB | LL86395.D | 1 | 11/17/23 | SS | n/a | n/a | GLL2993 |

**The QC reported here applies to the following samples:** **Method:** RSKSOP-147/175

FC11040-7, FC11040-8, FC11040-9, FC11040-10

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 74-82-8 | Methane | ND | 0.50 | 0.16 | ug/l | |
| 74-84-0 | Ethane | ND | 1.0 | 0.32 | ug/l | |
| 74-85-1 | Ethene | ND | 1.0 | 0.43 | ug/l | |
| 74-86-2 | Acetylene | ND | 5.0 | 1.5 | ug/l | |

# Blank Spike/Blank Spike Duplicate Summary

**Job Number:** FC11040
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| GLL2992-BS | LL86355.D | 1 | 11/16/23 | SS | n/a | n/a | GLL2992 |
| GLL2992-BSD | LL86356.D | 1 | 11/16/23 | SS | n/a | n/a | GLL2992 |

**The QC reported here applies to the following samples:** **Method:** RSKSOP-147/175

FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6

| CAS No. | Compound | Spike ug/l | BSP ug/l | BSP % | BSD ug/l | BSD % | RPD | Limits Rec/RPD |
|---|---|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 108 | 127 | 118 | 125 | 116 | 2 | 62-139/30 |
| 74-84-0 | Ethane | 219 | 256 | 117 | 250 | 114 | 2 | 67-141/30 |
| 74-85-1 | Ethene | 290 | 343 | 118 | 339 | 117 | 1 | 68-141/30 |
| 74-86-2 | Acetylene | 260 | 300 | 115 | 305 | 117 | 2 | 56-137/30 |

---

* = Outside of Control Limits.

# Blank Spike/Blank Spike Duplicate Summary

**Job Number:** FC11040
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| GLL2993-BS | LL86392.D | 1 | 11/17/23 | SS | n/a | n/a | GLL2993 |
| GLL2993-BSD | LL86393.D | 1 | 11/17/23 | SS | n/a | n/a | GLL2993 |

**The QC reported here applies to the following samples:** **Method:** RSKSOP-147/175

FC11040-7, FC11040-8, FC11040-9, FC11040-10

| CAS No. | Compound | Spike ug/l | BSP ug/l | BSP % | BSD ug/l | BSD % | RPD | Limits Rec/RPD |
|---|---|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 108 | 114 | 106 | 122 | 113 | 7 | 62-139/30 |
| 74-84-0 | Ethane | 219 | 225 | 103 | 244 | 111 | 8 | 67-141/30 |
| 74-85-1 | Ethene | 290 | 294 | 101 | 327 | 113 | 11 | 68-141/30 |
| 74-86-2 | Acetylene | 260 | 229 | 88 | 284 | 109 | 21 | 56-137/30 |

---

* = Outside of Control Limits.

# Matrix Spike Summary

**Job Number:** FC11040
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| FC11034-4MS [a] | LL86364.D | 10 | 11/16/23 | SS | n/a | n/a | GLL2992 |
| FC11034-4 [a] | LL86362.D | 10 | 11/16/23 | SS | n/a | n/a | GLL2992 |

**The QC reported here applies to the following samples:** **Method:** RSKSOP-147/175

FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6

| CAS No. | Compound | FC11034-4 ug/l | Q | Spike ug/l | MS ug/l | MS % | Limits |
|---|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 8530 | | 1080 | 9200 | 62 | 62-139 |
| 74-84-0 | Ethane | 10 U | | 2190 | 2500 | 114 | 67-141 |
| 74-85-1 | Ethene | 10 U | | 2900 | 3370 | 116 | 68-141 |
| 74-86-2 | Acetylene | 50 U | | 2600 | 3010 | 116 | 56-137 |

(a) Sample was not preserved to a pH < 2.

---

* = Outside of Control Limits.

# Matrix Spike Summary

**Job Number:** FC11040
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| FC11044-8MS | LL86417.D | 1 | 11/17/23 | SS | n/a | n/a | GLL2993 |
| FC11044-8 | LL86413.D | 1 | 11/17/23 | SS | n/a | n/a | GLL2993 |

**The QC reported here applies to the following samples:** **Method:** RSKSOP-147/175

FC11040-7, FC11040-8, FC11040-9, FC11040-10

| CAS No. | Compound | FC11044-8 ug/l | Q | Spike ug/l | MS ug/l | MS % | Limits |
|---|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 0.50 U | | 108 | 121 | 112 | 62-139 |
| 74-84-0 | Ethane | 1.0 U | | 219 | 244 | 111 | 67-141 |
| 74-85-1 | Ethene | 1.0 U | | 290 | 326 | 112 | 68-141 |
| 74-86-2 | Acetylene | 5.0 U | | 260 | 283 | 109 | 56-137 |

---

* = Outside of Control Limits.

# Duplicate Summary

**Job Number:** FC11040
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| FC11034-4DUP [a] | LL86363.D | 10 | 11/16/23 | SS | n/a | n/a | GLL2992 |
| FC11034-4 [a] | LL86362.D | 10 | 11/16/23 | SS | n/a | n/a | GLL2992 |

**The QC reported here applies to the following samples:** **Method:** RSKSOP-147/175

FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6

| CAS No. | Compound | FC11034-4 ug/l | Q | DUP ug/l | Q | RPD | Limits |
|---|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 8530 | | 9030 | | 6 | 30 |
| 74-84-0 | Ethane | 10 U | | ND | | nc | 30 |
| 74-85-1 | Ethene | 10 U | | ND | | nc | 30 |
| 74-86-2 | Acetylene | 50 U | | ND | | nc | 30 |

(a) Sample was not preserved to a pH < 2.

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* = Outside of Control Limits.

# Duplicate Summary

**Job Number:** FC11040
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| FC11044-8DUP | LL86416.D | 1 | 11/17/23 | SS | n/a | n/a | GLL2993 |
| FC11044-8 | LL86413.D | 1 | 11/17/23 | SS | n/a | n/a | GLL2993 |

**The QC reported here applies to the following samples:** **Method:** RSKSOP-147/175

FC11040-7, FC11040-8, FC11040-9, FC11040-10

| CAS No. | Compound | FC11044-8 ug/l | Q | DUP ug/l | Q | RPD | Limits |
|---|---|---|---|---|---|---|---|
| 74-82-8 | Methane | 0.50 U | | ND | | nc | 30 |
| 74-84-0 | Ethane | 1.0 U | | ND | | nc | 30 |
| 74-85-1 | Ethene | 1.0 U | | ND | | nc | 30 |
| 74-86-2 | Acetylene | 5.0 U | | ND | | nc | 30 |

---

* = Outside of Control Limits.

## Section 7

# Metals Analysis

## QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

# BLANK RESULTS SUMMARY
## Part 2 - Method Blanks

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

QC Batch ID: MP43117
Matrix Type: AQUEOUS

Methods: SW846 6010D
Units: ug/l

Prep Date: 11/09/23

| Metal | RL | IDL | MDL | MB raw | final |
|---|---|---|---|---|---|
| Aluminum | 200 | 14 | 14 | | |
| Antimony | 6.0 | 1 | 1 | | |
| Arsenic | 10 | 1.3 | 1.3 | | |
| Barium | 200 | .5 | 1 | | |
| Beryllium | 4.0 | .1 | .2 | | |
| Boron | 100 | 5 | 10 | | |
| Cadmium | 5.0 | .1 | .2 | | |
| Calcium | 1000 | 50 | 50 | | |
| Chromium | 10 | .5 | 1 | | |
| Cobalt | 50 | .2 | .2 | | |
| Copper | 25 | 1 | 1 | | |
| Iron | 300 | 15 | 17 | 13.3 | <300 |
| Lead | 5.0 | 1 | 1.1 | | |
| Lithium | 10 | .5 | 1.3 | | |
| Magnesium | 5000 | 35 | 35 | | |
| Manganese | 15 | .25 | 1 | 0.10 | <15 |
| Molybdenum | 50 | .3 | .3 | | |
| Nickel | 40 | .4 | .4 | | |
| Potassium | 10000 | 100 | 200 | | |
| Selenium | 10 | 2 | 2.9 | | |
| Silver | 10 | .5 | .7 | | |
| Sodium | 10000 | 250 | 500 | | |
| Strontium | 10 | .25 | .5 | | |
| Thallium | 10 | 1 | 1.4 | | |
| Tin | 50 | .5 | 1 | | |
| Titanium | 10 | .5 | 1 | | |
| Vanadium | 50 | .5 | .6 | | |
| Zinc | 20 | 3 | 4.4 | | |

Associated samples MP43117: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

# MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

QC Batch ID: MP43117
Matrix Type: AQUEOUS

Methods: SW846 6010D
Units: ug/l

| Metal | FC11041-4 Original | DUP | RPD | QC Limits | FC11041-4 Original | MS | Spikelot MPFLICP5 | % Rec | QC Limits |
|---|---|---|---|---|---|---|---|---|---|
| Prep Date: | | | 11/09/23 | | | | | 11/09/23 | |
| Aluminum | anr | | | | | | | | |
| Antimony | anr | | | | | | | | |
| Arsenic | anr | | | | | | | | |
| Barium | anr | | | | | | | | |
| Beryllium | anr | | | | | | | | |
| Boron | | | | | | | | | |
| Cadmium | anr | | | | | | | | |
| Calcium | anr | | | | | | | | |
| Chromium | anr | | | | | | | | |
| Cobalt | anr | | | | | | | | |
| Copper | anr | | | | | | | | |
| Iron | 3360 | 3310 | 1.5 | 0-20 | 3360 | 48300 | 46000 | 97.7 | 80-120 |
| Lead | anr | | | | | | | | |
| Lithium | | | | | | | | | |
| Magnesium | anr | | | | | | | | |
| Manganese | 67.4 | 65.8 | 2.4 | 0-20 | 67.4 | 251 | 200 | 91.8 | 80-120 |
| Molybdenum | anr | | | | | | | | |
| Nickel | anr | | | | | | | | |
| Potassium | anr | | | | | | | | |
| Selenium | anr | | | | | | | | |
| Silver | anr | | | | | | | | |
| Sodium | anr | | | | | | | | |
| Strontium | | | | | | | | | |
| Thallium | anr | | | | | | | | |
| Tin | anr | | | | | | | | |
| Titanium | | | | | | | | | |
| Vanadium | anr | | | | | | | | |
| Zinc | anr | | | | | | | | |

Associated samples MP43117: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

# MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

QC Batch ID: MP43117
Matrix Type: AQUEOUS

Methods: SW846 6010D
Units: ug/l

Prep Date: 11/09/23

| | FC11041-4 | | Spikelot | | MSD | QC |
|---|---|---|---|---|---|---|
| Metal | Original | MSD | MPFLICP5 | % Rec | RPD | Limit |
| Aluminum | anr | | | | | |
| Antimony | anr | | | | | |
| Arsenic | anr | | | | | |
| Barium | anr | | | | | |
| Beryllium | anr | | | | | |
| Boron | | | | | | |
| Cadmium | anr | | | | | |
| Calcium | anr | | | | | |
| Chromium | anr | | | | | |
| Cobalt | anr | | | | | |
| Copper | anr | | | | | |
| Iron | 3360 | 48900 | 46000 | 99.0 | 1.2 | 20 |
| Lead | anr | | | | | |
| Lithium | | | | | | |
| Magnesium | anr | | | | | |
| Manganese | 67.4 | 251 | 200 | 91.8 | 0.0 | 20 |
| Molybdenum | anr | | | | | |
| Nickel | anr | | | | | |
| Potassium | anr | | | | | |
| Selenium | anr | | | | | |
| Silver | anr | | | | | |
| Sodium | anr | | | | | |
| Strontium | | | | | | |
| Thallium | anr | | | | | |
| Tin | anr | | | | | |
| Titanium | | | | | | |
| Vanadium | anr | | | | | |
| Zinc | anr | | | | | |

Associated samples MP43117: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

## SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

QC Batch ID: MP43117
Matrix Type: AQUEOUS

Methods: SW846 6010D
Units: ug/l

Prep Date: 11/09/23

| Metal | BSP Result | Spikelot MPFLICP5 | % Rec | QC Limits |
|---|---|---|---|---|
| Aluminum | anr | | | |
| Antimony | anr | | | |
| Arsenic | anr | | | |
| Barium | anr | | | |
| Beryllium | anr | | | |
| Boron | | | | |
| Cadmium | anr | | | |
| Calcium | anr | | | |
| Chromium | anr | | | |
| Cobalt | anr | | | |
| Copper | anr | | | |
| Iron | 44500 | 46000 | 96.7 | 80-120 |
| Lead | anr | | | |
| Lithium | | | | |
| Magnesium | anr | | | |
| Manganese | 193 | 200 | 96.5 | 80-120 |
| Molybdenum | anr | | | |
| Nickel | anr | | | |
| Potassium | anr | | | |
| Selenium | anr | | | |
| Silver | anr | | | |
| Sodium | anr | | | |
| Strontium | | | | |
| Thallium | anr | | | |
| Tin | anr | | | |
| Titanium | | | | |
| Vanadium | anr | | | |
| Zinc | anr | | | |

Associated samples MP43117: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

# SERIAL DILUTION RESULTS SUMMARY

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

QC Batch ID: MP43117
Matrix Type: AQUEOUS

Methods: SW846 6010D
Units: ug/l

Prep Date: 11/09/23

| Metal | FC11041-4 Original | SDL 1:5 | %DIF | QC Limits |
|---|---|---|---|---|
| Aluminum | anr | | | |
| Antimony | anr | | | |
| Arsenic | anr | | | |
| Barium | anr | | | |
| Beryllium | anr | | | |
| Boron | | | | |
| Cadmium | anr | | | |
| Calcium | anr | | | |
| Chromium | anr | | | |
| Cobalt | anr | | | |
| Copper | anr | | | |
| Iron | 3360 | 3310 | 1.3 | 0-10 |
| Lead | anr | | | |
| Lithium | | | | |
| Magnesium | anr | | | |
| Manganese | 67.4 | 66.1 | 1.9 | 0-10 |
| Molybdenum | anr | | | |
| Nickel | anr | | | |
| Potassium | anr | | | |
| Selenium | anr | | | |
| Silver | anr | | | |
| Sodium | anr | | | |
| Strontium | | | | |
| Thallium | anr | | | |
| Tin | anr | | | |
| Titanium | | | | |
| Vanadium | anr | | | |
| Zinc | anr | | | |

Associated samples MP43117: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

## POST DIGESTATE SPIKE SUMMARY

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

QC Batch ID: MP43117
Matrix Type: AQUEOUS

Methods: SW846 6010D
Units: ug/l

Prep Date: 11/09/23

| Metal | Sample ml | Final ml | FC11041-4 Raw | Corr.** | PS ug/l | Spike ml | Spike ug/ml | Spike ug/l | % Rec | QC Limits |
|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | | | | | | | | | | |
| Antimony | | | | | | | | | | |
| Arsenic | | | | | | | | | | |
| Barium | | | | | | | | | | |
| Beryllium | | | | | | | | | | |
| Boron | | | | | | | | | | |
| Cadmium | | | | | | | | | | |
| Calcium | | | | | | | | | | |
| Chromium | | | | | | | | | | |
| Cobalt | | | | | | | | | | |
| Copper | | | | | | | | | | |
| Iron | 9.8 | 10 | 3355 | 3287.9 | 6436 | 0.2 | 150 | 3000 | 104.9 | 80-120 |
| Lead | | | | | | | | | | |
| Lithium | | | | | | | | | | |
| Magnesium | | | | | | | | | | |
| Manganese | 9.8 | 10 | 67.4 | 66.052 | 114 | 0.2 | 2.5 | 50 | 95.9 | 80-120 |
| Molybdenum | | | | | | | | | | |
| Nickel | | | | | | | | | | |
| Potassium | | | | | | | | | | |
| Selenium | | | | | | | | | | |
| Silver | | | | | | | | | | |
| Sodium | | | | | | | | | | |
| Strontium | | | | | | | | | | |
| Thallium | | | | | | | | | | |
| Tin | | | | | | | | | | |
| Titanium | | | | | | | | | | |
| Vanadium | | | | | | | | | | |
| Zinc | | | | | | | | | | |

Associated samples MP43117: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(**) Corr. sample result = Raw * (sample volume / final volume)
(anr) Analyte not requested

# General Chemistry

## QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

# METHOD BLANK AND SPIKE RESULTS SUMMARY
## GENERAL CHEMISTRY

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Analyte | Batch ID | RL | MB Result | Units | Spike Amount | BSP Result | BSP %Recov | QC Limits |
|---|---|---|---|---|---|---|---|---|
| Bromide | GP39356/GN95855 | 0.50 | 0.0 | mg/l | 10 | 10.1 | 101.0 | 90-110% |
| Chloride | GP39356/GN95855 | 2.0 | 0.0 | mg/l | 50 | 51.8 | 103.6 | 90-110% |
| Chloride | GP39357/GN95855 | 2.0 | 0.0 | mg/l | 50 | 52.1 | 104.2 | 90-110% |
| Fluoride | GP39356/GN95855 | 0.20 | 0.0 | mg/l | 2.5 | 2.49 | 99.6 | 90-110% |
| Iron, Ferrous | GN95878 | 0.10 | 0.0 | mg/l | 0.500 | 0.51 | 101.0 | 82-115% |
| Nitrogen, Nitrate | GP39356/GN95855 | 0.10 | 0.0 | mg/l | 2.5 | 2.46 | 98.4 | 90-110% |
| Nitrogen, Nitrate | GP39357/GN95855 | 0.10 | 0.0 | mg/l | 2.5 | 2.47 | 98.8 | 90-110% |
| Nitrogen, Nitrite | GP39356/GN95855 | 0.10 | 0.0 | mg/l | 2.5 | 2.62 | 104.8 | 90-110% |
| Nitrogen, Nitrite | GP39357/GN95855 | 0.10 | 0.0 | mg/l | 2.5 | 2.64 | 105.6 | 90-110% |
| Sulfate | GP39356/GN95855 | 2.0 | 0.0 | mg/l | 50 | 49.1 | 98.2 | 90-110% |
| Sulfate | GP39357/GN95855 | 2.0 | 0.0 | mg/l | 50 | 48.9 | 97.8 | 90-110% |
| Sulfide | GN95853 | 1.0 | 0.0 | mg/l | 12.30 | 12.3 | 100.0 | 85-115% |

Associated Samples:
Batch GN95853: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10
Batch GN95878: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10
Batch GP39356: FC11040-1, FC11040-2, FC11040-3
Batch GP39357: FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Analyte | Batch ID | QC Sample | Units | Original Result | DUP Result | RPD | QC Limits |
|---|---|---|---|---|---|---|---|
| Iron, Ferrous | GN95878 | FC11040-1 | mg/l | 0.030 U | 0.0 | 0.0 | 0-31% |

Associated Samples:
Batch GN95878: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10
(*) Outside of QC limits

# MATRIX SPIKE RESULTS SUMMARY
# GENERAL CHEMISTRY

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Analyte | Batch ID | QC Sample | Units | Original Result | Spike Amount | MS Result | %Rec | QC Limits |
|---|---|---|---|---|---|---|---|---|
| Bromide | GP39356/GN95855 | FC11034-4 | mg/l | 1.2 U | 10 | 9.1 | 91.0 | 90-110% |
| Chloride | GP39356/GN95855 | FC11034-4 | mg/l | 23.2 | 50 | 66.3 | 86.2N(a) | 90-110% |
| Chloride | GP39357/GN95855 | FC11040-4 | mg/l | 5.1 | 50 | 54.7 | 99.2 | 90-110% |
| Fluoride | GP39356/GN95855 | FC11034-4 | mg/l | 1.4 | 2.5 | 3.2 | 72.0N(a) | 90-110% |
| Nitrogen, Nitrate | GP39356/GN95855 | FC11034-4 | mg/l | 0.40 U | 2.5 | 2.2 | 88.0N(a) | 90-110% |
| Nitrogen, Nitrate | GP39357/GN95855 | FC11040-4 | mg/l | 0.22 | 2.5 | 2.6 | 95.2 | 90-110% |
| Nitrogen, Nitrite | GP39356/GN95855 | FC11034-4 | mg/l | 0.40 U | 2.5 | 2.1 | 84.0N(a) | 90-110% |
| Nitrogen, Nitrite | GP39357/GN95855 | FC11040-4 | mg/l | 0.040 U | 2.5 | 2.4 | 96.0 | 90-110% |
| Sulfate | GP39356/GN95855 | FC11034-4 | mg/l | 6.0 U | 50 | 45.0 | 90.0 | 90-110% |
| Sulfate | GP39357/GN95855 | FC11040-4 | mg/l | 4.4 | 50 | 51.7 | 94.6 | 90-110% |
| Sulfide | GN95853 | FC11040-1 | mg/l | 0.20 U | 8.95 | 9.1 | 101.6 | 85-115% |

Associated Samples:
Batch GN95853: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10
Batch GP39356: FC11040-1, FC11040-2, FC11040-3
Batch GP39357: FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(a) Spike recovery indicates possible matrix interference.

## MATRIX SPIKE DUPLICATE RESULTS SUMMARY
## GENERAL CHEMISTRY

Login Number: FC11040
Account: UTC - Raytheon Technologies
Project: AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Analyte | Batch ID | QC Sample | Units | Original Result | Spike Amount | MSD Result | RPD | QC Limit |
|---|---|---|---|---|---|---|---|---|
| Bromide | GP39356/GN95855 | FC11034-4 | mg/l | 1.2 U | 10 | 9.0 | 1.1 | 15% |
| Chloride | GP39356/GN95855 | FC11034-4 | mg/l | 23.2 | 50 | 65.3 | 1.5 | 15% |
| Chloride | GP39357/GN95855 | FC11040-4 | mg/l | 5.1 | 50 | 54.7 | 0.0 | 15% |
| Fluoride | GP39356/GN95855 | FC11034-4 | mg/l | 1.4 | 2.5 | 3.1 | 3.2 | 15% |
| Nitrogen, Nitrate | GP39356/GN95855 | FC11034-4 | mg/l | 0.40 U | 2.5 | 2.2 | 0.0 | 15% |
| Nitrogen, Nitrate | GP39357/GN95855 | FC11040-4 | mg/l | 0.22 | 2.5 | 2.6 | 0.0 | 15% |
| Nitrogen, Nitrite | GP39356/GN95855 | FC11034-4 | mg/l | 0.40 U | 2.5 | 2.1 | 0.0 | 15% |
| Nitrogen, Nitrite | GP39357/GN95855 | FC11040-4 | mg/l | 0.040 U | 2.5 | 2.4 | 0.0 | 15% |
| Sulfate | GP39356/GN95855 | FC11034-4 | mg/l | 6.0 U | 50 | 44.3 | 1.6 | 15% |
| Sulfate | GP39357/GN95855 | FC11040-4 | mg/l | 4.4 | 50 | 51.7 | 0.0 | 15% |
| Sulfide | GN95853 | FC11040-1 | mg/l | 0.20 U | 8.95 | 9.1 | 0.0 | 20% |

Associated Samples:
Batch GN95853: FC11040-1, FC11040-2, FC11040-3, FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10
Batch GP39356: FC11040-1, FC11040-2, FC11040-3
Batch GP39357: FC11040-4, FC11040-5, FC11040-6, FC11040-7, FC11040-8, FC11040-9, FC11040-10
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits

Client: Ros/Fitzgerald/AECOM
Project: Delavan Off-Site Remedial Investigation
PO#: 60707644.5b

ISO# 2024181
Location:Fridge 2 (Shelf 3)
6 for 13C-CSIA, 37Cl-CSIA

Environmental Isotope Lab
2024-06-25
1 of 1

| # | Sample | Date | Lab# | $\delta^{13}C$ | Result | Repeat | $\delta^{13}C$ | Result | Repeat | $\delta^{13}C$ | Result | Repeat | $\delta^{37}Cl$ | Result | Stdv | $\delta^{37}Cl$ | Result | Stdv | $\delta^{37}Cl$ | Result | Stdv | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | PCE | VPDB | ± 0.3‰ | TCE | VPDB | ± 0.3‰ | 1,1-DCE | VPDB | ± 0.3‰ | PCE | SMOC ± 0.4‰ | | TCE | SMOC ± 0.2‰ | | 1,1-DCE | SMOC ± 0.2‰ | | |
| 1 | MW-14D | 2024-03-13 | 527328 | X | -30.9 | | X | BAL | | X | BAL | | X | 0.39 | 0.34 | X | BAL | | X | BAL | | 40mlx9 |
| 2 | MW-3D | 2024-03-13 | 527329 | X | -32.6 | -32.77 | X | -33.9 | -33.67 | X | BAL | | X | 2.33 | 0.77 | X | 2.50 | 0.15 | X | 2.10 | 0.31 | 40mlx9 |
| 3 | MW-22D | 2024-03-13 | 527330 | X | -29 | | X | BAL | | X | BAL | | X | 1.69 | 0.23 | X | BAL | | X | 1.89 | 0.15 | 40mlx9 |
| 4 | MW-25D | 2024-03-13 | 527331 | X | -30.2 | | X | BAL | | X | BAL | | X | 1.19 | 0.41 | X | BAL | | X | 2.07 | | 40mlx9 |
| 5 | MW-30D | 2024-03-13 | 527332 | X | -29.7 | | X | BAL | | X | BAL | | X | 1.11 | 0.16 | X | 4.68 | | X | 1.52 | 0.22 | 40mlx9 |
| 6 | MW-31D | 2024-03-13 | 527333 | X | -29.7 | | X | BAL | | X | BAL | | X | 2.59 | 0.45 | X | BAL | | X | 1.93 | 0.01 | 40mlx9 |

| PCE | TCE | 1,1-DCE |
|---|---|---|
| ug/L | ug/L | ug/L |
| 35.5 | <0.35 | 0.4 |
| 261 | 8.1 | 5.7 |
| 79.3 | <0.35 | 1.5 |
| 63.3 | <0.35 | 1.2 |
| 53.2 | 0.73 | 1.2 |
| 128 | <0.35 | 3.7 |

Only a single injection (no repeat) was available for 527331-δ37Cl-1,1-DCE and 527332-δ37Cl-TCE

BAL= Below Analytical Limit
NA= Not Attempted (concentrations too low)
NES= Not Enough Sample
ND= Non-detect

SGS

Orlando, FL

12/22/23

The results set forth herein are provided by SGS North America Inc.

*e-Hardcopy 2.0*
*Automated Report*

# Technical Report for

## Raytheon Technologies

AECOMSCG: Delavan Spray Technologies; Bamberg, SC

60707644.5b

SGS Job Number: FC11990

Sampling Date: 12/13/23

Report to:

AECOM Environment
10 Patewood Dr Bldg VI, Suite 500
Greenville, SC 29615
leslee.alexander@aecom.com; doria.cullom@aecom.com

ATTN: Doria Cullom

Total number of pages in report: **26**

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable unless noted in the narrative, comments or footnotes.

Norm Farmer

Norm Farmer
Technical Director

Client Service contact: Muna Mohammed 407-425-6700

Certifications: FL(E83510), LA(03051), KS(E-10327), NC(573), NJ(FL002), NY(12022), SC(96038001) DoD ELAP(ANAB L2229), AZ(AZ0806), CA(2937), TX(T104704404), PA(68-03573), VA(460177), AL, AK, AR, CT, IA, KY, MA, MI. MS, ND, NH, NV, OK, OR, IL, UT, VT, WA, WI, WV

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Test results relate only to samples analyzed.

# Table of Contents

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# Sample Summary

Raytheon Technologies

**Job No:** FC11990

AECOMSCG: Delavan Spray Technologies; Bamberg, SC
Project No: 60707644.5b

This report contains results reported as ND = Not detected. The following applies:
Organics ND = Not detected above the MDL

| Sample | Collected | | | | Matrix | | Client |
|---|---|---|---|---|---|---|---|
| Number | Date | Time | By | Received | Code | Type | Sample ID |
| FC11990-1 | 12/13/23 | 11:55 | GCRM | 12/15/23 | AQ | Surface Water | SW-09-LC |
| FC11990-2 | 12/13/23 | 13:05 | GCRM | 12/15/23 | AQ | Surface Water | SW-04-TLC |
| FC11990-3 | 12/13/23 | 13:30 | GCRM | 12/15/23 | AQ | Surface Water | SW-12-TLC |
| FC11990-4 | 12/13/23 | 15:00 | GCRM | 12/15/23 | AQ | Surface Water | SW-10-HMB |
| FC11990-5 | 12/13/23 | 00:00 | GCRM | 12/15/23 | AQ | Trip Blank Water | TRIP BLANK |

# SAMPLE DELIVERY GROUP CASE NARRATIVE

| | | | |
|---|---|---|---|
| **Client:** | Raytheon Technologies | **Job No:** | FC11990 |
| **Site:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | **Report Date** | 12/22/2023 11:21:41 |

On 12/15/2023, 4 Samples, 1 Trip Blank, 0 Equip. Blanks and 0 Field Blanks were received at SGS North America Inc - Orlando. at a maximum corrected temperature of 3.6 C. Samples were intact and chemically preserved, unless noted below. A SGS North America Inc. - Orlando Job Number of FC11990 was assigned to the project.

Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section. Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

## MS Volatiles By Method SW846 8260D

**Matrix:** AQ **Batch ID:** V1A2022

All samples were analyzed within the recommended method holding time.

All method blanks for this batch meet method specific criteria.

Samples FC11791-1MS and FC11791-1MSD were used as the QC samples indicated.

V1A2022-MB: Sample was treated with an anti-foaming agent.

FC11990-1 for Methyl Bromide: Associated CCV outside control limits high, sample is ND.

FC11990-2 for Methyl Bromide: Associated CCV outside control limits high, sample is ND.

FC11990-3 for Methyl Bromide: Associated CCV outside control limits high, sample is ND.

FC11990-4 for Methyl Bromide: Associated CCV outside control limits high, sample is ND.

FC11990-5 for Methyl Bromide: Associated CCV outside control limits high, sample is ND.

SGS North America Inc. - Orlando certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting the Quality System precision, accuracy and completeness objectives except as noted. Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria. SGS North America Inc.- Orlando is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety.

Narrative prepared by:

______________________________________

Elizabeth Kent, Quality Assurance Officer *(Signature on File)*

# Summary of Hits

**Job Number:** FC11990
**Account:** Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC
**Collected:** 12/13/23

| Lab Sample ID<br>Analyte | Client Sample ID | Result/<br>Qual | RL | MDL | Units | Method |
|---|---|---|---|---|---|---|
| **FC11990-1** | **SW-09-LC** | | | | | |
| Tetrachloroethylene | | 2.7 | 1.0 | 0.22 | ug/l | SW846 8260D |
| **FC11990-2** | **SW-04-TLC** | | | | | |
| No hits reported in this sample. | | | | | | |
| **FC11990-3** | **SW-12-TLC** | | | | | |
| No hits reported in this sample. | | | | | | |
| **FC11990-4** | **SW-10-HMB** | | | | | |
| Tetrachloroethylene | | 4.4 | 1.0 | 0.22 | ug/l | SW846 8260D |
| **FC11990-5** | **TRIP BLANK** | | | | | |
| No hits reported in this sample. | | | | | | |

## Sample Results

## Report of Analysis

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | SW-09-LC | | |
| **Lab Sample ID:** | FC11990-1 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Surface Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | 1A51527.D | 1 | 12/19/23 13:58 | JW | n/a | n/a | V1A2022 |
| Run #2 | | | | | | | |

| | Purge Volume |
|---|---|
| Run #1 | 5.0 ml |
| Run #2 | |

## VOA TCL List

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 67-64-1 | Acetone | ND | 25 | 10 | ug/l | |
| 71-43-2 | Benzene | ND | 1.0 | 0.31 | ug/l | |
| 75-27-4 | Bromodichloromethane | ND | 1.0 | 0.24 | ug/l | |
| 75-25-2 | Bromoform | ND | 1.0 | 0.41 | ug/l | |
| 78-93-3 | 2-Butanone (MEK) | ND | 5.0 | 2.0 | ug/l | |
| 75-15-0 | Carbon Disulfide | ND | 2.0 | 0.53 | ug/l | |
| 56-23-5 | Carbon Tetrachloride | ND | 1.0 | 0.36 | ug/l | |
| 108-90-7 | Chlorobenzene | ND | 1.0 | 0.20 | ug/l | |
| 75-00-3 | Chloroethane | ND | 2.0 | 0.67 | ug/l | |
| 67-66-3 | Chloroform | ND | 1.0 | 0.30 | ug/l | |
| 124-48-1 | Dibromochloromethane | ND | 1.0 | 0.28 | ug/l | |
| 75-34-3 | 1,1-Dichloroethane | ND | 1.0 | 0.34 | ug/l | |
| 107-06-2 | 1,2-Dichloroethane | ND | 1.0 | 0.31 | ug/l | |
| 75-35-4 | 1,1-Dichloroethylene | ND | 1.0 | 0.32 | ug/l | |
| 156-59-2 | cis-1,2-Dichloroethylene | ND | 1.0 | 0.28 | ug/l | |
| 156-60-5 | trans-1,2-Dichloroethylene | ND | 1.0 | 0.22 | ug/l | |
| 78-87-5 | 1,2-Dichloropropane | ND | 1.0 | 0.43 | ug/l | |
| 10061-01-5 | cis-1,3-Dichloropropene | ND | 1.0 | 0.29 | ug/l | |
| 10061-02-6 | trans-1,3-Dichloropropene | ND | 1.0 | 0.21 | ug/l | |
| 100-41-4 | Ethylbenzene | ND | 1.0 | 0.36 | ug/l | |
| 591-78-6 | 2-Hexanone | ND | 10 | 2.0 | ug/l | |
| 74-83-9 | Methyl Bromide [a] | ND | 5.0 | 2.0 | ug/l | |
| 74-87-3 | Methyl Chloride | ND | 2.0 | 0.50 | ug/l | |
| 75-09-2 | Methylene Chloride | ND | 5.0 | 2.0 | ug/l | |
| 108-10-1 | 4-Methyl-2-pentanone (MIBK) | ND | 5.0 | 1.0 | ug/l | |
| 100-42-5 | Styrene | ND | 1.0 | 0.22 | ug/l | |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l | |
| 127-18-4 | Tetrachloroethylene | 2.7 | 1.0 | 0.22 | ug/l | |
| 108-88-3 | Toluene | ND | 1.0 | 0.30 | ug/l | |
| 71-55-6 | 1,1,1-Trichloroethane | ND | 1.0 | 0.25 | ug/l | |
| 79-00-5 | 1,1,2-Trichloroethane | ND | 1.0 | 0.47 | ug/l | |
| 79-01-6 | Trichloroethylene | ND | 1.0 | 0.35 | ug/l | |

---

ND = Not detected

MDL = Method Detection Limit

RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

B = Indicates analyte found in associated method blank

N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | SW-09-LC | | |
| **Lab Sample ID:** | FC11990-1 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Surface Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## VOA TCL List

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 75-01-4 | Vinyl Chloride | ND | 1.0 | 0.41 | ug/l | |
| 1330-20-7 | Xylene (total) | ND | 3.0 | 0.72 | ug/l | |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 1868-53-7 | Dibromofluoromethane | 95% | | 83-118% |
| 17060-07-0 | 1,2-Dichloroethane-D4 | 105% | | 79-125% |
| 2037-26-5 | Toluene-D8 | 103% | | 85-112% |
| 460-00-4 | 4-Bromofluorobenzene | 100% | | 83-118% |

(a) Associated CCV outside control limits high, sample is ND.

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | SW-04-TLC | | |
| **Lab Sample ID:** | FC11990-2 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Surface Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | 1A51528.D | 1 | 12/19/23 14:23 | JW | n/a | n/a | V1A2022 |
| Run #2 | | | | | | | |

| | Purge Volume |
|---|---|
| Run #1 | 5.0 ml |
| Run #2 | |

**VOA TCL List**

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 67-64-1 | Acetone | ND | 25 | 10 | ug/l | |
| 71-43-2 | Benzene | ND | 1.0 | 0.31 | ug/l | |
| 75-27-4 | Bromodichloromethane | ND | 1.0 | 0.24 | ug/l | |
| 75-25-2 | Bromoform | ND | 1.0 | 0.41 | ug/l | |
| 78-93-3 | 2-Butanone (MEK) | ND | 5.0 | 2.0 | ug/l | |
| 75-15-0 | Carbon Disulfide | ND | 2.0 | 0.53 | ug/l | |
| 56-23-5 | Carbon Tetrachloride | ND | 1.0 | 0.36 | ug/l | |
| 108-90-7 | Chlorobenzene | ND | 1.0 | 0.20 | ug/l | |
| 75-00-3 | Chloroethane | ND | 2.0 | 0.67 | ug/l | |
| 67-66-3 | Chloroform | ND | 1.0 | 0.30 | ug/l | |
| 124-48-1 | Dibromochloromethane | ND | 1.0 | 0.28 | ug/l | |
| 75-34-3 | 1,1-Dichloroethane | ND | 1.0 | 0.34 | ug/l | |
| 107-06-2 | 1,2-Dichloroethane | ND | 1.0 | 0.31 | ug/l | |
| 75-35-4 | 1,1-Dichloroethylene | ND | 1.0 | 0.32 | ug/l | |
| 156-59-2 | cis-1,2-Dichloroethylene | ND | 1.0 | 0.28 | ug/l | |
| 156-60-5 | trans-1,2-Dichloroethylene | ND | 1.0 | 0.22 | ug/l | |
| 78-87-5 | 1,2-Dichloropropane | ND | 1.0 | 0.43 | ug/l | |
| 10061-01-5 | cis-1,3-Dichloropropene | ND | 1.0 | 0.29 | ug/l | |
| 10061-02-6 | trans-1,3-Dichloropropene | ND | 1.0 | 0.21 | ug/l | |
| 100-41-4 | Ethylbenzene | ND | 1.0 | 0.36 | ug/l | |
| 591-78-6 | 2-Hexanone | ND | 10 | 2.0 | ug/l | |
| 74-83-9 | Methyl Bromide [a] | ND | 5.0 | 2.0 | ug/l | |
| 74-87-3 | Methyl Chloride | ND | 2.0 | 0.50 | ug/l | |
| 75-09-2 | Methylene Chloride | ND | 5.0 | 2.0 | ug/l | |
| 108-10-1 | 4-Methyl-2-pentanone (MIBK) | ND | 5.0 | 1.0 | ug/l | |
| 100-42-5 | Styrene | ND | 1.0 | 0.22 | ug/l | |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l | |
| 127-18-4 | Tetrachloroethylene | ND | 1.0 | 0.22 | ug/l | |
| 108-88-3 | Toluene | ND | 1.0 | 0.30 | ug/l | |
| 71-55-6 | 1,1,1-Trichloroethane | ND | 1.0 | 0.25 | ug/l | |
| 79-00-5 | 1,1,2-Trichloroethane | ND | 1.0 | 0.47 | ug/l | |
| 79-01-6 | Trichloroethylene | ND | 1.0 | 0.35 | ug/l | |

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | SW-04-TLC | | |
| **Lab Sample ID:** | FC11990-2 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Surface Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

**VOA TCL List**

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 75-01-4 | Vinyl Chloride | ND | 1.0 | 0.41 | ug/l | |
| 1330-20-7 | Xylene (total) | ND | 3.0 | 0.72 | ug/l | |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 1868-53-7 | Dibromofluoromethane | 95% | | 83-118% |
| 17060-07-0 | 1,2-Dichloroethane-D4 | 103% | | 79-125% |
| 2037-26-5 | Toluene-D8 | 101% | | 85-112% |
| 460-00-4 | 4-Bromofluorobenzene | 102% | | 83-118% |

(a) Associated CCV outside control limits high, sample is ND.

---

ND = Not detected MDL = Method Detection Limit J = Indicates an estimated value
RL = Reporting Limit B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | SW-12-TLC | | |
| **Lab Sample ID:** | FC11990-3 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Surface Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | 1A51529.D | 1 | 12/19/23 14:47 | JW | n/a | n/a | V1A2022 |
| Run #2 | | | | | | | |

| | Purge Volume |
|---|---|
| Run #1 | 5.0 ml |
| Run #2 | |

## VOA TCL List

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 67-64-1 | Acetone | ND | 25 | 10 | ug/l | |
| 71-43-2 | Benzene | ND | 1.0 | 0.31 | ug/l | |
| 75-27-4 | Bromodichloromethane | ND | 1.0 | 0.24 | ug/l | |
| 75-25-2 | Bromoform | ND | 1.0 | 0.41 | ug/l | |
| 78-93-3 | 2-Butanone (MEK) | ND | 5.0 | 2.0 | ug/l | |
| 75-15-0 | Carbon Disulfide | ND | 2.0 | 0.53 | ug/l | |
| 56-23-5 | Carbon Tetrachloride | ND | 1.0 | 0.36 | ug/l | |
| 108-90-7 | Chlorobenzene | ND | 1.0 | 0.20 | ug/l | |
| 75-00-3 | Chloroethane | ND | 2.0 | 0.67 | ug/l | |
| 67-66-3 | Chloroform | ND | 1.0 | 0.30 | ug/l | |
| 124-48-1 | Dibromochloromethane | ND | 1.0 | 0.28 | ug/l | |
| 75-34-3 | 1,1-Dichloroethane | ND | 1.0 | 0.34 | ug/l | |
| 107-06-2 | 1,2-Dichloroethane | ND | 1.0 | 0.31 | ug/l | |
| 75-35-4 | 1,1-Dichloroethylene | ND | 1.0 | 0.32 | ug/l | |
| 156-59-2 | cis-1,2-Dichloroethylene | ND | 1.0 | 0.28 | ug/l | |
| 156-60-5 | trans-1,2-Dichloroethylene | ND | 1.0 | 0.22 | ug/l | |
| 78-87-5 | 1,2-Dichloropropane | ND | 1.0 | 0.43 | ug/l | |
| 10061-01-5 | cis-1,3-Dichloropropene | ND | 1.0 | 0.29 | ug/l | |
| 10061-02-6 | trans-1,3-Dichloropropene | ND | 1.0 | 0.21 | ug/l | |
| 100-41-4 | Ethylbenzene | ND | 1.0 | 0.36 | ug/l | |
| 591-78-6 | 2-Hexanone | ND | 10 | 2.0 | ug/l | |
| 74-83-9 | Methyl Bromide [a] | ND | 5.0 | 2.0 | ug/l | |
| 74-87-3 | Methyl Chloride | ND | 2.0 | 0.50 | ug/l | |
| 75-09-2 | Methylene Chloride | ND | 5.0 | 2.0 | ug/l | |
| 108-10-1 | 4-Methyl-2-pentanone (MIBK) | ND | 5.0 | 1.0 | ug/l | |
| 100-42-5 | Styrene | ND | 1.0 | 0.22 | ug/l | |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l | |
| 127-18-4 | Tetrachloroethylene | ND | 1.0 | 0.22 | ug/l | |
| 108-88-3 | Toluene | ND | 1.0 | 0.30 | ug/l | |
| 71-55-6 | 1,1,1-Trichloroethane | ND | 1.0 | 0.25 | ug/l | |
| 79-00-5 | 1,1,2-Trichloroethane | ND | 1.0 | 0.47 | ug/l | |
| 79-01-6 | Trichloroethylene | ND | 1.0 | 0.35 | ug/l | |

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | SW-12-TLC | | |
| **Lab Sample ID:** | FC11990-3 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Surface Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

## VOA TCL List

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 75-01-4 | Vinyl Chloride | ND | 1.0 | 0.41 | ug/l | |
| 1330-20-7 | Xylene (total) | ND | 3.0 | 0.72 | ug/l | |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 1868-53-7 | Dibromofluoromethane | 96% | | 83-118% |
| 17060-07-0 | 1,2-Dichloroethane-D4 | 103% | | 79-125% |
| 2037-26-5 | Toluene-D8 | 102% | | 85-112% |
| 460-00-4 | 4-Bromofluorobenzene | 101% | | 83-118% |

(a) Associated CCV outside control limits high, sample is ND.

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | SW-10-HMB | | |
| **Lab Sample ID:** | FC11990-4 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Surface Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

| | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | 1A51530.D | 1 | 12/19/23 15:11 | JW | n/a | n/a | V1A2022 |
| Run #2 | | | | | | | |

| | Purge Volume |
|---|---|
| Run #1 | 5.0 ml |
| Run #2 | |

**VOA TCL List**

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 67-64-1 | Acetone | ND | 25 | 10 | ug/l | |
| 71-43-2 | Benzene | ND | 1.0 | 0.31 | ug/l | |
| 75-27-4 | Bromodichloromethane | ND | 1.0 | 0.24 | ug/l | |
| 75-25-2 | Bromoform | ND | 1.0 | 0.41 | ug/l | |
| 78-93-3 | 2-Butanone (MEK) | ND | 5.0 | 2.0 | ug/l | |
| 75-15-0 | Carbon Disulfide | ND | 2.0 | 0.53 | ug/l | |
| 56-23-5 | Carbon Tetrachloride | ND | 1.0 | 0.36 | ug/l | |
| 108-90-7 | Chlorobenzene | ND | 1.0 | 0.20 | ug/l | |
| 75-00-3 | Chloroethane | ND | 2.0 | 0.67 | ug/l | |
| 67-66-3 | Chloroform | ND | 1.0 | 0.30 | ug/l | |
| 124-48-1 | Dibromochloromethane | ND | 1.0 | 0.28 | ug/l | |
| 75-34-3 | 1,1-Dichloroethane | ND | 1.0 | 0.34 | ug/l | |
| 107-06-2 | 1,2-Dichloroethane | ND | 1.0 | 0.31 | ug/l | |
| 75-35-4 | 1,1-Dichloroethylene | ND | 1.0 | 0.32 | ug/l | |
| 156-59-2 | cis-1,2-Dichloroethylene | ND | 1.0 | 0.28 | ug/l | |
| 156-60-5 | trans-1,2-Dichloroethylene | ND | 1.0 | 0.22 | ug/l | |
| 78-87-5 | 1,2-Dichloropropane | ND | 1.0 | 0.43 | ug/l | |
| 10061-01-5 | cis-1,3-Dichloropropene | ND | 1.0 | 0.29 | ug/l | |
| 10061-02-6 | trans-1,3-Dichloropropene | ND | 1.0 | 0.21 | ug/l | |
| 100-41-4 | Ethylbenzene | ND | 1.0 | 0.36 | ug/l | |
| 591-78-6 | 2-Hexanone | ND | 10 | 2.0 | ug/l | |
| 74-83-9 | Methyl Bromide [a] | ND | 5.0 | 2.0 | ug/l | |
| 74-87-3 | Methyl Chloride | ND | 2.0 | 0.50 | ug/l | |
| 75-09-2 | Methylene Chloride | ND | 5.0 | 2.0 | ug/l | |
| 108-10-1 | 4-Methyl-2-pentanone (MIBK) | ND | 5.0 | 1.0 | ug/l | |
| 100-42-5 | Styrene | ND | 1.0 | 0.22 | ug/l | |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l | |
| 127-18-4 | Tetrachloroethylene | 4.4 | 1.0 | 0.22 | ug/l | |
| 108-88-3 | Toluene | ND | 1.0 | 0.30 | ug/l | |
| 71-55-6 | 1,1,1-Trichloroethane | ND | 1.0 | 0.25 | ug/l | |
| 79-00-5 | 1,1,2-Trichloroethane | ND | 1.0 | 0.47 | ug/l | |
| 79-01-6 | Trichloroethylene | ND | 1.0 | 0.35 | ug/l | |

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | SW-10-HMB | | |
| **Lab Sample ID:** | FC11990-4 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Surface Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

**VOA TCL List**

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 75-01-4 | Vinyl Chloride | ND | 1.0 | 0.41 | ug/l | |
| 1330-20-7 | Xylene (total) | ND | 3.0 | 0.72 | ug/l | |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 1868-53-7 | Dibromofluoromethane | 98% | | 83-118% |
| 17060-07-0 | 1,2-Dichloroethane-D4 | 106% | | 79-125% |
| 2037-26-5 | Toluene-D8 | 102% | | 85-112% |
| 460-00-4 | 4-Bromofluorobenzene | 100% | | 83-118% |

(a) Associated CCV outside control limits high, sample is ND.

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

|  |  |  |  |
|---|---|---|---|
| **Client Sample ID:** | TRIP BLANK |  |  |
| **Lab Sample ID:** | FC11990-5 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Trip Blank Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC |  |  |

|  | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| Run #1 | 1A51519.D | 1 | 12/19/23 10:44 | JW | n/a | n/a | V1A2022 |
| Run #2 |  |  |  |  |  |  |  |

|  | Purge Volume |
|---|---|
| Run #1 | 5.0 ml |
| Run #2 |  |

## VOA TCL List

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 67-64-1 | Acetone | ND | 25 | 10 | ug/l |  |
| 71-43-2 | Benzene | ND | 1.0 | 0.31 | ug/l |  |
| 75-27-4 | Bromodichloromethane | ND | 1.0 | 0.24 | ug/l |  |
| 75-25-2 | Bromoform | ND | 1.0 | 0.41 | ug/l |  |
| 78-93-3 | 2-Butanone (MEK) | ND | 5.0 | 2.0 | ug/l |  |
| 75-15-0 | Carbon Disulfide | ND | 2.0 | 0.53 | ug/l |  |
| 56-23-5 | Carbon Tetrachloride | ND | 1.0 | 0.36 | ug/l |  |
| 108-90-7 | Chlorobenzene | ND | 1.0 | 0.20 | ug/l |  |
| 75-00-3 | Chloroethane | ND | 2.0 | 0.67 | ug/l |  |
| 67-66-3 | Chloroform | ND | 1.0 | 0.30 | ug/l |  |
| 124-48-1 | Dibromochloromethane | ND | 1.0 | 0.28 | ug/l |  |
| 75-34-3 | 1,1-Dichloroethane | ND | 1.0 | 0.34 | ug/l |  |
| 107-06-2 | 1,2-Dichloroethane | ND | 1.0 | 0.31 | ug/l |  |
| 75-35-4 | 1,1-Dichloroethylene | ND | 1.0 | 0.32 | ug/l |  |
| 156-59-2 | cis-1,2-Dichloroethylene | ND | 1.0 | 0.28 | ug/l |  |
| 156-60-5 | trans-1,2-Dichloroethylene | ND | 1.0 | 0.22 | ug/l |  |
| 78-87-5 | 1,2-Dichloropropane | ND | 1.0 | 0.43 | ug/l |  |
| 10061-01-5 | cis-1,3-Dichloropropene | ND | 1.0 | 0.29 | ug/l |  |
| 10061-02-6 | trans-1,3-Dichloropropene | ND | 1.0 | 0.21 | ug/l |  |
| 100-41-4 | Ethylbenzene | ND | 1.0 | 0.36 | ug/l |  |
| 591-78-6 | 2-Hexanone | ND | 10 | 2.0 | ug/l |  |
| 74-83-9 | Methyl Bromide [a] | ND | 5.0 | 2.0 | ug/l |  |
| 74-87-3 | Methyl Chloride | ND | 2.0 | 0.50 | ug/l |  |
| 75-09-2 | Methylene Chloride | ND | 5.0 | 2.0 | ug/l |  |
| 108-10-1 | 4-Methyl-2-pentanone (MIBK) | ND | 5.0 | 1.0 | ug/l |  |
| 100-42-5 | Styrene | ND | 1.0 | 0.22 | ug/l |  |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l |  |
| 127-18-4 | Tetrachloroethylene | ND | 1.0 | 0.22 | ug/l |  |
| 108-88-3 | Toluene | ND | 1.0 | 0.30 | ug/l |  |
| 71-55-6 | 1,1,1-Trichloroethane | ND | 1.0 | 0.25 | ug/l |  |
| 79-00-5 | 1,1,2-Trichloroethane | ND | 1.0 | 0.47 | ug/l |  |
| 79-01-6 | Trichloroethylene | ND | 1.0 | 0.35 | ug/l |  |

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Report of Analysis

| | | | |
|---|---|---|---|
| **Client Sample ID:** | TRIP BLANK | | |
| **Lab Sample ID:** | FC11990-5 | **Date Sampled:** | 12/13/23 |
| **Matrix:** | AQ - Trip Blank Water | **Date Received:** | 12/15/23 |
| **Method:** | SW846 8260D | **Percent Solids:** | n/a |
| **Project:** | AECOMSCG: Delavan Spray Technologies; Bamberg, SC | | |

**VOA TCL List**

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 75-01-4 | Vinyl Chloride | ND | 1.0 | 0.41 | ug/l | |
| 1330-20-7 | Xylene (total) | ND | 3.0 | 0.72 | ug/l | |

| CAS No. | Surrogate Recoveries | Run# 1 | Run# 2 | Limits |
|---|---|---|---|---|
| 1868-53-7 | Dibromofluoromethane | 96% | | 83-118% |
| 17060-07-0 | 1,2-Dichloroethane-D4 | 104% | | 79-125% |
| 2037-26-5 | Toluene-D8 | 103% | | 85-112% |
| 460-00-4 | 4-Bromofluorobenzene | 101% | | 83-118% |

(a) Associated CCV outside control limits high, sample is ND.

---

ND = Not detected
MDL = Method Detection Limit
J = Indicates an estimated value
RL = Reporting Limit
B = Indicates analyte found in associated method blank
E = Indicates value exceeds calibration range
N = Indicates presumptive evidence of a compound

# Misc. Forms

## Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

SGS

# SGS North America Inc - Orlando
# Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL 407-425-6700 FAX: 407-425-0707
www.sgs.com

**SGS - ORLANDO JOB # :** FC11990 **PAGE** 1 **OF** 1

**SGS - ORLANDO Quote #** **SHIP**

## Client / Reporting Information

**Company Name:** AECOM
**Address:** 10 Patewood Drive Bldg VI Suite 500
**City:** Greenville **State:** SC **Zip:** 29615
**Project Contact:** IAN ROS **Email:** ian.ros@aecom.com
**Phone #:** 1-252-326-5240
**Sampler(s) Name(s) (Printed)**
**Sampler 1:** Griffin Collins **Sampler 2:** Randy Morgan

## Project Information

**Project Name:** RTX Delavan
**Street** 4334 Main Hwy
**City** Bamberg **State** SC
**Project #** 60707644.56-OffsiteRI
**Fax #**
**Client Purchase Order #** 1610495

## Analytical Information

**Matrix Codes**
DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL- Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid

| SGS Orlando Sample # | Field ID / Point of Collection | COLLECTION<br>DATE | TIME | SAMPLED BY: | MATRIX | TOTAL # OF BOTTLES | CONTAINER INFORMATION<br>OTHER | NONE | HCl | NaOH | HNO3 | H2SO4 | NAOH+ZNAC | DI WATER | MEOH | EPA 8260 | | | | | | | | | | | LAB USE ONLY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SW-09-LC | 12/13/23 | 1155 | GC | SW | 3 | | | X | | | | | | | X | | | | | | | | | | | |
| 2 | SW-04-TLC | 12/13/23 | 1305 | GC | SW | 3 | | | X | | | | | | | X | | | | | | | | | | | |
| 3 | SW-12-TLC | 12/13/23 | 1330 | GC | SW | 3 | | | X | | | | | | | X | | | | | | | | | | | |
| 4 | SW-10-HMB | 12/13/23 | 1500 | GC | SW | 3 | | | X | | | | | | | X | | | | | | | | | | | |
| 5 | Trip Blank | 12/13/23 | | | | | | | X | | | | | | | X | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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INITIAL ASSESSMENT

## Turnaround Time ( Business days)

10 Day (Business)
7 Day
5 Day
[✓ 3 Day *RUSH*]
2 Day *RUSH*
1 Day *RUSH*
Other

Approved By: / Date: Ian Ros / RM

Rush T/A Data Available VIA Email or Lablink

## Data Deliverable Information

☐ COMMERCIAL "A" (RESULTS ONLY)
☐ COMMERCIAL "B" (RESULTS PLUS QC)
☐ REDT1 (EPA LEVEL 3)
☐ FULLT1 (EPA LEVEL 4)
☒ EDD'S

## Comments / Remarks

LABEL VERIFICATION

Sample Custody must be documented below each time samples change possession, including courier delivery.

| Relinquished by Sampler/Affiliation | Date Time: | Received By/Affiliation | Relinquished By/Affiliation | Date Time: | Received By/Affiliation |
|---|---|---|---|---|---|
| Randy Morgan AECOM | 12/14/23 0930 | 2 FedEX | 3 FX | | 4 12/15/23 0930 |
| Relinquished by/Affiliation | Date Time: | Received By/Affiliation | Relinquished By/Affiliation | Date Time: | Received By/Affiliation |
| 5 | | 6 | 7 | | 8 |

**Lab Use Only :** Cooler Temperature (s) Celsius (corrected): 3.2 FR #1

http://www.sgs.com/en/terms-and-conditions

ORLD-SMT-0001-03-FORM-COC (1) Rev 031318

## FC11990: Chain of Custody
## Page 1 of 2

# SGS - Orlando Sample Receipt Summary

**Job Number:** fc11990 **Client:** AECOM **Project:** RTX DELAVAN

**Date / Time Received:** 12/15/2023 9:30:00 AM **Delivery Method:** FED EX **Airbill #'s:** 6840 3320 1779

**Cooler Temps (Raw Measured) °C:** Cooler 1: (3.2);

**Cooler Temps (Corrected) °C:** Cooler 1: (3.6);

| Cooler Information | Y | N |
|---|---|---|
| 1. Custody Seals Present: | ☑ | ☐ |
| 2. Custody Seals Intact: | ☑ | ☐ |
| 3. Temp criteria achieved: | ☑ | ☐ |
| 4. Cooler temp verification: | IR Gun | |
| 5. Cooler media: | Ice (Bag) | |

| Trip Blank Information | Y | N | N/A |
|---|---|---|---|
| 1. Trip Blank present / cooler: | ☑ | ☐ | ☐ |
| 2. Trip Blank listed on COC: | ☑ | ☐ | ☐ |
| | **W** | **S** | **N/A** |
| 3. Type of TB Received | ☑ | ☐ | ☐ |

| Sample Information | Y | N | N/A |
|---|---|---|---|
| 1. Sample labels present on bottles: | ☑ | ☐ | |
| 2. Samples presented properly | ☑ | ☐ | |
| 3. Suffiient volume/containers recv'd for analysis | ☑ | ☐ | |
| 4. Condition of sample: | Intact | | |
| 5. Sample recv'd within HT | ☑ | ☐ | |
| 6. Dates/Times/IDs on COC match sample label | ☑ | ☐ | |
| 7. VOCs have headspace | ☐ | ☑ | ☐ |
| 8. Bottles received for unspecified tests | ☐ | ☑ | |
| 9. Compositing instructions clear | ☐ | ☐ | ☑ |
| 10. Voa Soil Kits/Jars received past 48hrs? | ☐ | ☐ | ☑ |
| 11. % Solids Jar Received? | ☐ | ☐ | ☑ |
| 12. Residual Chlorine Present? | ☐ | ☐ | ☑ |

**Misc Information**

Number of Encores: 25 Gram 5 Gram

Number of Lab Filtered Metals:

Test Strip Lot #s: pH 0-3: 226422

pH 10-12:

Other: (Specify) pH 1.0 - 12.0 222221

Residual Chlorine Test Strip Lot #

Comments

Sample Receipt Summary 112723 EK Technician: SHAYLAP Date: 12/15/2023 10:05:46 AM Reviewer: Date:

# MS Volatiles

## QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

# Method Blank Summary

**Job Number:** FC11990
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| V1A2022-MB [a] | 1A51514.D | 1 | 12/19/23 | JW | n/a | n/a | V1A2022 |

**The QC reported here applies to the following samples:** **Method:** SW846 8260D

FC11990-1, FC11990-2, FC11990-3, FC11990-4, FC11990-5

| CAS No. | Compound | Result | RL | MDL | Units | Q |
|---|---|---|---|---|---|---|
| 67-64-1 | Acetone | ND | 25 | 10 | ug/l | |
| 71-43-2 | Benzene | ND | 1.0 | 0.31 | ug/l | |
| 75-27-4 | Bromodichloromethane | ND | 1.0 | 0.24 | ug/l | |
| 75-25-2 | Bromoform | ND | 1.0 | 0.41 | ug/l | |
| 78-93-3 | 2-Butanone (MEK) | ND | 5.0 | 2.0 | ug/l | |
| 75-15-0 | Carbon Disulfide | ND | 2.0 | 0.53 | ug/l | |
| 56-23-5 | Carbon Tetrachloride | ND | 1.0 | 0.36 | ug/l | |
| 108-90-7 | Chlorobenzene | ND | 1.0 | 0.20 | ug/l | |
| 75-00-3 | Chloroethane | ND | 2.0 | 0.67 | ug/l | |
| 67-66-3 | Chloroform | ND | 1.0 | 0.30 | ug/l | |
| 124-48-1 | Dibromochloromethane | ND | 1.0 | 0.28 | ug/l | |
| 75-34-3 | 1,1-Dichloroethane | ND | 1.0 | 0.34 | ug/l | |
| 107-06-2 | 1,2-Dichloroethane | ND | 1.0 | 0.31 | ug/l | |
| 75-35-4 | 1,1-Dichloroethylene | ND | 1.0 | 0.32 | ug/l | |
| 156-59-2 | cis-1,2-Dichloroethylene | ND | 1.0 | 0.28 | ug/l | |
| 156-60-5 | trans-1,2-Dichloroethylene | ND | 1.0 | 0.22 | ug/l | |
| 78-87-5 | 1,2-Dichloropropane | ND | 1.0 | 0.43 | ug/l | |
| 10061-01-5 | cis-1,3-Dichloropropene | ND | 1.0 | 0.29 | ug/l | |
| 10061-02-6 | trans-1,3-Dichloropropene | ND | 1.0 | 0.21 | ug/l | |
| 100-41-4 | Ethylbenzene | ND | 1.0 | 0.36 | ug/l | |
| 591-78-6 | 2-Hexanone | ND | 10 | 2.0 | ug/l | |
| 74-83-9 | Methyl Bromide | ND | 5.0 | 2.0 | ug/l | |
| 74-87-3 | Methyl Chloride | ND | 2.0 | 0.50 | ug/l | |
| 75-09-2 | Methylene Chloride | ND | 5.0 | 2.0 | ug/l | |
| 108-10-1 | 4-Methyl-2-pentanone (MIBK) | ND | 5.0 | 1.0 | ug/l | |
| 100-42-5 | Styrene | ND | 1.0 | 0.22 | ug/l | |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | ND | 1.0 | 0.30 | ug/l | |
| 127-18-4 | Tetrachloroethylene | ND | 1.0 | 0.22 | ug/l | |
| 108-88-3 | Toluene | ND | 1.0 | 0.30 | ug/l | |
| 71-55-6 | 1,1,1-Trichloroethane | ND | 1.0 | 0.25 | ug/l | |
| 79-00-5 | 1,1,2-Trichloroethane | ND | 1.0 | 0.47 | ug/l | |
| 79-01-6 | Trichloroethylene | ND | 1.0 | 0.35 | ug/l | |
| 75-01-4 | Vinyl Chloride | ND | 1.0 | 0.41 | ug/l | |
| 1330-20-7 | Xylene (total) | ND | 3.0 | 0.72 | ug/l | |

# Method Blank Summary

**Job Number:** FC11990
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| V1A2022-MB [a] | 1A51514.D | 1 | 12/19/23 | JW | n/a | n/a | V1A2022 |

**The QC reported here applies to the following samples:** **Method:** SW846 8260D

FC11990-1, FC11990-2, FC11990-3, FC11990-4, FC11990-5

| CAS No. | Surrogate Recoveries | | Limits |
|---|---|---|---|
| 1868-53-7 | Dibromofluoromethane | 93% | 83-118% |
| 17060-07-0 | 1,2-Dichloroethane-D4 | 101% | 79-125% |
| 2037-26-5 | Toluene-D8 | 101% | 85-112% |
| 460-00-4 | 4-Bromofluorobenzene | 103% | 83-118% |

| CAS No. | Tentatively Identified Compounds | R.T. | Est. Conc. | Units | Q |
|---|---|---|---|---|---|
| | Total TIC, Volatile | | 0 | ug/l | |

(a) Sample was treated with an anti-foaming agent.

# Blank Spike Summary

**Job Number:** FC11990
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| V1A2022-BS | 1A51512.D | 1 | 12/19/23 | JW | n/a | n/a | V1A2022 |

**The QC reported here applies to the following samples:** **Method:** SW846 8260D

FC11990-1, FC11990-2, FC11990-3, FC11990-4, FC11990-5

| CAS No. | Compound | Spike ug/l | BSP ug/l | BSP % | Limits |
|---|---|---|---|---|---|
| 67-64-1 | Acetone | 125 | 117 | 94 | 50-147 |
| 71-43-2 | Benzene | 25 | 22.7 | 91 | 81-122 |
| 75-27-4 | Bromodichloromethane | 25 | 20.5 | 82 | 79-123 |
| 75-25-2 | Bromoform | 25 | 19.5 | 78 | 66-123 |
| 78-93-3 | 2-Butanone (MEK) | 125 | 102 | 82 | 56-143 |
| 75-15-0 | Carbon Disulfide | 25 | 20.5 | 82 | 66-148 |
| 56-23-5 | Carbon Tetrachloride | 25 | 22.3 | 89 | 76-136 |
| 108-90-7 | Chlorobenzene | 25 | 22.6 | 90 | 82-124 |
| 75-00-3 | Chloroethane | 25 | 23.4 | 94 | 62-144 |
| 67-66-3 | Chloroform | 25 | 22.8 | 91 | 80-124 |
| 124-48-1 | Dibromochloromethane | 25 | 21.7 | 87 | 78-122 |
| 75-34-3 | 1,1-Dichloroethane | 25 | 20.7 | 83 | 81-122 |
| 107-06-2 | 1,2-Dichloroethane | 25 | 22.7 | 91 | 75-125 |
| 75-35-4 | 1,1-Dichloroethylene | 25 | 21.4 | 86 | 78-137 |
| 156-59-2 | cis-1,2-Dichloroethylene | 25 | 21.3 | 85 | 78-120 |
| 156-60-5 | trans-1,2-Dichloroethylene | 25 | 21.4 | 86 | 76-127 |
| 78-87-5 | 1,2-Dichloropropane | 25 | 21.8 | 87 | 76-124 |
| 10061-01-5 | cis-1,3-Dichloropropene | 25 | 20.5 | 82 | 75-118 |
| 10061-02-6 | trans-1,3-Dichloropropene | 25 | 20.3 | 81 | 80-120 |
| 100-41-4 | Ethylbenzene | 25 | 21.7 | 87 | 81-121 |
| 591-78-6 | 2-Hexanone | 125 | 109 | 87 | 61-129 |
| 74-83-9 | Methyl Bromide | 25 | 32.0 | 128 | 59-143 |
| 74-87-3 | Methyl Chloride | 25 | 21.8 | 87 | 50-159 |
| 75-09-2 | Methylene Chloride | 25 | 23.4 | 94 | 69-135 |
| 108-10-1 | 4-Methyl-2-pentanone (MIBK) | 125 | 115 | 92 | 66-122 |
| 100-42-5 | Styrene | 25 | 21.8 | 87 | 78-119 |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | 25 | 21.4 | 86 | 72-120 |
| 127-18-4 | Tetrachloroethylene | 25 | 23.5 | 94 | 76-135 |
| 108-88-3 | Toluene | 25 | 23.4 | 94 | 80-120 |
| 71-55-6 | 1,1,1-Trichloroethane | 25 | 23.1 | 92 | 75-130 |
| 79-00-5 | 1,1,2-Trichloroethane | 25 | 20.9 | 84 | 76-119 |
| 79-01-6 | Trichloroethylene | 25 | 22.4 | 90 | 81-126 |
| 75-01-4 | Vinyl Chloride | 25 | 23.1 | 92 | 69-159 |
| 1330-20-7 | Xylene (total) | 75 | 69.4 | 93 | 80-126 |

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* = Outside of Control Limits.

# Blank Spike Summary

**Job Number:** FC11990
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| V1A2022-BS | 1A51512.D | 1 | 12/19/23 | JW | n/a | n/a | V1A2022 |

**The QC reported here applies to the following samples:** **Method:** SW846 8260D

FC11990-1, FC11990-2, FC11990-3, FC11990-4, FC11990-5

| CAS No. | Surrogate Recoveries | BSP | Limits |
|---|---|---|---|
| 1868-53-7 | Dibromofluoromethane | 95% | 83-118% |
| 17060-07-0 | 1,2-Dichloroethane-D4 | 105% | 79-125% |
| 2037-26-5 | Toluene-D8 | 104% | 85-112% |
| 460-00-4 | 4-Bromofluorobenzene | 101% | 83-118% |

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* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

**Job Number:** FC11990
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| FC11791-1MS | 1A51536.D | 5 | 12/19/23 | JW | n/a | n/a | V1A2022 |
| FC11791-1MSD | 1A51537.D | 5 | 12/19/23 | JW | n/a | n/a | V1A2022 |
| FC11791-1 | 1A51516.D | 1 | 12/19/23 | JW | n/a | n/a | V1A2022 |

**The QC reported here applies to the following samples:** **Method:** SW846 8260D

FC11990-1, FC11990-2, FC11990-3, FC11990-4, FC11990-5

| CAS No. | Compound | FC11791-1 ug/l | Q | Spike ug/l | MS ug/l | MS % | Spike ug/l | MSD ug/l | MSD % | RPD | Limits Rec/RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 67-64-1 | Acetone | ND | | 625 | 523 | 84 | 625 | 518 | 83 | 1 | 50-147/21 |
| 71-43-2 | Benzene | ND | | 125 | 112 | 90 | 125 | 110 | 88 | 2 | 81-122/14 |
| 75-27-4 | Bromodichloromethane | ND | | 125 | 105 | 84 | 125 | 103 | 82 | 2 | 79-123/19 |
| 75-25-2 | Bromoform | ND | | 125 | 94.2 | 75 | 125 | 96.8 | 77 | 3 | 66-123/21 |
| 78-93-3 | 2-Butanone (MEK) | ND | | 625 | 511 | 82 | 625 | 503 | 80 | 2 | 56-143/18 |
| 75-15-0 | Carbon Disulfide | ND | | 125 | 101 | 81 | 125 | 98.5 | 79 | 3 | 66-148/23 |
| 56-23-5 | Carbon Tetrachloride | ND | | 125 | 105 | 84 | 125 | 108 | 86 | 3 | 76-136/23 |
| 108-90-7 | Chlorobenzene | ND | | 125 | 115 | 92 | 125 | 112 | 90 | 3 | 82-124/14 |
| 75-00-3 | Chloroethane | ND | | 125 | 119 | 95 | 125 | 114 | 91 | 4 | 62-144/20 |
| 67-66-3 | Chloroform | ND | | 125 | 114 | 91 | 125 | 113 | 90 | 1 | 80-124/15 |
| 124-48-1 | Dibromochloromethane | ND | | 125 | 108 | 86 | 125 | 109 | 87 | 1 | 78-122/19 |
| 75-34-3 | 1,1-Dichloroethane | 1.6 | | 125 | 107 | 84 | 125 | 103 | 81 | 4 | 81-122/15 |
| 107-06-2 | 1,2-Dichloroethane | ND | | 125 | 120 | 96 | 125 | 116 | 93 | 3 | 75-125/14 |
| 75-35-4 | 1,1-Dichloroethylene | ND | | 125 | 106 | 85 | 125 | 102 | 82 | 4 | 78-137/18 |
| 156-59-2 | cis-1,2-Dichloroethylene | 1.8 | | 125 | 110 | 87 | 125 | 105 | 83 | 5 | 78-120/15 |
| 156-60-5 | trans-1,2-Dichloroethylene | ND | | 125 | 104 | 83 | 125 | 102 | 82 | 2 | 76-127/17 |
| 78-87-5 | 1,2-Dichloropropane | ND | | 125 | 112 | 90 | 125 | 111 | 89 | 1 | 76-124/14 |
| 10061-01-5 | cis-1,3-Dichloropropene | ND | | 125 | 102 | 82 | 125 | 99.6 | 80 | 2 | 75-118/23 |
| 10061-02-6 | trans-1,3-Dichloropropene | ND | | 125 | 101 | 81 | 125 | 101 | 81 | 0 | 80-120/22 |
| 100-41-4 | Ethylbenzene | ND | | 125 | 118 | 94 | 125 | 119 | 95 | 1 | 81-121/14 |
| 591-78-6 | 2-Hexanone | ND | | 625 | 550 | 88 | 625 | 552 | 88 | 0 | 61-129/18 |
| 74-83-9 | Methyl Bromide | ND | | 125 | 126 | 101 | 125 | 136 | 109 | 8 | 59-143/19 |
| 74-87-3 | Methyl Chloride | ND | | 125 | 111 | 89 | 125 | 108 | 86 | 3 | 50-159/19 |
| 75-09-2 | Methylene Chloride | ND | | 125 | 117 | 94 | 125 | 114 | 91 | 3 | 69-135/16 |
| 108-10-1 | 4-Methyl-2-pentanone (MIBK) | ND | | 625 | 606 | 97 | 625 | 591 | 95 | 3 | 66-122/16 |
| 100-42-5 | Styrene | ND | | 125 | 109 | 87 | 125 | 107 | 86 | 2 | 78-119/23 |
| 79-34-5 | 1,1,2,2-Tetrachloroethane | ND | | 125 | 117 | 94 | 125 | 114 | 91 | 3 | 72-120/14 |
| 127-18-4 | Tetrachloroethylene | 14.0 | | 125 | 126 | 90 | 125 | 123 | 87 | 2 | 76-135/16 |
| 108-88-3 | Toluene | ND | | 125 | 116 | 93 | 125 | 112 | 90 | 4 | 80-120/14 |
| 71-55-6 | 1,1,1-Trichloroethane | 1.8 | | 125 | 117 | 92 | 125 | 114 | 90 | 3 | 75-130/16 |
| 79-00-5 | 1,1,2-Trichloroethane | ND | | 125 | 107 | 86 | 125 | 105 | 84 | 2 | 76-119/14 |
| 79-01-6 | Trichloroethylene | 0.65 | J | 125 | 110 | 87 | 125 | 106 | 84 | 4 | 81-126/15 |
| 75-01-4 | Vinyl Chloride | ND | | 125 | 119 | 95 | 125 | 119 | 95 | 0 | 69-159/18 |
| 1330-20-7 | Xylene (total) | ND | | 375 | 346 | 92 | 375 | 338 | 90 | 2 | 80-126/15 |

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* = Outside of Control Limits.

# Matrix Spike/Matrix Spike Duplicate Summary

**Job Number:** FC11990
**Account:** UTC Raytheon Technologies
**Project:** AECOMSCG: Delavan Spray Technologies; Bamberg, SC

| Sample | File ID | DF | Analyzed | By | Prep Date | Prep Batch | Analytical Batch |
|---|---|---|---|---|---|---|---|
| FC11791-1MS | 1A51536.D | 5 | 12/19/23 | JW | n/a | n/a | V1A2022 |
| FC11791-1MSD | 1A51537.D | 5 | 12/19/23 | JW | n/a | n/a | V1A2022 |
| FC11791-1 | 1A51516.D | 1 | 12/19/23 | JW | n/a | n/a | V1A2022 |

**The QC reported here applies to the following samples:** **Method:** SW846 8260D

FC11990-1, FC11990-2, FC11990-3, FC11990-4, FC11990-5

| CAS No. | Surrogate Recoveries | MS | MSD | FC11791-1 | Limits |
|---|---|---|---|---|---|
| 1868-53-7 | Dibromofluoromethane | 96% | 96% | 94% | 83-118% |
| 17060-07-0 | 1,2-Dichloroethane-D4 | 106% | 105% | 102% | 79-125% |
| 2037-26-5 | Toluene-D8 | 101% | 103% | 103% | 85-112% |
| 460-00-4 | 4-Bromofluorobenzene | 100% | 101% | 101% | 83-118% |

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* = Outside of Control Limits.

**Site Name: RTX - Delavan Spray Technologies**
**Laboratory Batch Number: FC11040**
**Collection Date: November 7, 2023**

# DATA ASSESSMENT REPORT

Data assessment is a systematic process for reviewing a body of data against a predefined set of criteria to provide assurance that the data meet project Data Quality Objective (DQO) requirements. The purpose of the data assessment process is to determine if and how the usability of the analytical data is affected by the overall analytical processes and sample collection and handling procedures. If specific DQOs are not met, the data are qualified (i.e., data flags are assigned to sample results) in accordance with guidelines established by the United States Environmental Protection Agency (USEPA). Data assessment allows the data user to adequately determine if the data can be used for its intended purpose. The data acceptance criteria are established according to Standard Operating Procedures (SOPs) and Statements of Work (SOWs) provided to the contracted analytical laboratory. The assessment of data quality and usability involves five components, as described below.

1) **Field Sampling Check** is a process to ensure that all samples were collected, and the laboratory analyses were performed as stipulated in the applicable site-specific Work Plan or Field Sampling Plan (FSP). Inspection of sample preservation procedures, sample handling, analysis requested, sample description and identification (ID), cooler receipt forms, holding time evaluation, and Chain of Custody procedures are all evaluated to ensure that the evidentiary nature of the samples and the resulting analytical data have not been compromised.
2) **Data Verification** is a process for determining the completeness, correctness, consistency, and compliance of a data package in accordance with requirements contained in the applicable SOW and/or contract-specific requirements. This is a review of the data package, electronic data deliverable (EDD), and invoice received from the contract laboratory to ensure that the contract required information is present and complete prior to data validation.
3) **Data Review** is a process of reviewing the primary quality control (QC) data provided by the laboratory and the results of any internal quality assurance (QA)/QC samples, such as field blanks, trip blanks, equipment blanks or ambient blanks, field split samples, and duplicate samples, to ascertain any effect the laboratory's procedures or the sample collection process has on the data.
4) **Data Evaluation** is a process to determine if the data meet project-specific DQOs and contract requirements. This evaluation may involve a review of field sampling and sample management procedures, laboratory audits, Performance Evaluation (PE) sample results, and any other data quality indicators that are available.
5) **Data Validation** is a process to determine the accuracy and precision of analytical data generated and to identify any anomalies encountered. The validation process is performed in accordance with USEPA regional or national functional guidelines, project-specific guidelines, and

compliance with the requirements of each analytical method. Two major components of data validation are laboratory performance and matrix interferences. Evaluation of laboratory performance is a check for compliance for each analytical method to determine if the samples were analyzed within the prescribed acceptance criteria of the method. Evaluation of matrix interferences involves the analysis of surrogate spike recoveries, matrix spike recoveries, and duplicate sample results. Data not meeting project-specific DQOs or the requirements of the analytical method are qualified with data flags according to referenced guidelines.

## Data Assessment Procedures

AECOM performed independent QC checks of field and laboratory procedures that were used in collecting and analyzing the data. The QC checks verify that the data collected are of appropriate quality for the intended data use and that the DQOs were met. The steps and guidelines followed during the data validation process were modeled on the *USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA, November 2020). In addition, method-specific criteria set forth in the compendium of analytical methods found in the *Test Methods for Evaluation Solid Waste: Physical/Chemical Methods Compendium (SW-846)*, *Update V* (USEPA, July 2014) are also evaluated during the validation process. This validation process has been adapted to meet the DQO requirements for generation of definitive critical data.

## Data Validation Results

The analytical data associated with analytical data package FC11040 were collected on November 7, 2023 for UTC - Delavan Spray Technologies located in Bamberg, South Carolina. The analytical data were validated according to the procedures outlined above. Where data flags have been applied to this data set, they are separated by a slash "/" and presented in the following format:

**Laboratory Flag / Result Flags / Analysis Flags**

- Laboratory Flag: This flag precedes the first slash and is added by the laboratory as a result of QC excursions from the analytical method. These flags are laboratory-specific and are described in the associated laboratory report.

- Result Flags: These are presented after the first slash and are added by AECOM based on data validation procedures and guidelines. They tell how and if the data should be used.

- Analysis Flags: These flags are presented after the second slash and are added by AECOM to inform the data user of any specific QA/QC problems that were encountered.

Any data requiring qualification as a result of the validation process were assigned data flags, as discussed below. The validation flags indicate how any QC excursions may have impacted the usability of the data.

## Select Metals by Method 6010D

Results of the validation process indicate the data analyzed for this method are acceptable for their intended use and no data flags are required.

## Sulfide Metals by Method SM4500s2-F-11

Results of the validation process indicate the data analyzed for this method are acceptable for their intended use and no data flags are required.

## Dissolved Gases by Method RSK-175

Results of the validation process indicate the data analyzed for this method are acceptable for their intended use and no data flags are required.

## Anions by Method 9056A

Results of the validation process indicate the data analyzed for this method are acceptable for their intended use and no data flags are required.

## Ferric and Ferrous Iron by Method SM3500Fe B-11

Results of the validation process indicate the data analyzed for this method are acceptable for their intended use and no data flags are required.

## Data Summary and Usability

No QC excursions were encountered during the validation of this data set. Therefore, the data associated with this laboratory batch should be considered compliant and adequate for its intended use.

## References

United States Environmental Protection Agency (USEPA), July 2014. *Test Methods for Evaluation Solid Waste: Physical/Chemical Methods Compendium (SW-846)*, *Update V.*

United States Environmental Protection Agency (USEPA), November 2020. *USEPA National Functional Guidelines for Organic Superfund Methods Data Review.* Publication #EPA-542-R-20-006.

**Site Name: RTX - Delavan Spray Technologies**
**Laboratory Batch Number: FC11990**
**Collection Date: December 13, 2023**

# DATA ASSESSMENT REPORT

Data assessment is a systematic process for reviewing a body of data against a predefined set of criteria to provide assurance that the data meet project Data Quality Objective (DQO) requirements. The purpose of the data assessment process is to determine if and how the usability of the analytical data is affected by the overall analytical processes and sample collection and handling procedures. If specific DQOs are not met, the data are qualified (i.e., data flags are assigned to sample results) in accordance with guidelines established by the United States Environmental Protection Agency (USEPA). Data assessment allows the data user to adequately determine if the data can be used for its intended purpose. The data acceptance criteria are established according to Standard Operating Procedures (SOPs) and Statements of Work (SOWs) provided to the contracted analytical laboratory. The assessment of data quality and usability involves five components, as described below.

1) **Field Sampling Check** is a process to ensure that all samples were collected, and the laboratory analyses were performed as stipulated in the applicable site-specific Work Plan or Field Sampling Plan (FSP). Inspection of sample preservation procedures, sample handling, analysis requested, sample description and identification (ID), cooler receipt forms, holding time evaluation, and Chain of Custody procedures are all evaluated to ensure that the evidentiary nature of the samples and the resulting analytical data have not been compromised.

2) **Data Verification** is a process for determining the completeness, correctness, consistency, and compliance of a data package in accordance with requirements contained in the applicable SOW and/or contract-specific requirements. This is a review of the data package, electronic data deliverable (EDD), and invoice received from the contract laboratory to ensure that the contract required information is present and complete prior to data validation.

3) **Data Review** is a process of reviewing the primary quality control (QC) data provided by the laboratory and the results of any internal quality assurance (QA)/QC samples, such as field blanks, trip blanks, equipment blanks or ambient blanks, field split samples, and duplicate samples, to ascertain any effect the laboratory’s procedures or the sample collection process has on the data.

4) **Data Evaluation** is a process to determine if the data meet project-specific DQOs and contract requirements. This evaluation may involve a review of field sampling and sample management procedures, laboratory audits, Performance Evaluation (PE) sample results, and any other data quality indicators that are available.

5) **Data Validation** is a process to determine the accuracy and precision of analytical data generated and to identify any anomalies encountered. The validation process is performed in accordance with USEPA regional or national functional guidelines, project-specific guidelines, and

compliance with the requirements of each analytical method. Two major components of data validation are laboratory performance and matrix interferences. Evaluation of laboratory performance is a check for compliance for each analytical method to determine if the samples were analyzed within the prescribed acceptance criteria of the method. Evaluation of matrix interferences involves the analysis of surrogate spike recoveries, matrix spike recoveries, and duplicate sample results. Data not meeting project-specific DQOs or the requirements of the analytical method are qualified with data flags according to referenced guidelines.

## Data Assessment Procedures

AECOM performed independent QC checks of field and laboratory procedures that were used in collecting and analyzing the data. The QC checks verify that the data collected are of appropriate quality for the intended data use and that the DQOs were met. The steps and guidelines followed during the data validation process were modeled on the *USEPA National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA, November 2020). In addition, method-specific criteria set forth in the compendium of analytical methods found in the *Test Methods for Evaluation Solid Waste: Physical/Chemical Methods Compendium (SW-846)*, *Update V* (USEPA, July 2014) are also evaluated during the validation process. This validation process has been adapted to meet the DQO requirements for generation of definitive critical data.

## Data Validation Results

The analytical data associated with analytical data package FC11990 were collected on December 13, 2023 for RTX - Delavan Spray Technologies located in Bamberg, South Carolina. The analytical data were validated according to the procedures outlined above. Where data flags have been applied to this data set, they are separated by a slash "/" and presented in the following format:

**Laboratory Flag / Result Flags / Analysis Flags**

- Laboratory Flag: This flag precedes the first slash and is added by the laboratory as a result of QC excursions from the analytical method. These flags are laboratory-specific and are described in the associated laboratory report.

- Result Flags: These are presented after the first slash and are added by AECOM based on data validation procedures and guidelines. They tell how and if the data should be used.

- Analysis Flags: These flags are presented after the second slash and are added by AECOM to inform the data user of any specific QA/QC problems that were encountered.

Any data requiring qualification as a result of the validation process were assigned data flags, as discussed below. The validation flags indicate how any QC excursions may have impacted the usability of the data.

## Volatile Organic Compounds by Method 8260D

Results of the validation process indicate the data analyzed for this method are acceptable for their intended use and no data flags are required.

## Data Summary and Usability

No QC excursions were encountered during the validation of this data set. Therefore, the data associated with this laboratory batch should be considered compliant and adequate for its intended use.

## References

United States Environmental Protection Agency (USEPA), July 2014. *Test Methods for Evaluation Solid Waste: Physical/Chemical Methods Compendium (SW-846)*, *Update V.*

United States Environmental Protection Agency (USEPA), November 2020. *USEPA National Functional Guidelines for Organic Superfund Methods Data Review.* Publication #EPA-540-R-20-005.

# Appendix B
# Definitions of Data Qualifiers
# RTX - Delavan
# Bamberg, South Carolina

| Modifier | Description |
|---|---|
| < | Indicates not detected at the reporting limit indicated. |
| "/" | Separates the laboratory added data qualifiers from the validation data qualifiers. The laboratory added data qualifiers precede the first "/." The result qualifiers follow the first "/," and the analysis qualifiers follow the second "/." The result qualifiers are a product of the data validation process, and the analysis qualifiers define the type of QC excursion. |

## Laboratory Data Qualifiers

| Qualifier | Description |
|---|---|
| B | Indicates analyte found in an associated blank. |
| J | Indicates an estimated value. |

## Result Data Qualifiers

| Qualifier | Description |
|---|---|
| B | The analyte was found in an associated blank as well as the sample. |
| J | The analyte was positively identified. The quantitation is an estimation. |

## Analysis Data Qualifiers

| Qualifier | Description |
|---|---|
| C | Laboratory control recovery exceeded established criteria. |
| L | Common laboratory artifact detected in the sample at a concentration less than or equal to ten times the concentration detected in the associated method blank. This analyte is not considered site-related per EPA data evaluation guidance. |
| T | Detected in the associated trip blank. |

# Appendix C

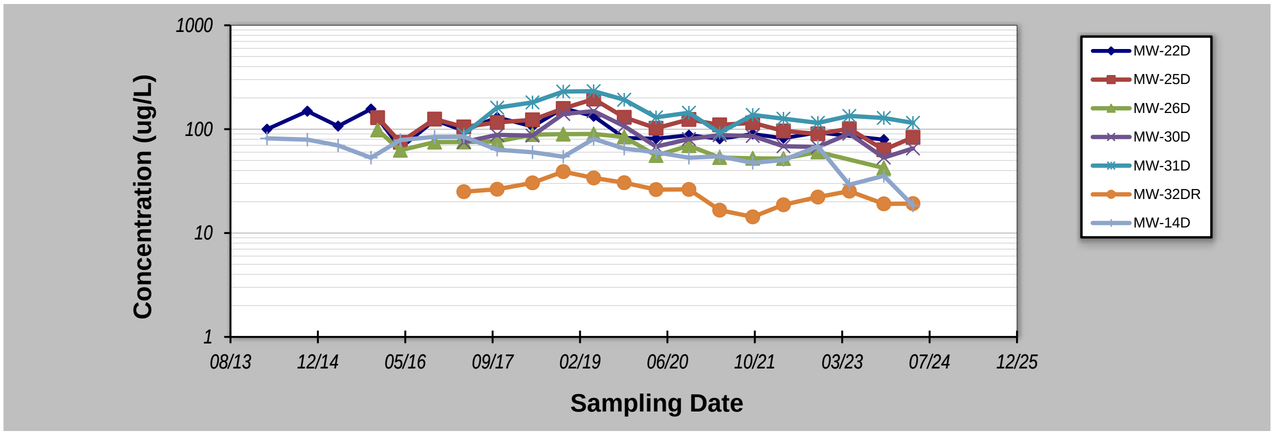
## Mann-Kendall Analyses

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: **10-Jun-24**
Facility Name: **Delavan**
Conducted By: **LKB**

Job ID: **Spring 2024Semi-Annual**
Constituent: **PCE**
Concentration Units: **ug/L**

| | Sampling Point ID: | MW-22D | MW-25D | MW-26D | MW-30D | MW-31D | MW-32DR | MW-14D |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | PCE CONCENTRATION (ug/L) | | | | | | |
| 1 | 11-Mar-14 | 99.8 | | | | | | 81.5 |
| 2 | 28-Oct-14 | 149 | | | | | | 79.3 |
| 3 | 22-Apr-15 | 107 | | | | | | 69.7 |
| 4 | 27-Oct-15 | 156 | | | | | | 53.1 |
| 5 | 4-Dec-15 | | 129 | 98.1 | | | | |
| 6 | 12-Apr-16 | 65.7 | 74.8 | 62.6 | | | | 78.5 |
| 7 | 25-Oct-16 | 122 | 125 | 75 | | | | 84.3 |
| 8 | 10-Apr-17 | 96.6 | 105 | 75.2 | 75.2 | 89.2 | 25 | 84.6 |
| 9 | 18-Oct-17 | 130 | 116 | 76 | 88.1 | 161 | 26.4 | 63.4 |
| 10 | 8-May-18 | 106 | 123 | 88.6 | 86.7 | 181 | 30.4 | 59.9 |
| 11 | 31-Oct-18 | 159 | 158 | 89.5 | 140 | 230 | 39 | 54.3 |
| 12 | 23-Apr-19 | 133 | 195 | 89.9 | 149 | 232 | 33.9 | 80.6 |
| 13 | 15-Oct-19 | 82.4 | 130 | 84.1 | 107 | 192 | 30.5 | 65 |
| 14 | 14-Apr-20 | 81.1 | 102 | 55.7 | 67.9 | 130 | 26.2 | 59.9 |
| 15 | 19-Oct-20 | 87.5 | 124 | 69.3 | 80.2 | 144 | 26.3 | 53.1 |
| 16 | 13-Apr-21 | 80.7 | 110 | 53.3 | 87.7 | 92.2 | 16.6 | 54.8 |
| 17 | 19-Oct-21 | 89.9 | 115 | 52.4 | 85.9 | 137 | 14.3 | 47.4 |
| 18 | 13-Apr-22 | 81.8 | 96.1 | 52.1 | 68.4 | 126 | 18.7 | 50.5 |
| 19 | 27-Oct-22 | 92.9 | 90.1 | 60.3 | 67.4 | 115 | 22.2 | 68.2 |
| 20 | 25-Apr-23 | | 101 | | 90.4 | 134 | 25.3 | 29.2 |
| 21 | 8-Nov-23 | 79.3 | 63.3 | 42.3 | 53.2 | 128 | 19.1 | 35.5 |
| 22 | 23-Apr-24 | | 83.4 | | 65.2 | 115 | 19.2 | 18.4 |
| 23 | | | | | | | | |
| 24 | | | | | | | | |
| 25 | | | | | | | | |
| | Coefficient of Variation: | 0.27 | 0.27 | 0.24 | 0.30 | 0.30 | 0.27 | 0.30 |
| | Mann-Kendall Statistic (S): | -61 | -61 | -58 | -41 | -34 | -41 | -120 |
| | Confidence Factor: | 98.3% | 98.9% | 99.6% | 97.7% | 94.9% | 97.7% | >99.9% |
| | Concentration Trend: | Decreasing | Decreasing | Decreasing | Decreasing | Prob. Decreasing | Decreasing | Decreasing |



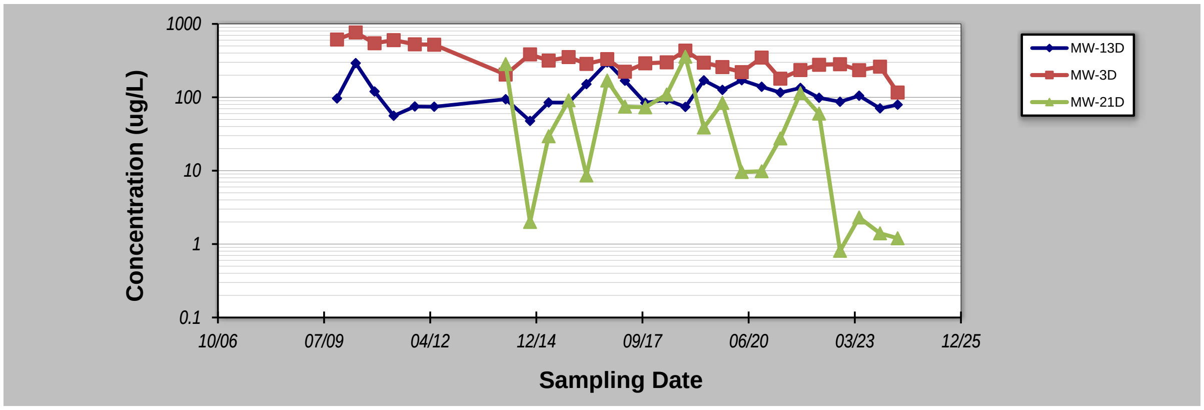
**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

# GSI MANN-KENDALL TOOLKIT
## for Constituent Trend Analysis

Evaluation Date: **10-Jun-24**
Facility Name: **Delavan**
Conducted By: **LKB**
Job ID: **Spring 2024Semi-Annual**
Constituent: **PCE**
Concentration Units: **ug/L**

| | Sampling Point ID: | MW-13D | MW-3D | MW-21D | | | | |
|---|---|---|---|---|---|---|---|---|
| Sampling Event | Sampling Date | PCE CONCENTRATION (ug/L) | | | | | | |
| 1 | 5-Nov-09 | 96.4 | 612 | | | | | |
| 2 | 30-Apr-10 | 292 | 764 | | | | | |
| 3 | 25-Oct-10 | 120 | 544 | | | | | |
| 4 | 23-Apr-11 | 56 | 600 | | | | | |
| 5 | 8-Nov-11 | 74.9 | 526 | | | | | |
| 6 | 9-May-12 | 74.3 | 520 | | | | | |
| 7 | 13-Mar-14 | 94.1 | 204 | 283 | | | | |
| 8 | 29-Oct-14 | 47.6 | 384 | 2 | | | | |
| 9 | 22-Apr-15 | 84.8 | 316 | 29.4 | | | | |
| 10 | 27-Oct-15 | 84.5 | 353 | 90.8 | | | | |
| 11 | 12-Apr-16 | 151 | 285 | 8.6 | | | | |
| 12 | 25-Oct-16 | 298 | 331 | 169 | | | | |
| 13 | 10-Apr-17 | 168 | 223 | 74.6 | | | | |
| 14 | 18-Oct-17 | 84 | 290 | 72.9 | | | | |
| 15 | 8-May-18 | 92.5 | 299 | 109 | | | | |
| 16 | 31-Oct-18 | 73.9 | 432 | 357 | | | | |
| 17 | 23-Apr-19 | 170 | 296 | 38.7 | | | | |
| 18 | 15-Oct-19 | 126 | 258 | 83.8 | | | | |
| 19 | 14-Apr-20 | 171 | 220 | 9.6 | | | | |
| 20 | 19-Oct-20 | 139 | 347 | 9.8 | | | | |
| 21 | 13-Apr-21 | 116 | 179 | 27.5 | | | | |
| 22 | 19-Oct-21 | 134 | 235 | 114 | | | | |
| 23 | 13-Apr-22 | 98.4 | 277 | 59.9 | | | | |
| 24 | 27-Oct-22 | 86.9 | 282 | 0.81 | | | | |
| 25 | 25-Apr-23 | 105 | 234 | 2.3 | | | | |
| 26 | 8-Nov-23 | 70.6 | 261 | 1.4 | | | | |
| 27 | 22-Apr-24 | 79.2 | 116 | 1.2 | | | | |
| 28 | | | | | | | | |
| 29 | | | | | | | | |
| 30 | | | | | | | | |
| | Coefficient of Variation: | 0.52 | 0.44 | 1.29 | | | | |
| | Mann-Kendall Statistic (S): | 5 | -207 | -70 | | | | |
| | Confidence Factor: | 53.3% | >99.9% | 98.2% | | | | |
| | Concentration Trend: | No Trend | Decreasing | Decreasing | | | | |



**Notes:**

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

# Appendix D

## PFM Analytical Results

| AECOM | |
|---|---|
| **Project name:** | RTX Off-Site RI |
| **Project Manager** | Ian Ros |
| **Installation Date** | 3/13/2024 |
| **Sampling Date** | 4/10/2024 |
| **Reporting Date** | 5/17/2024 |

**Table 4. Well average values of mass flux based on PFMs**

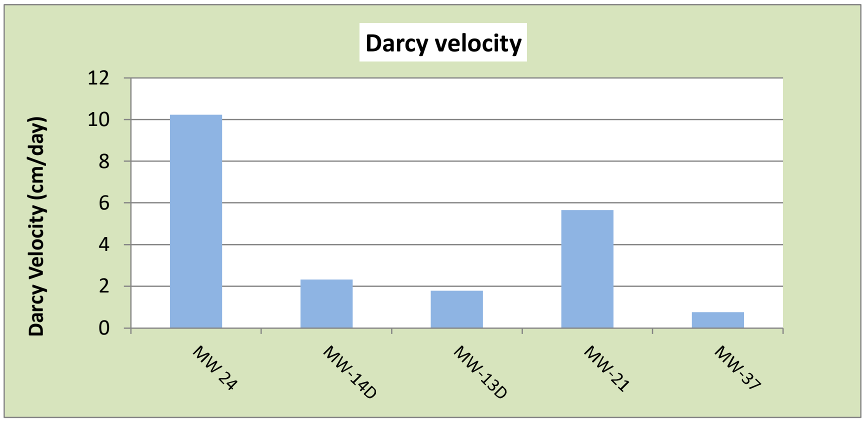
| Well | **Darcy Velocity** (cm/day) | **VC flux** (mg/m^2/day) | **cis-1,2DCE flux** (mg/m^2/day) | **TCE flux** (mg/m^2/day) | **PCE flux** (mg/m^2/day) | **Chloroform flux** (mg/m^2/day) | **1,1,1 TCA flux** (mg/m^2/day) | **Toluene flux** (mg/m^2/day) |
|---|---|---|---|---|---|---|---|---|
| **MW 24** | 10.2 | <0.05 | 1.10 | 0.32 | 284.8 | <0.03 | <0.03 | <0.1 |
| **MW-14D** | 2.3 | <0.05 | 0.06 | 0.03 | 6.3 | <0.03 | <0.03 | <0.1 |
| **MW-13D** | 1.8 | <0.05 | <0.05 | 0.01 | 1.5 | <0.03 | <0.03 | <0.1 |
| **MW-21** | 5.7 | <0.05 | 77.46 | 32.78 | 1227.5 | <0.03 | <0.03 | <0.1 |
| **MW-37** | 0.8 | <0.05 | <0.05 | 0.02 | 50.9 | <0.03 | <0.03 | <0.1 |

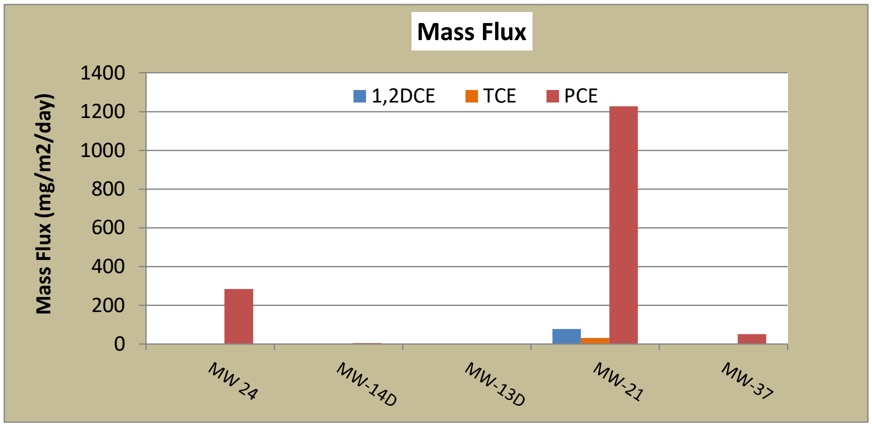
**Table 5. Flux average contaminant concentration on PFMs**

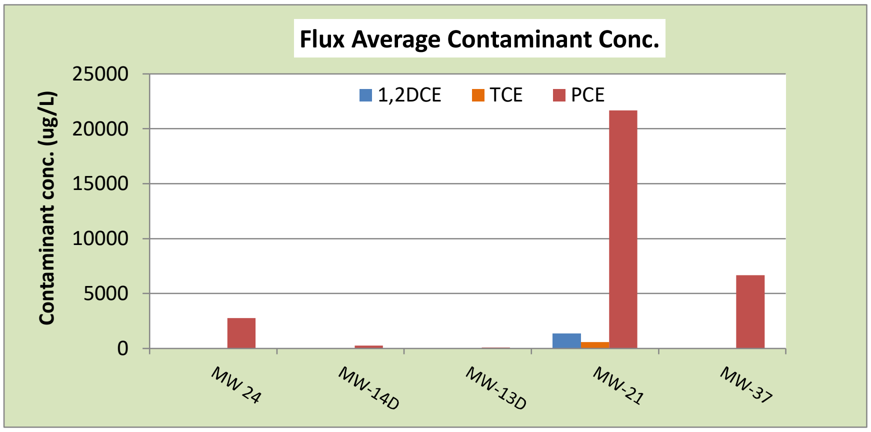
| Well | **Darcy Velocity** (cm/day) | **VC** (ug/L) | **cis-1,2DCE** (ug/L) | **TCE** (ug/L) | **PCE** (ug/L) | **Chloroform** (ug/L) | **1,1,1TCA** (ug/L) | **Toluene** (ug/L) |
|---|---|---|---|---|---|---|---|---|
| **MW 24** | 10.2 | - | 10.7 | 3.1 | 2784 | - | - | - |
| **MW-14D** | 2.3 | - | 2.4 | 1.3 | 270 | - | - | - |
| **MW-13D** | 1.8 | - | - | 0.8 | 83 | - | - | - |
| **MW-21** | 5.7 | - | 1368 | 579 | 21678 | - | - | - |
| **MW-37** | 0.8 | - | - | 2.4 | 6666 | - | - | - |

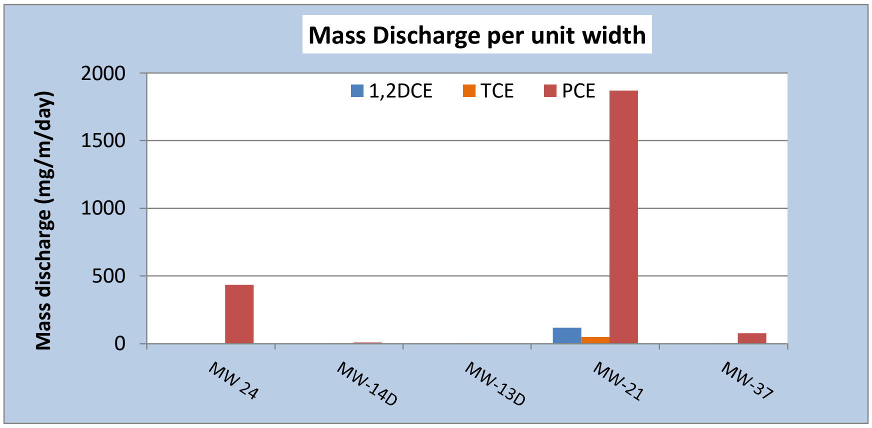
**Table 1. Mass discharge per unit width for aquifer of each well**

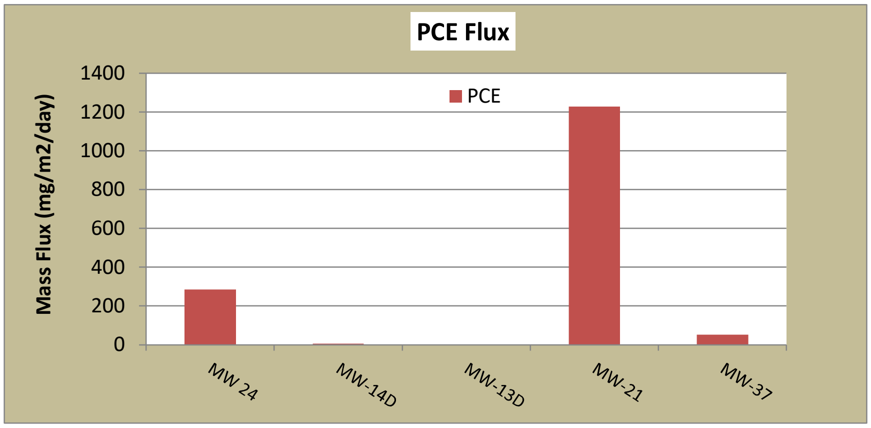
| Well | **Darcy Velocity** (cm/day) | **VC Discharge** (mg/m/day) | **cis-1,2DCE Discharge** (mg/m/day) | **TCE Discharge** (mg/m/day) | **PCE Discharge** (mg/m/day) | **Chloroform Discharge** (mg/m/day) | **1,1,1TCA Discharge** (mg/m/day) | **Toluene Discharge** (mg/m/day) |
|---|---|---|---|---|---|---|---|---|
| **MW 24** | 10.2 | - | 1.67 | 0.49 | 434.06 | - | - | - |
| **MW-14D** | 2.3 | - | 0.09 | 0.05 | 9.56 | - | - | - |
| **MW-13D** | 1.8 | - | - | 0.02 | 2.27 | - | - | - |
| **MW-21** | 5.7 | - | 118.05 | 49.96 | 1870.68 | - | - | - |
| **MW-37** | 0.8 | - | - | 0.03 | 77.63 | - | - | - |

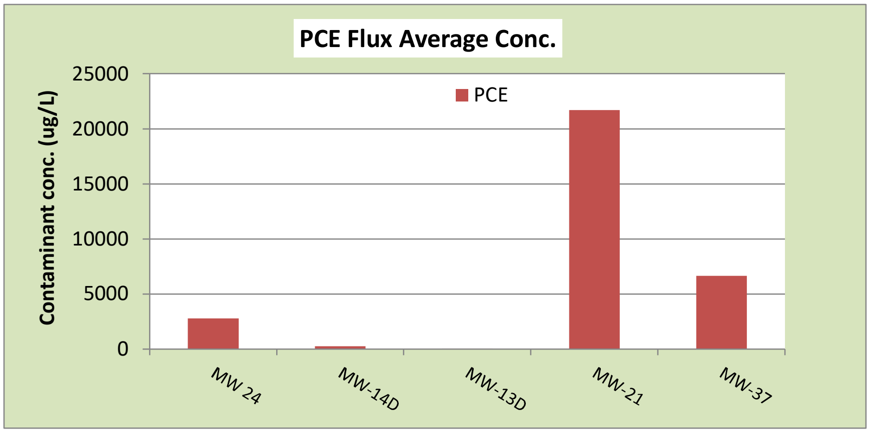

Darcy velocity
Darcy Velocity (cm/day)
12
10
8
6
4
2
0
MW 24
MW-14D
MW-13D
MW-21
MW-37

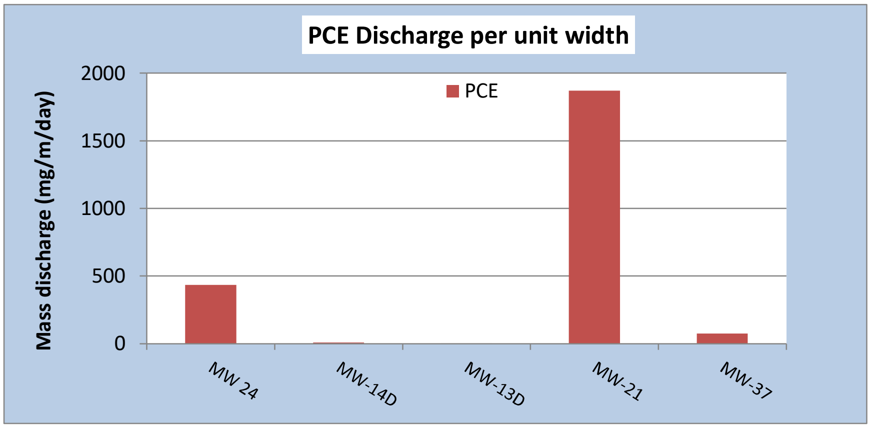

Mass Flux
Mass Flux (mg/m2/day)
1,2DCE
TCE
PCE
1400
1200
1000
800
600
400
200
0
MW 24
MW-14D
MW-13D
MW-21
MW-37

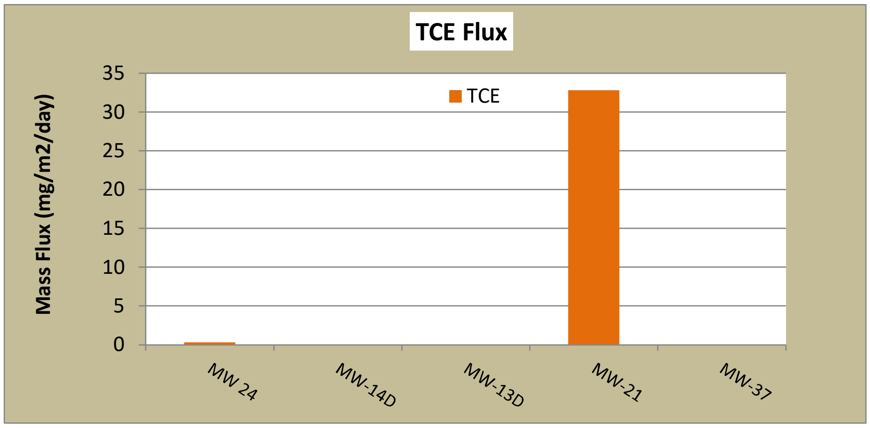

Flux Average Contaminant Conc.
Contaminant conc. (ug/L)
1,2DCE
TCE
PCE
25000
20000
15000
10000
5000
0
MW 24
MW-14D
MW-13D
MW-21
MW-37

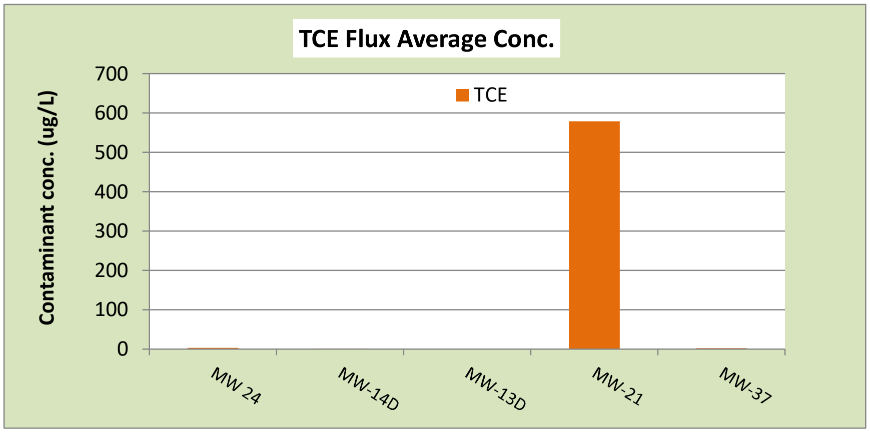

Mass Discharge per unit width
Mass discharge (mg/m/day)
1,2DCE
TCE
PCE
2000
1500
1000
500
0
MW 24
MW-14D
MW-13D
MW-21
MW-37

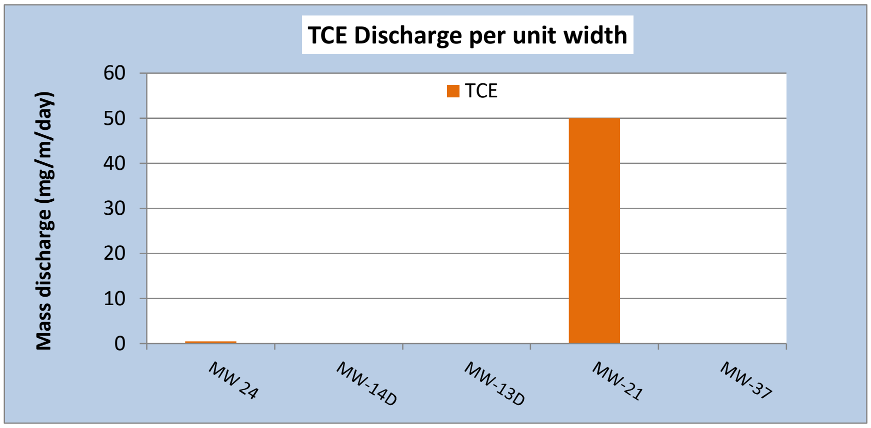

PCE Flux
Mass Flux (mg/m2/day)
1400
1200
1000
800
600
400
200
0
PCE
MW 24
MW-14D
MW-13D
MW-21
MW-37

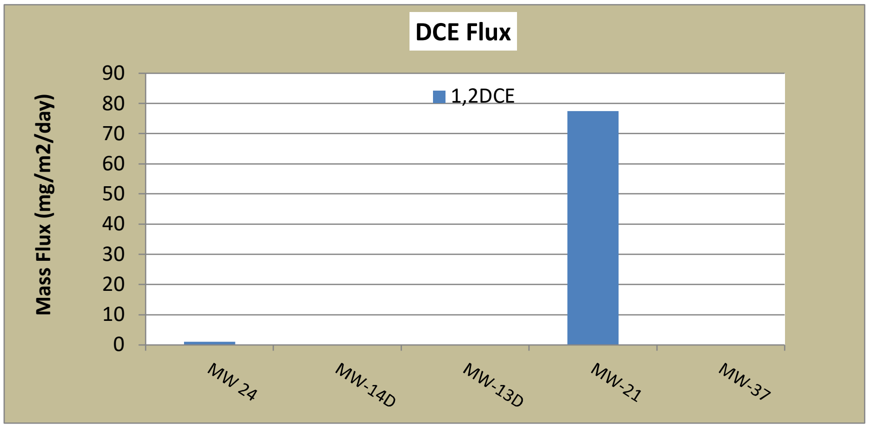

PCE Flux Average Conc.
Contaminant conc. (ug/L)
25000
20000
15000
10000
5000
0
PCE
MW 24
MW-14D
MW-13D
MW-21
MW-37

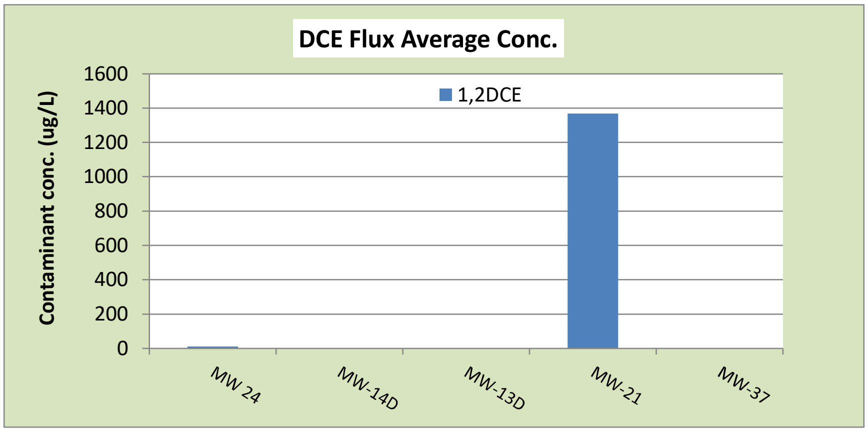

PCE Discharge per unit width
Mass discharge (mg/m/day)
2000
1500
1000
500
0
PCE
MW 24
MW-14D
MW-13D
MW-21
MW-37

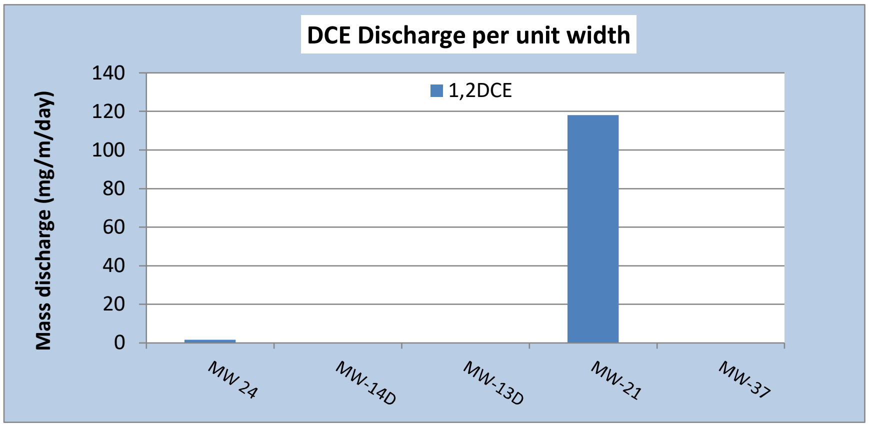

TCE Flux
Mass Flux (mg/m2/day)
35
30
25
20
15
10
5
0
TCE
MW 24
MW-14D
MW-13D
MW-21
MW-37


TCE Flux Average Conc.
Contaminant conc. (ug/L)
700
600
500
400
300
200
100
0
TCE
MW 24
MW-14D
MW-13D
MW-21
MW-37


TCE Discharge per unit width
Mass discharge (mg/m/day)
60
50
40
30
20
10
0
TCE
MW 24
MW-14D
MW-13D
MW-21
MW-37

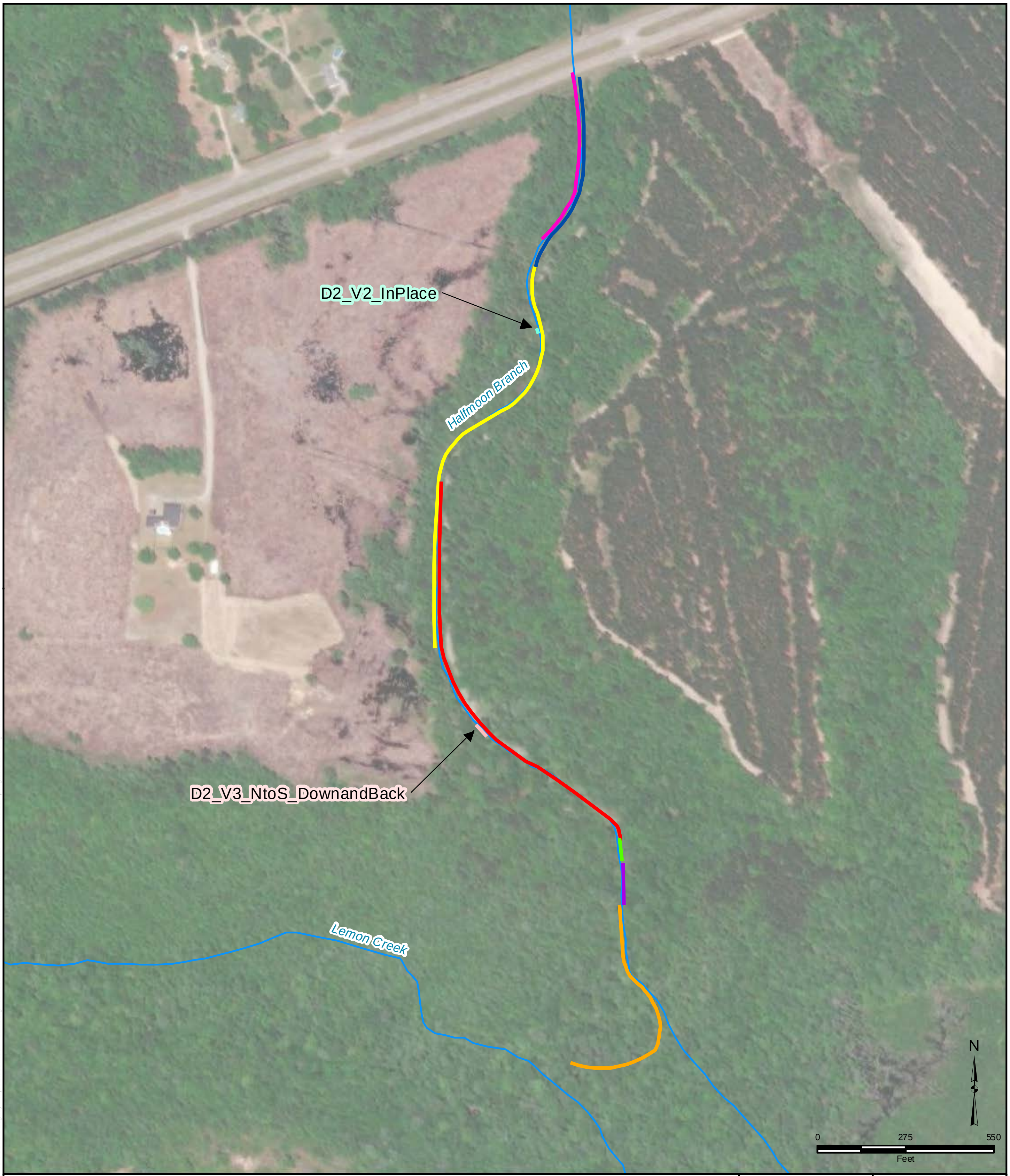

DCE Flux
1,2DCE
Mass Flux (mg/m2/day)
90
80
70
60
50
40
30
20
10
0
MW 24
MW-14D
MW-13D
MW-21
MW-37


DCE Flux Average Conc.
1,2DCE
Contaminant conc. (ug/L)
1600
1400
1200
1000
800
600
400
200
0
MW 24
MW-14D
MW-13D
MW-21
MW-37


DCE Discharge per unit width
1,2DCE
Mass discharge (mg/m/day)
140
120
100
80
60
40
20
0
MW 24
MW-14D
MW-13D
MW-21
MW-37

# Appendix E

## UAS Field Work Documentation



**Legend**

**Video Name**

- D1_V1_HighwayNtoS
- D1_V2_NtoS
- D1_V3_StoN
- D1_V4_NtoS
- D1_V5_NtoS
- D1_V6_NtoS
- D2_V1_HighwayNtoS
- D2_V2_InPlace
- D2_V3_NtoS_DownandBack

〰 Stream

Note: D1 (Day 1) videos were taken in the afternoon of Jan. 29, 2024 and D2 (Day 2) videos were taken in the morning of Jan. 30, 2024

AECOM

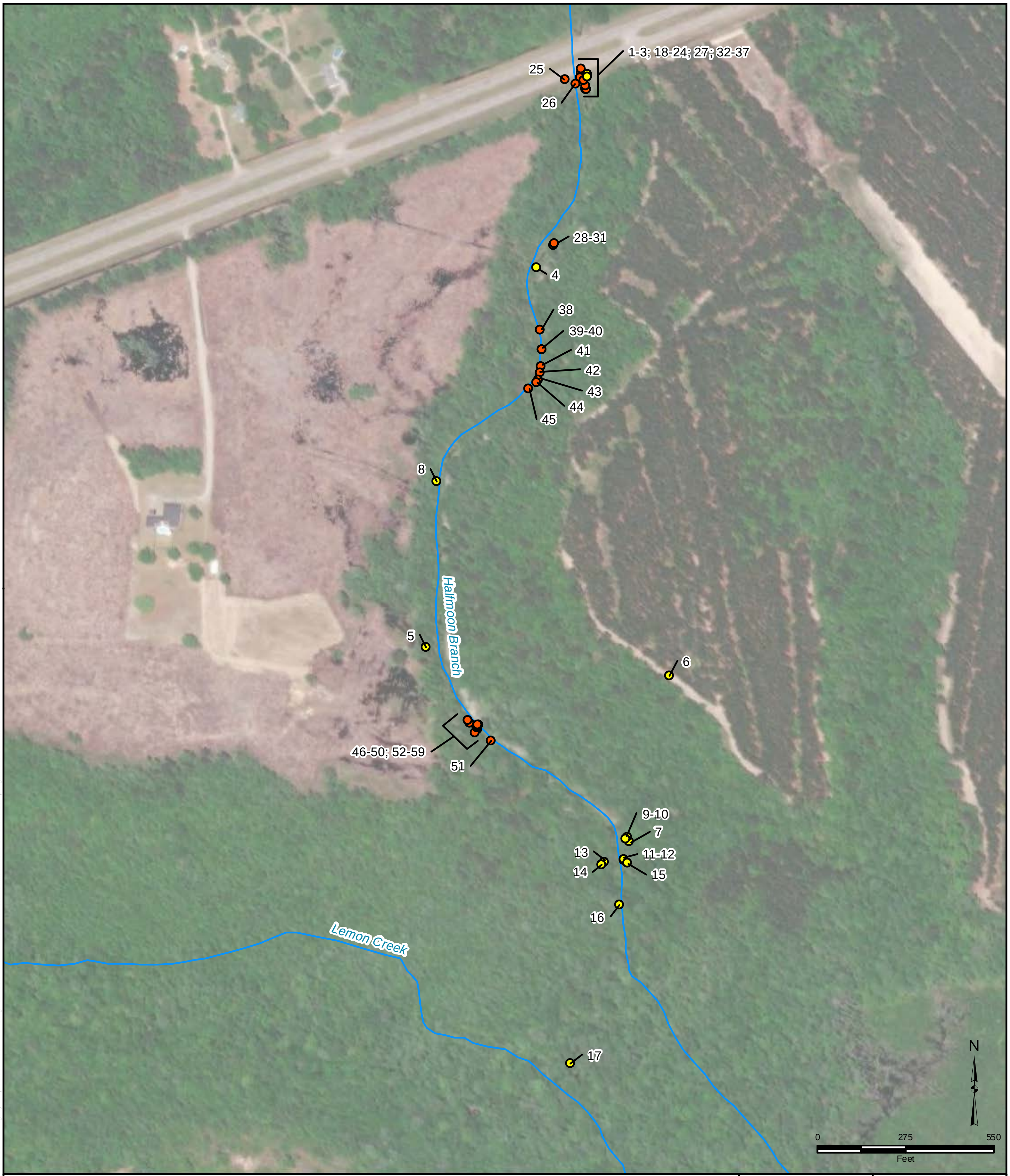
**Figure 1**

UAS Video Flight Paths

Delavan Spray Technologies Site
Bamberg, South Carolina

| DRAWN BY: | DATE: | PROJECT NO.: |
|---|---|---|
| R. Alexander | 2/13/2024 | 60707644 |

Document Path: \\na.aecomnet.com\lfs\AMER\Greenville-USGRN1\Legacy\Projects\60314964 - Bamberg\400-Technical\411 Field Work Documentation\2023 Off-Site RI Sampling\UAS\GIS\FlighPaths.mxd



## Legend

● Day 1 Photo Points - Jan. 29, 2024 PM

● Day 2 Photo Points - Jan. 30, 2024 AM

〰 Stream

AECOM

**Figure 2**

UAS Photo Points

Delavan Spray Technologies Site
Bamberg, South Carolina

| DRAWN BY: | DATE: | PROJECT NO.: |
|---|---|---|
| R. Alexander | 2/13/2024 | 60707644 |

Document Path: \\na.aecomnet.com\lfs\AMER\Greenville-USGRN1\Legacy\Projects\60314964 - Bamberg\400-Technical\411 Field Work Documentation\2023 Off-Site RI Sampling\UAS\GIS\PhotoPoints.mxd

AECOM

# Photographic Record

**Client:** Raytheon Technologies
**Site Name:** Delavan Spray Technologies Site

**AECOM Project #:** 60707644
**Site Location:** 4334 Main Highway, Bamberg, SC

**Date:**
January 30, 2024

**Direction:**
South

**Description:**
View of Halfmoon Branch surface water sampling location SW-03-HMB.

**Date:**
January 29, 2024

**Direction:**
South

**Description:**
View of man-made access road along eastern edge of Halfmoon Branch.

Halfmoon Branch pictured to right, behind bank vegetation.

| | |
|---|---|
| **Date:**<br>January 29, 2024<br>**Direction:**<br>Southwest<br>**Description:**<br>View of excavation berm along western edge of Halfmoon Branch and surface water sampling location SW-10-HMB. |  |
| **Date:**<br>January 29, 2024<br>**Direction:**<br>Southeast<br>**Description:**<br>View of Halfmoon Branch and Lemon Creek wetland confluence. |  |

AECOM

# Photographic Record

**Client:** Raytheon Technologies
**Site Name:** Delavan Spray Technologies Site

**AECOM Project #:** 60707644
**Site Location:** 4334 Main Highway, Bamberg, SC

**Date:**
January 29, 2024

**Direction:**
North

**Description:**
View of UAV takeoff point, pilot, and spotter.

**Date:**
January 29, 2024

**Direction:**
N/A

**Description:**
View of UAV flight controller and infrared imaging output.

**Date:**
January 30, 2024

**Direction:**
N/A

**Description:**
UAV view of Halfmoon Branch surface water sampling location SW-03-HMB.

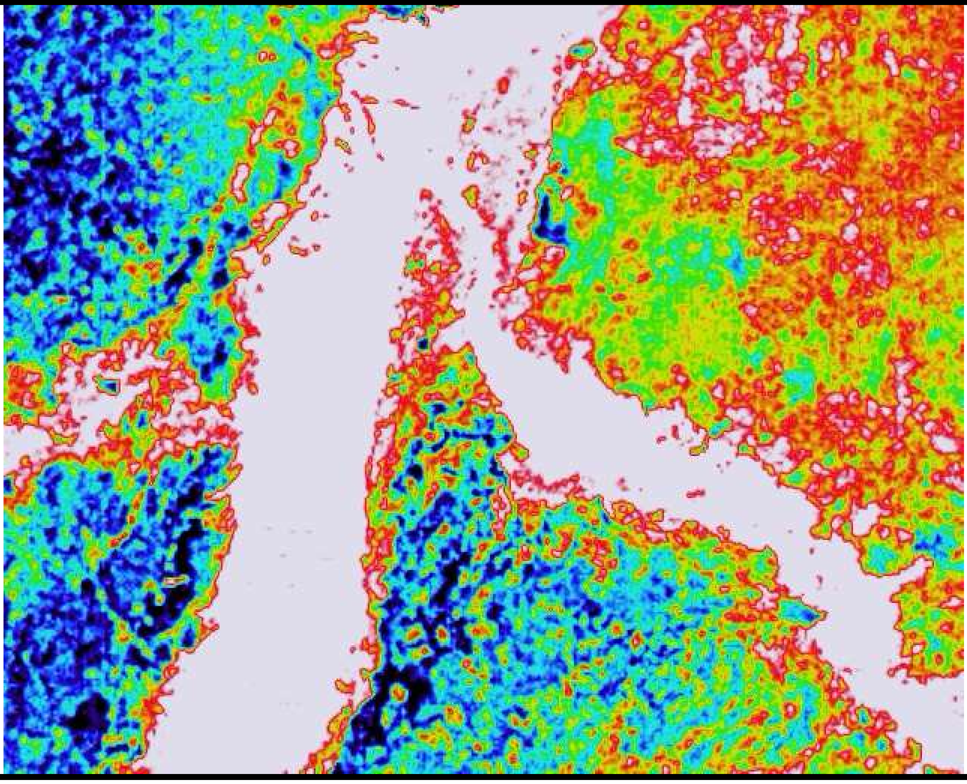
(Photo #26)

**Date:**
January 30, 2024

**Direction:**
N/A

**Description:**
UAV infrared view of Halfmoon Branch surface water sampling location SW-03-HMB.

(Photo #26_IR)



**Date:**
January 30, 2024

**Direction:**
South

**Description:**
UAV ground view of Halfmoon Branch surface water sampling location SW-03-HMB.

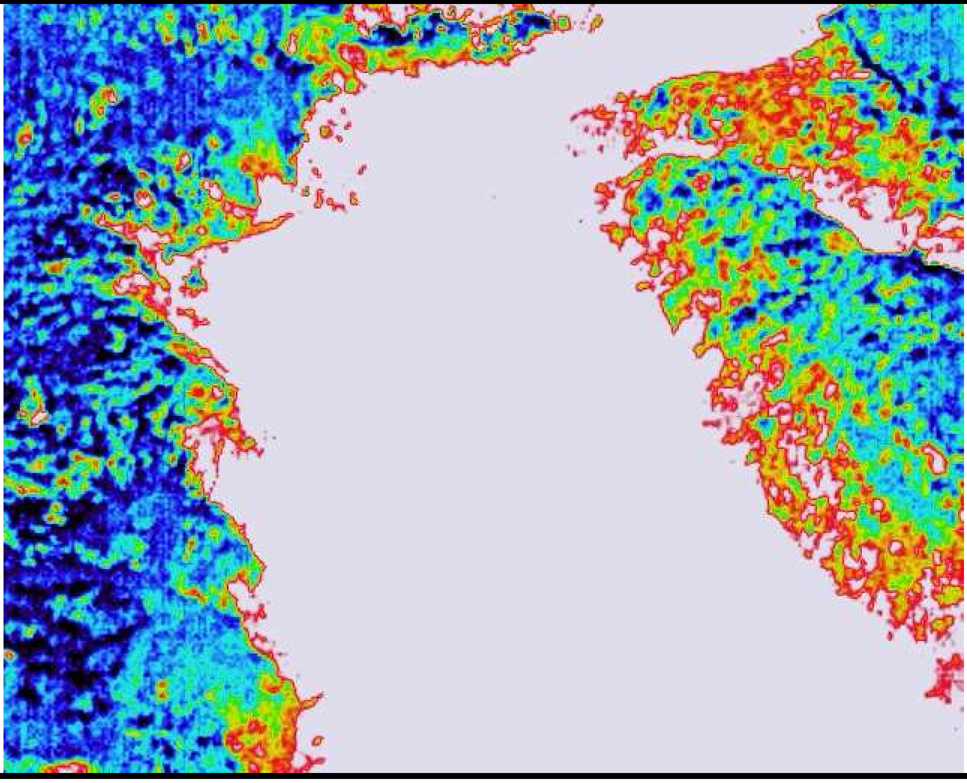
(Photo #37)

**Date:**
January 30, 2024

**Direction:**
N/A

**Description:**
UAV infrared ground view of Halfmoon Branch surface water sampling location SW-03-HMB.

(Photo #37_IR)



**Client:** Raytheon Technologies
**Site Name:** Delavan Spray Technologies Site

**AECOM Project #:** 60707644
**Site Location:** 4334 Main Highway, Bamberg, SC

**Date:**
January 30, 2024

**Direction:**
N/A

**Description:**
UAV view of Halfmoon Branch surface water sampling location SW-10-HMB.

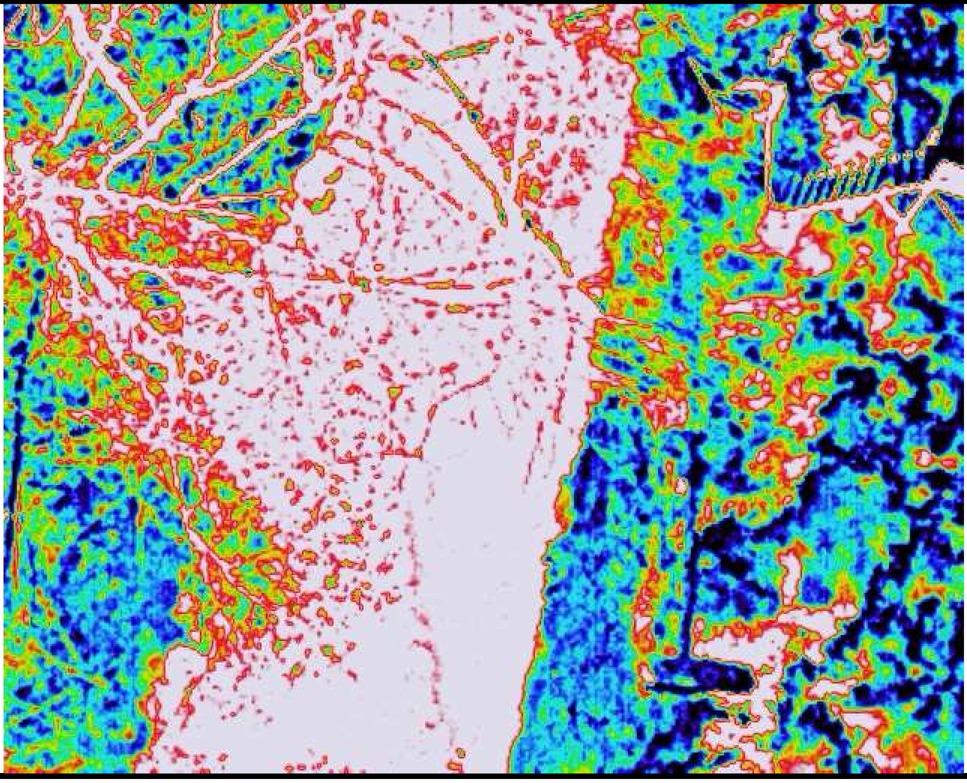
(Photo #47)

**Date:**
January 30, 2024

**Direction:**
N/A

**Description:**
UAV infrared view of Halfmoon Branch surface water sampling location
SW-10-HMB.

(Photo #47_IR)



End of Photographic Record