APPENDIX O

Tier 1 Building Investigation Report

GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

Richard E. Dunn, Director

Land Protection Branch
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404-657-8600

May 20, 2021

Sent via email and USPS

Mr. Tim Hassett
Project Manager
Hercules, LLC
500 Hercules Road
Wilmington, DE 19808-1599

Ms. Molly Matthews
Director of Operations
DRT America, Inc.
2801 Cook Street
Brunswick, Georgia 31520

RE: Revised Vapor Intrusion Tier 1 Investigation Report
Hercules/Pinova - Brunswick Facility
Hazardous Waste Facility Permit No. HW-52(D&S)
EPA ID# GAD004065520

Dear Mr. Hassett and Ms. Matthews:

The Georgia Environmental Protection Division (EPD) has reviewed the Revised Vapor Intrusion Tier 1 Investigation Report, dated April 2021. No comments or deficiencies were noted during the review.

Should you have any questions or concerns please contact Penny Gaynor at 404-657-8600.

Sincerely,

James Sliwinski

James Sliwinski
Unit Coordinator
Remedial Sites Unit

File: Hercules, Brunswick 216-0060 (G)
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REVISED VAPOR INTRUSION TIER 1 INVESTIGATION REPORT

Hercules/Pinova Facility

Brunswick, Georgia

Prepared for

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April 2021

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ACRONYMS AND ABBREVIATIONS

COPC	constituent of potential concern
CSM	conceptual site model
EPD	Environmental Protection Division
ft^2	square feet
Geosyntec	Geosyntec Consultants, Inc.
Hercules	Hercules LLC
HVAC	heating, ventilation, and air conditioning
L	liter
LSASD	Laboratory Services and Applied Science Division
µg/L	microgram(s) per liter
$\mu g/m^3$	microgram(s) per cubic meter
ml/min	milliliter per minute
CS	crawl space
MDL	method detection limit
NAPL	nonaqueous-phase liquid
NewFields	NewFields, LLC
PID	photoionization detector
Pinova	Pinova, Inc.
ppmv	parts per million volume
SSD	subslab depressurization
SSSG	subslab soil gas
USEPA	United States Environmental Protection Agency
VI	vapor intrusion
VISL	vapor intrusion screening level
VOC	volatile organic compound

1. INTRODUCTION AND BACKGROUND

Geosyntec Consultants, Inc. ("Geosyntec") has prepared this revised version of the Vapor Intrusion Investigation Report for Tier 1 Buildings (the "Tier 1 Report") for submission to the Georgia Department of Natural Resources, Environmental Protection Division ("EPD") on behalf of Hercules LLC ("Hercules") in connection with environmental conditions at the industrial facility located at 2801 Cook Street in Brunswick, Glynn County, Georgia (the "Brunswick facility"). The Brunswick facility consists of approximately 321 acres of real property, portions of which are owned by Hercules and portions of which are owned by Pinova, Inc. ("Pinova"). This Tier 1 Report has been developed to describe the process that Hercules is using to evaluate and address the vapor intrusion ("VI") pathway into 10 buildings at the Brunswick facility classified as Tier 1 buildings from historical releases of volatile organic compounds ("VOCs") into the subsurface at the Brunswick facility. The buildings at the Brunswick facility classified as Tier 1 buildings were identified within a document titled *Revised Vapor Intrusion Conceptual Site Model and Data Gap Analysis Report* (the "Revised VI CSM Report") that Geosyntec prepared on behalf of Hercules and submitted to EPD on December 23, 2019 (Geosyntec 2019d). Tier 1 buildings consist of those buildings with the greatest potential to have a complete VI pathway. The 10 Tier 1 buildings are located exclusively within the portion of the Brunswick facility owned by Pinova.

1.1 Background

The preliminary version of the VI conceptual site model ("CSM") for the Brunswick facility was presented in a document titled *Vapor Intrusion Pathway Evaluation Work Plan, Hercules/Pinova Facility, Brunswick, GA* (the "VI Work Plan") that Geosyntec prepared on behalf of Hercules (Geosyntec 2019a). The VI Work Plan was included as Appendix F in a document titled *Baseline Human Health Risk Assessment and Screening Level Ecological Risk Assessment* (the "Risk Assessment Report") that NewFields LLC prepared on behalf of Hercules (NewFields 2019), which was submitted to EPD on March 22, 2019. EPD approved the VI Work Plan in an e-mail dated April 4, 2019.

The VI Work Plan was an outgrowth of communications between NewFields and EPD. Specifically, on February 15, 2019, NewFields submitted to EPD an outline of its methods for prioritizing and evaluating the potential VI pathway for buildings at the Brunswick facility, which EPD requested prior to submission of the Risk Assessment Report. EPD provided comments regarding NewFields' approach, recommending that Hercules develop a VI CSM and site-specific attenuation factors to evaluate potential risks posed by VI. Following receipt of EPD's comments, Hercules retained Geosyntec to prepare the VI Work Plan in accordance with EPD's comments and technical guidance issued by the United States Environmental Protection Agency ("USEPA") titled *OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air* ("USEPA VI Guide") (USEPA 2015).

Subsequent to EPD's approval of the VI Work Plan, Geosyntec implemented the initial steps described therein. On June 4, 2019, Geosyntec submitted to EPD on behalf of Hercules a document titled *On-Site Vapor Intrusion Sampling Plan, Hercules/Pinova Facility, Brunswick, GA* (the "VI

Sampling Plan") (Geosyntec 2019b) describing the steps that Geosyntec had completed pursuant to the VI Work Plan and proposed field investigation activities to assess shallow groundwater conditions at the Brunswick facility to support the ongoing VI evaluation. Following an on-site meeting with EPD on June 18, 2019, Geosyntec submitted to EPD an addendum to the VI Sampling Plan on July 10, 2019 (Geosyntec 2019c), containing certain additional information requested by EPD. EPD subsequently approved the VI Sampling Plan (as amended) by e-mail and letter dated July 16, 2019.

Both the VI Work Plan and VI Sampling Plan as amended described a tiered approach for assessing VI at the Brunswick facility that relies on multiple lines of evidence using the following steps:

1. Develop a preliminary VI CSM and identify data gaps related to subsurface sources.
2. Identify constituents of potential concern ("COPCs") for the VI pathway.
3. Identify buildings that are susceptible to VI (i.e., buildings where a completed VI pathway is possible given building conditions and the potential presence of one or more sufficiently concentrated subsurface source(s) of VOCs).
4. Evaluate existing data and fill data gaps related to subsurface sources of VOCs with a targeted investigation of shallow groundwater conditions near susceptible buildings.
5. Revise the preliminary VI CSM based on the results of the targeted investigation and prioritize susceptible buildings for follow-up actions based on the revised VI CSM.
6. Recommend follow-up investigations or other actions, beginning with higher priority buildings and working toward lower priority buildings.

To date, steps one through five of the foregoing process have been completed as signified by submission of the Revised VI CSM Report to EPD on December 23, 2019. The additional investigative steps undertaken for Tier 1 buildings as described in this Tier I Report represent the first iteration of activities to implement step six in the above process. Sampling activities were performed to better understand the VI pathway for Tier 1 buildings with the goal of determining whether mitigation measures or other actions might be necessary in connection with Tier I buildings. In addition, the information and lessons learned from the sampling activities at Tier 1 buildings will be used to inform the evaluation of VI pathways for the buildings at the Brunswick facility classified as Tier 2 buildings.

1.2 Summary of Prior VI Investigation Activities

The Revised VI CSM Report (Geosyntec, 2019d) grouped the 36 susceptible buildings identified at the Brunswick facility as shown on **Figure 1** into three tiers primarily based on the degree to which VI COPCs were detected in shallow groundwater at concentrations exceeding their respective vapor intrusion screening levels ("VISLs") for shallow groundwater, the representativeness (i.e., proximity) of the shallow groundwater samples to each building, and the historical detections of VI COPCs in soils in the vadose zone near such buildings, where applicable. Geosyntec concluded in the Revised VI CSM Report that more work was necessary at the buildings classified as Tier 1 and 2 buildings to evaluate whether there might be a complete VI

pathway present. By contrast, buildings at the Brunswick facility classified as Tier 3 buildings are understood to have an incomplete VI pathway.

Of the 36 susceptible buildings listed in the Revised VI CSM Report, 11 buildings were categorized as Tier 1 buildings - 10 buildings on the Pinova property and one apartment building located off-site, 20 buildings were categorized as Tier 2 buildings, and five buildings were categorized as Tier 3 buildings.

While revising the VI CSM and developing the scope of work for conducting supplemental sampling activities for buildings classified as Tier 1 buildings, Geosyntec conducted additional shallow groundwater sampling activities on behalf of Hercules along the property line of the Brunswick facility upgradient of the off-site apartment building located near the northern edge of Brunswick facility (which had initially been identified as a Tier 1 building). Specifically, Geosyntec collected a shallow groundwater sample from temporary well TW-1RR which had been installed at a location approximately upgradient of the apartment building and along the fence line of the Brunswick facility. No VI COPCs were detected in temporary well TW-1RR, and the laboratory reporting limits for analytical results from the groundwater sample were at or below USEPA's residential groundwater VISLs. Based on these analytical results coupled with existing groundwater sampling results from the general area, groundwater elevation measurements, and the configuration of the vadose zone in the general area, Geosyntec concluded that the VI pathway to the off-site apartment building is incomplete with respect to sources of VI COPCs associated with the Brunswick facility. Accordingly, as set forth in a document titled *Vapor Intrusion Pathway Tier 1 Building Investigation Work Plan* which Geosyntec submitted to EPD in revised form on behalf of Hercules on August 5, 2020 (the "Tier 1 Work Plan") (Geosyntec 2020a), the off-site apartment building qualifies as a Tier 3 building and no further actions are warranted. EPD approved the Tier 1 Work Plan by e-mail dated August 5, 2020.

In addition to addressing the off-site apartment building as discussed above, the Tier 1 Work Plan described the investigation approaches to be utilized for the 10 Tier 1 buildings present in the portion of the Brunswick facility owned by Pinova. For two of the buildings - the Stillhouse Control Room (Building No. 13 as shown on **Figure 1**) and the Chemical Plant Control Room and Laboratory (Building No. 17 as shown on **Figure 1**) - Hercules decided that preemptive mitigation was the best course of action and elected to install sub-slab depressurization ("SSD") systems due to the presence of non-aqueous phase liquid ("NAPL") or elevated concentrations of VI COPCs at the water table in proximity to those two buildings. Geosyntec described the design, construction, installation, and commissioning of the SDD systems for the two Tier 1 buildings in a document titled *Vapor Intrusion Mitigation Work Plan, Hercules/Pinova Facility, Brunswick, GA* (the "VI Mitigation Work Plan") that was submitted to EPD on August 20, 2020 (Geosyntec 2020b). EPD approved the VI Mitigation Work Plan via e-mail and letter dated September 9, 2020. The VI Mitigation Work Plan summarized the diagnostic testing conducted at each of the two Tier 1 buildings to determine design vacuums and flows, and placement of suction points. The VI Mitigation Work Plan also included conceptual design drawings for each SSD system. Hercules has completed the construction and installation of the SSD systems, and both SSD systems are currently in operation as described in greater detail in a report prepared by Geosyntec titled

Construction Completion Report – Stillhouse Control Room and Chemical Plant Control Room and Laboratory Sub-Slab Depressurization Systems, Hercules/Pinova. Facility, Brunswick, Georgia that Hercules submitted to EPD for review and approval on April 13, 2021.

For the eight remaining Tier 1 buildings at the Brunswick facility requiring additional investigation activities, a reconnaissance was completed to identify building construction characteristics; potential soil gas entry points; potential background sources of VI COPCs; and the types of heating, ventilation and air conditioning ("HVAC") systems used at the buildings. Geosyntec also collected photoionization detector ("PID") readings during the building reconnaissance activities. The information obtained during the building reconnaissance activities was summarized in the Tier 1 Work Plan and findings from those activities were used to develop building-specific sampling plans. For the eight remaining Tier 1 buildings, Geosyntec proposed collecting nine sub-slab soil gas ("SSSG") samples among seven buildings as well as collecting paired crawl space air and outdoor air samples at the Office Trailer (Building No. 15 as shown on **Figure 1**), which includes a breakroom on a concrete block foundation as opposed to a slab-on-grade foundation (of the type present at the other seven Tier 1 buildings). The results obtained through implementing the approved Tier 1 Work Plan are summarized in the following sections of this Tier 1 Report.

Hercules submitted the initial version of the Tier 1 Report to EPD on January 12, 2021. On February 19, 2021, representatives of EPD, Hercules and Geosyntec discussed the initial version of the Tier 1 Report. During that conference call, EPD requested that Hercules collect and analyze an additional round of sub-slab soil gas samples at the Resin Supervisor's Office and the Stillhouse Cooling Tower Control Room to confirm the sub-slab soil gas sampling results obtained during the September 2020 sampling event as presented in the initial version of the Tier 1 Report. Hercules agreed to conduct such supplemental soil gas sampling activities and to submit a revised version of the Tier 1 Report incorporating the results of such sampling activities. The supplemental soil gas samples were collected on March 3, 2021. The results are included in this revised version of the Tier 1 Report. The results from the supplemental soil gas samples confirm the conclusions that were previously presented in the initial version of the Tier 1 Report.

2. EVALUATION APPROACH FOR VI PATHWAYS

Tier 1 buildings at the Brunswick facility were evaluated using a multiple-lines-of-evidence ("MLE") approach. The MLE approach for VI starts with data and information from the groundwater table and moves sequentially through sub-slab soil gas or crawl space air and then to indoor air, as needed and appropriate. The flow chart presented on **Figure 2** provides the decision framework that is guiding the investigation of each Tier 1 building. A majority of the process presented on **Figure 2** follows the process discussed in Chapter 6 ("Detailed Facility Investigation") of the USEPA VI Guide. This Tier 1 Report navigates the right-hand side of the flowchart for each Tier 1 building through refining the VI CSM for each such building.

As described in the Tier 1 Work Plan, Geosyntec proposed collecting samples to provide building-specific lines of evidence for evaluating the VI pathway at the eight Tier 1 buildings covered by the Tier 1 Work Plan. The results from the samples that were collected (including the results from the supplemental sub-slab soil gas samples that EPD requested Hercules to collect) are summarized in Section 3 of this Tier 1 Report. The results from the Tier 1 building field investigation activities were evaluated against applicable USEPA generic VI screening levels for sub-slab, crawl space, and/or indoor air locations. The outcomes from the screening process were either that the VI pathway is incomplete (meaning that no further actions are necessary) or that additional desktop analysis of data is needed to determine whether the VI pathway may be complete. Under the MLE approach described above, if additional desktop analysis is inconclusive for a particular building, either additional data can be collected or Hercules can elect preemptively to mitigate the VI pathway for that building. If the results from the Tier 1 building investigation activities at a particular Tier 1 building indicate that there is no complete VI pathway through either the absence of VI COPCs in the subsurface or concentrations of VI COPCs in sub-slab soil gas or crawl space air samples below applicable screening levels, then no further actions are necessary at that building.

3. DATA COLLECTION: METHODS AND RESULTS OF INVESTIGATION OF TIER 1 BUILDINGS

The Tier 1 building investigation activities targeted eight Tier 1 buildings at the Brunswick facility. As described in Section 1.2, above, Hercules elected preemptively to implement vapor mitigation measures at the other two Tier 1 buildings at the Brunswick facility. Although the Tier 1 Work Plan provided for the collection of SSSG samples from beneath seven of the Tier 1 buildings, an SSSG sample could not be collected at the Small Office (Building No. 19 as shown on **Figure 1**) due to water accumulating within the sampling train as described in Section 3.2, below. SSSG samples were collected from beneath six other Tier 1 buildings. One SSSG sample was collected from each of these six buildings with a footprint under 1,500 square feet ("ft^2") in size, and two SSSG samples were collected from each of these six buildings with a footprint over 1,500 ft^2 in size (i.e., the Resin Supervisor's Office and the E&I Shop). In contrast to the other seven Tier 1 buildings covered by the Tier 1 Work Plan, Geosyntec collected one crawl space air sample and one outdoor air sample at the Office Trailer (Building No. 15 as shown on **Figure 1**). The Office Trailer rests on steel I-beams so that outdoor air is present on all sides of the building; however, a breakroom addition is constructed on a raised, concrete block foundation, thereby creating an enclosed crawl space beneath the breakroom. The SSSG samples were collected on either September 23 or 24, 2020; and the crawl space air sample and outdoor air sample were collected on September 24, 2020.

As discussed in Section 1.2, above, Geosyntec also collected at EPD's request a second round of sub-slab soil gas samples from the Resin Supervisor's Office (SSSG-01 and SSSG-02) and the Stillhouse Cooling Tower Control Room (SSSG-08) on March 3, 2021.

3.1 Methods

Methods used to install and purge SSSG probes and to collect SSSG samples, a crawl space air sample and an outdoor air sample are discussed herein. Sampling methods were consistent with those discussed in technical guidance issued by USEPA Region 4 Laboratory Services and Applied Science Division ("LSASD") for soil gas sampling activities (LSASDPROC-307-R4) and ambient air sampling activities (SESDPROC-303-R5), respectively.

3.1.1 Sub-Slab Soil Gas Samples

To facilitate collecting SSSG samples, soil gas probes were installed through the building foundation slabs using a hammer drill with a vacuum and shroud to control dust produced by drilling activities. Soil gas probes were installed by first drilling approximately 2 inches into the slab with a 1.5-inch-diameter bit and then switching to a smaller 5/8-inch bit to penetrate the remaining thickness of the slab. A VaporPin® was installed within each 5/8-inch hole in accordance with the manufacturer's standard operating procedures, and a plastic flush-mounted cover was installed over the 1.5-inch hole to protect the soil gas probe for future sampling events.

SSSG samples were collected from each soil gas probe in accordance with the operating procedures for SSSG sampling presented in the Tier 1 Work Plan. Prior to collecting each SSSG

sample, Geosyntec tested and verified the integrity of the sampling train using a combination of pneumatic and tracer tests. First, a vacuum leak test was conducted by closing a valve at the VaporPin® and using a vacuum bag sampler ("lung box") to induce a minimum vacuum of 80 inches of water throughout the aboveground portion of the sampling train. The lung box operates by applying a vacuum to a sealed box containing a tedlar sample bag affixed to the SSSG probe using tubing; the vacuum applied within the box results in a vacuum being applied throughout the sampling train and the tedlar bag filling with soil gas. Then, a valve was shut near the lung box to isolate the portion of the sampling train from the VaporPin® to the summa canister, and the pressure in the line was monitored for a minimum of 60 seconds.

Following completion of a successful vacuum test, the valves were reopened and a plastic shroud was placed over the sampling train to perform helium leak checks while purging soil gas from the soil gas probe. Prior to each purge, the shroud was flooded with helium to achieve a concentration of approximately 10% to 20% helium by volume. Soil gas was purged from the soil gas probe through the sampling train into a 1-liter tedlar bag using the lung box, typically three times before collecting a sample. Purged soil gas was screened for VOCs (using a PID); oxygen, methane, and carbon dioxide (using a landfill gas meter); and helium (using a helium meter). A helium leak test is considered to be acceptable if helium readings from purged soil gas are less than 5% of the concentration of helium in the shroud. Purging and screening the SSSG probe continued until field measurements from purged soil gas from two consecutive tedlar bags reflected levels of VOCs, oxygen, methane, and carbon dioxide within approximately 5% of each other. SSSG sample collection field forms from the sampling event are provided in **Appendix A**. After purging, the valves were closed at the VaporPin® and lung box to isolate the summa canister within the sampling train, the summa canister was opened, and the vacuum within the sampling train was monitored for 30 seconds as a final check against leaks. Once all checks were complete, the valve at the VaporPin® was opened and the SSSG sample was collected in the summa cannister. Successful pneumatic and tracer test results during purging indicated that the sampling trains were sound and that the SSSG samples which were collected were representative of sub-slab conditions.

SSSG samples were collected into 1-liter summa canisters affixed with 200 milliliter per minute flow controllers. The initial vacuum of each summa canister was measured with a digital pressure gauge before it was connected to the sampling train. The ending vacuum of each summa canister was also recorded after the SSSG sample was collected.

SSSG samples were shipped under chain-of-custody protocols to TestAmerica in Knoxville, Tennessee, for analysis of VI COPCs by USEPA Method TO-15 low-level. The Tier 1 Work Plan specified that SSSG samples would be analyzed via USEPA Method TO-15 and the crawl space air and outdoor air samples would be analyzed via USEPA Method TO-14A. Use of the two analytical methods referenced above was planned based on discussions with TestAmerica regarding the analytical methods necessary to achieve reporting limits at or below USEPA commercial VISLs, based on medium. After the Tier 1 Work Plan had been submitted, TestAmerica indicated that it could achieve the desired reporting limits for all samples using USEPA Method TO-15 low-level. Accordingly, the decision was made to use USEPA Method TO-15 low-level for all analyses to streamline the reporting and data validation process.

3.1.2 Crawl Space Air and Outdoor Air Samples

The crawl space air and outdoor air samples were collected in 6-liter summa canisters affixed with 8-hour flow controllers. Both the crawl space air sample and the outdoor air sample were collected concurrently during working hours, from approximately 9:00 a.m. to approximately 5:00 p.m. The outdoor air sample was collected by securing the summa canister to a pole approximately 6 feet above the ground surface and attaching to the summa canister a short length of Nylaflow tubing turned toward the ground to prevent moisture from entering the summa canister during sampling activities. The crawl space air sample was collected by drilling a 5/8-inch hole through the side of the concrete block foundation wall forming the crawl space, inserting Nylaflow tubing into the hole, and sealing the tubing in place using a blue, low-VOC adhesive mounting putty. The tubing and mounting putty were removed after the crawl space air sample was collected, and the hole was sealed with concrete. Crawl space air and outdoor air samples were shipped under the same chain-of-custody protocols as the SSSG samples to TestAmerica in Knoxville, Tennessee, for analysis of VI COPCs by USEPA Method TO-15 low-level.

3.2 Field Changes from Tier 1 Building Work Plan

Minor modifications were made to procedures described in the Tier 1 Work Plan during implementation of the field work to accommodate new conditions encountered while purging and collecting certain SSSG samples.

The SSSG sample planned for the Small Office located north of the Storeroom (Building No. 19 as shown on **Figure 1**) was not collected because water entered the sampling train during purging. The field crew installed a second SSSG probe but encountered the same problem with water entering the sampling train. Although the crew could not collect an SSSG sample for laboratory analysis, the following field screening measurements were obtained from the soil gas probe installed at the Small Office: a PID measurement of 103.4 parts per million ("ppm") of VOCs was recorded, and the landfill gas meter recorded measurements of 23.5% methane, 9.7% carbon dioxide, and 2.4% oxygen.

On October 9, 2020, Geosyntec returned to the Small Office approximately two weeks after initial efforts to collect an SSSG sample took place and installed a temporary piezometer using a hand auger and one 5-foot section of 2-inch polyvinyl chloride ("PVC") slotted screen at a location approximately 1 feet from the eastern wall of the building. After allowing the water level within the piezometer to equilibrate for approximately 90 minutes, the water level was measured using a water level meter and found to be 2.50 feet below ground surface. Thus, the water encountered during sub-slab soil gas sampling does not appear to have been groundwater.

Geosyntec measured helium in purged gas at concentrations greater than 5% of the concentration of helium in the shroud at three sample locations at the E&I Shop (SSSG-03), the Terpene Resins Building (SSSG-05), and the Refrigeration Shop (SSSG-07/DUP-02), respectively, during purging of the soil gas probes. However, no leaks were identified in the sampling trains at these locations during vacuum tests. Field crews noted that methane was detected in purged soil gas using the landfill gas meter at each of these locations, at concentrations ranging from 9.3% to 53.4%.

According to the instruction manual for the MGD-2002 helium meter which was used for measuring the concentration of helium, methane can interfere with the helium sensor (Dielectric, 2018). Two measures were implemented to address this issue:

- A water dam was installed at each soil gas probe and monitored throughout purging activities to check for leaks at each probe.
- The summa canister used to collect the SSSG sample was placed inside the shroud with the rest of the sampling train, helium was monitored within the shroud during sample collection activities, and the SSSG sample was submitted for helium analysis in addition to analysis using USEPA Method TO-15 low-level. Typically, the shroud is removed after purging and before collecting the sample.

The results of the helium analyses for samples SSSG-03, SSSG-05, and SSSG-07 are provided in **Table 1**. Helium was not detected in the three SSSG samples where it was analyzed by the laboratory, which indicates that the sampling train was sound and that the SSSG samples that were collected are representative of sub-slab conditions.

3.3 Supplemental Sampling Requested by EPD

As discussed in Section 1.2, above, during a conference call on February 19, 2021, EPD requested that Hercules perform supplemental sub-slab soil gas sampling at the Resin Supervisor's Office and the Stillhouse Cooling Tower Control Room. Hercules agreed to satisfy this request. Accordingly, Geosyntec collected a second round of sub-slab soil gas samples from the Resin Supervisor's Office (SSSG-01 and SSSG-02) and the Stillhouse Cooling Tower Control Room (SSSG-08) on March 3, 2021. The soil gas samples were collected using the same materials and methods discussed in Section 3.1.1, above, from the same soil gas probes at those two buildings installed as part of the September 2020 sub-slab soil gas sampling event.

3.4 Results

Of the 25 VI COPCs that have been identified at the Brunswick facility, 14 VI COPCs collectively were detected in the 11 SSSG samples that were collected during the September 2020 and March 2021 sub-slab soil gas sampling events, 15 VI COPCs were detected in the crawl space air sample, and 12 VI COPCs were detected in the outdoor air sample (not including field duplicate results).

In the SSSG samples:

- Benzene and chloroform were detected in 9 of 11 samples.
- Paracymene and toluene were detected in 8 of 11 samples.
- Ethylbenzene was detected in 5 of 11 samples.

In the crawl space and outdoor air samples:

- Eleven VI COPCs were detected in both crawl space air and outdoor air samples.

- Methylene chloride was detected in the outdoor air sample but not in the crawl space air sample.
- Tetrachloroethylene, trichloroethylene, 1,1-dichloroethane, and 1,1-dichloroethene were detected in the crawl space air sample but not the outdoor air sample.

The analytical laboratory report and data validation report from the sampling activities that were performed are provided in **Appendix B** and **Appendix C**, respectively.

The validated laboratory data from the September 2020 sub-slab soil gas sampling event were provided to EPD on November 4, 2020. Analytical laboratory results from the September 2020 and March 2021 sub-slab soil gas sampling events were validated by Geosyntec and are summarized in **Table 1**. The SSSG sampling results were compared to the most recent (November 2020) generic USEPA commercial vapor intrusion screening levels for sub-slab soil gas. The crawl space air and outdoor air sampling results were compared to the most recent (November 2020) generic USEPA commercial target indoor air concentrations (USEPA 2020). Sub-slab screening levels and target indoor air concentrations are based on a $1x10^{-6}$ cancer risk and hazard index of 0.1.

4. REVISED VAPOR INTRUSION CONCEPTUAL SITE MODEL

The VI CSM is a living document that is designed to be updated as new information becomes available. The preliminary version of the VI CSM was updated to incorporate the results from shallow groundwater samples collected in August 2019 and February 2020. This process allowed some buildings to be prioritized for further evaluation of the VI pathway and others to be eliminated from such evaluation. The VI CSM has again been updated in this document to include the sampling results from SSSG, crawl space air, and outdoor air samples collected in September 2020 and March 2021, and other field measurements and observations obtained in September 2020. The VI CSM follows VI COPCs from sources in either shallow groundwater or soils in the vadose zone along their potential pathways to indoor air within susceptible buildings. The VI CSM also provides context for potential background contributions of VI COPCs from outdoor air and indoor sources that are unrelated to VI. Through this lens, the data for Tier 1 buildings were reviewed to assess the potential for complete VI pathways to exist and to evaluate potential options for next steps, following the flowchart on **Figure 2**.

In each subsection below, the analytical results from the field work that took place in September 2020 and March 2021 were compared to regulatory screening levels, where available. Concentrations of VI COPCs from sampling performed at three Tier 1 buildings (the Resin Supervisor's Office, the Liquid Loading Shed and the Stillhouse Cooling Tower Control Room) were below regulatory screening levels and therefore no further actions are necessary at those three buildings. Following a desktop forensic review, an updated VI CSM was developed for the other five Tier 1 buildings covered by this Tier 1 Report. Each Tier 1 building covered by this Tier 1 Report is discussed in detail in the subsections set forth below. Options for next steps involving additional forensic field investigation activities and/or mitigation measures are also presented for the five Tier 1 buildings that warrant further evaluation.

4.1 Resin Supervisor's Office

The Resin Supervisor's Office (Building No. 2 as shown on **Figure 1**) is a slab-on-grade office building with sheet metal siding and a foundation slab that is approximately four inches thick. The Resin Supervisor's Office is approximately 2,750 ft^2 in size. The building contains five offices, a breakroom, a bathroom, and an outdoor covered shop area where valves and other equipment (e.g., golf carts) are repaired. The foundation slab within the building interior is covered with vinyl/laminate flooring, and no gaps or cracks in the floor were observed during building reconnaissance.

Various VI COPCs including benzene (at a concentration of 14 micrograms per liter ["µg/L"]), naphthalene (at a concentration of 23 µg/L) , toluene (at a concentration of 130 µg/L), paracymene (at a concentration of 5,200 E[1] µg/L), ethylbenzene (at a concentration of 1,000 E µg/L), and xylene (at a concentration of 5,100 µg/L) were detected in groundwater at the water table approximately 60 feet downgradient of the Resin Supervisor's Office at temporary well point

[1] An "E" qualifier on a sampling result from the laboratory indicates that the result exceeded the instrument calibration range.

SGW-4 shown on **Figure 3a**. By contrast, no VI COPCs were detected in groundwater at the water table approximately 45 feet upgradient of the Resin Supervisor's Office at temporary well point SGW-2.

Between the September 2020 and March 2021 sampling events, a total of ten VI COPCs were detected in sub-slab soil gas samples from monitoring location SSSG-01, collected from beneath the slab in the southern portion of the Resin Supervisor's Office, and a total of 11 VI COPCs were detected in sub-slab soil gas samples from monitoring location SSSG-02, collected from beneath the slab in the northern portion of the building as shown on **Figure 3a**. Analytical results from the second round of sub-slab soil gas samples were very similar to the analytical results from the first round of sub-slab soil gas samples. None of the VI COPCs were detected at concentrations exceeding the USEPA commercial VISLs for sub-slab soil gas in either sampling event. Method detection limits ("MDLs") for all VI COPCs that were not detected in sub-slab soil gas samples were also below their respective USEPA commercial VISLs for sub-slab soil gas. The presence of low concentrations of VI COPCs in sub-slab soil gas samples at the Resin Supervisor's Office is consistent with a long history of industrial occupation indoors and the presence of clean groundwater upgradient of the building (i.e., the absence of an aqueous source of VI COPCs under the building). The results from the SSSG samples indicate that a VI source is neither present underneath the building nor close enough to act as a subsurface source of VI COPCs at the building. These multiple lines of evidence indicate that the VI pathway at the Resin Supervisor's Office is incomplete and that no further actions are necessary with respect to vapor intrusion at the Resin Supervisor's Office.

4.2 Liquid Loading Shed

The Liquid Loading Shed (Building No. 5 as shown on **Figure 1**) is a one-story warehouse approximately 12,500 ft^2 in size constructed approximately three feet above grade on concrete blocks with corrugated sheet-metal siding. The siding is attached with a gap of several inches between the floor of the building and the bottom of the siding thereby allowing air exchange between indoor and outdoor air. An enclosed, abandoned office space (approximately 200 ft^2 in size) is present at the east end of the building and an enclosed storage room (approximately 100 ft^2 in size) is present at the southwest corner of the building that is rarely occupied. The office space and storage room are enclosed by sheet rock walls with drop ceilings. The abandoned office was demolished in February 2021 and was therefore not evaluated as part of the investigation activities pursuant to the Tier 1 Work Plan. Geosyntec will submit a letter report describing demolition activities under separate cover.

Paracymene was detected in groundwater at the water table at a concentration of 32,000 µg/L approximately 225 feet upgradient of the Liquid Loading Shed at temporary well point SGW-5 and was detected at a concentration of 3.2 µg/L in groundwater at the water table approximately 25 feet downgradient of the Liquid Loading Shed at temporary well point SGW-7 as shown on **Figure 3b**. Geosyntec collected sub-slab soil gas sample SSSG-06 from beneath the storage room in the southwest corner of the Liquid Loading Shed as shown on **Figure 3b**. Five VI COPCs were detected in sample SSSG-06, all at concentrations below their respective USEPA commercial

VISLs for sub-slab soil gas. Only two VI COPCs detected in sample SSSG-06 were found in common with the VI COPCs detected in shallow groundwater at temporary well point SGW-7. MDLs for all VI COPCs that were not detected in sample SSSG-06 were below the respective USEPA commercial VISLs for sub-slab soil gas, except for naphthalene. Naphthalene was not detected in sample SSSG-06, but the laboratory MDL for naphthalene in the sample of 20 micrograms per cubic meter ("µg/m^3") is slightly above the USEPA commercial VISL for naphthalene in sub-slab soil gas of 12 µg/m^3. However, the reported concentration of naphthalene in shallow groundwater immediately downgradient of the Liquid Loading Shed was less than the corresponding USEPA commercial VISL for naphthalene in groundwater (5.8 µg/L vs. 26 µg/L). In fact, all four of the VI COPCs detected in temporary well point SGW-7 were reported at concentrations below their corresponding USEPA commercial VISLs for groundwater. These multiple lines of evidence indicate that the VI pathway at the Liquid Loading Shed is incomplete and that no further actions are necessary with respect to vapor intrusion at the Liquid Loading Shed.

4.3 Stillhouse Cooling Tower Control Room

The Stillhouse Cooling Tower Control Room (Building No. 16 as shown on **Figure 1**) is a slab-on-grade, concrete-block building with a 4-inch thick foundation slab that is approximately 390 ft^2 in size. The Stillhouse Cooling Tower Control Room is connected to the Stillhouse Cooling Tower and is located immediately east of the Stillhouse Control Room. The building contains storage cabinets and process-related instruments. The Stillhouse Cooling Tower Control Room is unoccupied except for short visits by plant personnel to check the process instruments.

NAPL was observed in shallow groundwater approximately 70 feet upgradient from the Stillhouse Cooling Tower Control Room at temporary well point SGW-23 and six VI COPCs were detected at low concentrations in groundwater at the water table approximately 45 feet downgradient of the Stillhouse Cooling Tower Control Room at temporary well point SGW-22. A sub-slab soil gas monitoring location (SSSG-08) was installed through the building foundation at the location shown on **Figure 3c**. Sub-slab soil gas samples were collected from monitoring location SSSG-08 in September 2020 and March 2021. Eleven VI COPCs were detected at monitoring location SSSG-08 (acetone, methyl ethyl ketone, paracymene, chloroform, methyl isobutyl ketone, tetrachloroethylene, toluene, styrene, benzene, ethylbenzene, and xylene) between the September 2020 and March 2021 sampling events. Analytical results from the second round of sub-slab soil gas samples showed generally lower concentrations of VI COPCs compared to the analytical results from the first round of sub-slab soil gas samples. For example, acetone and benzene were detected in soil gas at concentrations of 12,000 µg/m^3 and 24 J µg/m^3 in September 2020, and 50 J µg/m^3 and 3.6 J µg/m^3 in March 2021, respectively. Additionally, ethylbenzene, methyl ethyl ketone, methyl isobutyl ketone, and paracymene were detected during the sampling event in September 2020, but were not detected during the sampling event in March 2021. VI COPCs were not detected at concentrations above the respective USEPA commercial VISLs for sub-slab soil gas during either sampling event.

Reporting limits for all VI COPCs that were not detected in soil gas samples collected from monitoring location SSSG-08 were also below the USEPA commercial VISLs for sub-slab soil gas, except for naphthalene. In the September 2020 sampling event, naphthalene was not detected in the sub-slab soil gas sample collected at monitoring location SSSG-08, but the laboratory MDL for naphthalene in that sample was 69 µg/m^3, which is above the USEPA commercial VISL for naphthalene in sub-slab soil gas of 12 µg/m^3. By contrast, in the March 2021 sampling event, naphthalene was again not detected in the soil gas sample collected at monitoring location SSSG-08, but the laboratory MDL for naphthalene in that sample was below the USEPA commercial VISL for naphthalene in sub-slab soil gas of 12 µg/m^3. In addition, the reported concentration of naphthalene in shallow groundwater immediately downgradient of the Stillhouse Cooling Tower Control Room was less than the USEPA commercial VISL for naphthalene in groundwater (3.1 µg/L vs 26 µg/L). In fact, all six of the VI COPCs detected in groundwater at temporary well point SGW-22 were reported at concentrations below their respective USEPA commercial VISLs for groundwater. These multiple lines of evidence indicate that the VI pathway at the Stillhouse Cooling Tower Control Room is incomplete and that no further actions are necessary with respect to vapor intrusion at the Stillhouse Cooling Tower Control Room.

4.4 Office Trailer

The Office Trailer (Building No. 15 as shown on **Figure 1**) is located west of the Pexite Process area and is a one-story control room, approximately 400 ft^2 in size, with an adjoining breakroom. The Office Trailer is elevated approximately 6 inches above the ground on steel I-beams, and the breakroom is elevated approximately 2 feet above the ground and constructed on a concrete-block foundation. The breakroom is susceptible to VI from soil gas because of the enclosed concrete-block foundation that supports the room. By contrast, the control room, which is located on steel I-beams, has an unenclosed crawl space underneath the structure that is open to the outdoor air on three sides, and is therefore not susceptible to VI. Paracymene was detected at a concentration of 5,100 E µg/L and benzene was detected at a concentration of 970 µg/L in groundwater at the water table upgradient of the Office Trailer at temporary well point SGW-26 as shown in **Figure 3d**. No VI COPCs were detected in a shallow groundwater sample collected from temporary well point SGW-25, located approximately 115 feet downgradient of the Office Trailer.

Geosyntec sampled air from the crawl space beneath the breakroom (sample CS-01) and outdoor air near the Office Building (sample OA-01). A total of 15 VI COPCs were detected in the crawl space air sample, 12 of which were also detected in the outdoor air sample. Methylene chloride was the only VI COPC detected in the outdoor air sample that was not detected in the crawl space air sample. The results from the crawl space air sample were screened against USEPA commercial target indoor air concentrations, consistent with USEPA VI guidance which assumes that there is no attenuation between crawl spaces and indoor air for the purpose of screening analytical results. Two VI COPCs were detected above their respective target indoor air concentrations in the crawl space air sample, although neither of the VI COPCs was detected in shallow groundwater:

- Carbon tetrachloride was detected at a concentration of 2.3 µg/m^3, slightly above the USEPA commercial target indoor air concentration for carbon tetrachloride (2.0 µg/m^3); and

- Chloroform was detected at a concentration of 5.1 µg/m^3, which is above the USEPA commercial target indoor air concentration for chloroform (0.5 µg/m^3).

The desktop forensic review suggests that further effort would be needed to resolve whether the VI pathway is complete at the Office Trailer. A comparison between the measured concentrations of the five VI COPCs detected in shallow groundwater upgradient of the Office Trailer at temporary well point SGW-26 – paracymene, benzene, toluene, naphthalene, and ethylbenzene - and the same five COPCs as reported in crawl space air and outdoor air samples demonstrate that the outdoor air and crawl space air samples are more similar to each other than the groundwater and crawl space air samples. For example, naphthalene was detected in groundwater but not in crawlspace air, and the relative concentration distribution of the five VI COPCs between groundwater and crawlspace air is different. The distribution of VI COPCs in the crawlspace air sample is more similar to the outdoor air sample than the groundwater sample collected upgradient of the Office Trailer. These observations are consistent with the conclusion that outdoor air is the source of the VI COPCs detected in the crawl space air sample rather than vapor intrusion from shallow groundwater.

However, with two VI COPCs being found in the crawl space air sample at concentrations exceeding the corresponding USEPA commercial target indoor air concentrations and some degree of uncertainty remaining as to the origins of VI COPCs in the crawl space air sample, further efforts are needed to resolve whether the VI pathway to the Office Trailer breakroom is complete. Options for further steps include collecting one round of concurrent samples of crawl space air, indoor air and outdoor air; conducting building pressure control testing ("BPC") to induce VI; or reviewing mitigation options.[2] Mitigation options for the breakroom associated with the Office Trailer include institutional controls or adding ventilation to the concrete block foundation under the breakroom so that outdoor air can circulate through the crawl space and make the breakroom and Office Trailer no longer susceptible to VI.

4.5 Terpene Resins Building

The Terpene Resins Building (Building No. 4 as shown on **Figure 1**) is a process structure constructed on a concrete slab foundation with foundation supports of steel and concrete block, and a sheet metal exterior. The total footprint of the Terpene Resins Building is approximately 5,750 ft^2 in size. The only room on the first floor of the Terpene Resins Building is a switch room constructed out of concrete blocks with one exterior door on the south wall. The switch room is approximately 200 ft^2 in size and is rarely occupied. The concrete-block construction extends up to the second story, which houses the control room for the terpene resins process. The foundation slab within the first-floor switch room is 13 inches thick.

[2] BPC can both induce and suppress vapor intrusion at a building through the use of a temporary mounted blower door, similar to what is used in energy audits, to cycle between depressurizing the building, which induces vapor intrusion, and pressurizing the building, which suppresses vapor samples. Indoor air samples collected during pressure cycles provide insights into indoor air concentrations of VI COPCs under worst-case seasonal conditions.

Paracymene was detected at a concentration of 32,000 µg/L in groundwater at the water table at temporary well point SGW-5 located upgradient of the Terpene Resins Building. However, due to site access constraints, temporary well point SGW-5 could not be located closer than approximately 130 feet upgradient of the Terpene Resins Building. As a result, there is more uncertainty about the presence or absence of dissolved phase VI COPCs under the Terpene Resins Building than if the temporary well point had been located closer to the building. Geosyntec collected one sub-slab soil gas sample (SSSG-05) from beneath the switch room at the location shown on **Figure 3e**.

The following VI COPCs were detected in sub-slab soil gas sample SSSG-05 at concentrations above the corresponding USEPA commercial VISLs for sub-slab soil gas:

- Ethylbenzene (150,000 µg/m^3)
- Xylene (440,000 µg/m^3)
- Chloroform (1,400 µg/m^3)
- Paracymene (83,000 µg/m^3)
- Benzene (480 µg/m^3)

The VI COPCs present in sample SSSG-05 are inconsistent with the VI COPCs detected in shallow groundwater at temporary well point SGW-5. Further desktop forensic review is not likely to resolve whether the VI pathway is complete. Therefore, additional effort is required. Options for further steps at the Terpene Resins Building include collecting a round of concurrent samples of sub-slab soil gas, indoor air and outdoor air; conducting BPC to induce VI; or reviewing mitigation options such as institutional controls, sub-slab depressurization systems or modifications to the first-floor switch room to make it no longer susceptible to VI.

4.6 Small Office (North of Storeroom)

The Small Office (Building No. 19 as shown on **Figure 1**) is a stand-alone, one-room, slab-on-grade, concrete-block building located north of the Storeroom that is approximately 240 ft^2 in size. The Small Office is enclosed but rarely occupied. The Small Office has concrete-block walls that appear to be grouted to the floor slab and are covered with an epoxy coating. Three VI COPCs including paracymene (at a concentration of 20,000 µg/L), benzene (at a concentration of 330 µg/L), and toluene (at a concentration of 210 µg/L) were detected in groundwater at the water table approximately 25 feet upgradient of the Small Office at temporary well point SGW-31 as shown on **Figure 3f**. No sub-slab soil gas samples were collected from this building for laboratory analysis as discussed in Section 3.2, above, due to water entering the sampling train during purging activities. However, Geosyntec collected a 1-liter tedlar bag sample of soil gas from the soil gas probe that was installed and screened the soil gas for total organic vapor ("TOV"), oxygen, carbon dioxide, and methane. The screening results (103.4 ppm TOV, 2.4% oxygen, 23.5% methane, and 9.7% carbon dioxide) are consistent with microbial degradation of organic contaminants in the vadose zone.

The absence of speciation of VI COPCs in sub-slab soil gas beneath the Small Office is a data gap in the VI CSM. Given the TOV readings, however, further information would be needed to determine whether the VI pathway at the Small Office is complete. Options for further steps to advance the VI pathway evaluation include attempting to collect a round of concurrent samples of sub-slab soil gas, indoor air and outdoor air; conducting BPC to induce VI; or assessing mitigation options. Mitigation options for the Small Office may include institutional controls, retrofitting openings into the walls and/or door such that outdoor air may circulate more freely through indoor air and thereby make the Small Office no longer susceptible to VI, demolishing the building and replacing it with a structure of similar size but elevated above ground so that outdoor air can circulate under the building, or installing an SSD system.

4.7 E&I Shop

The E&I Shop (Building No. 3 as shown on **Figure 1**) is a one-story, slab-on-grade building that is approximately 3,450 ft^2 in size, with a foundation slab that is approximately four inches thick. The E&I Shop contains a machine shop, a bathroom, a storage room, and a breakroom. The southern portion of the building, which houses the machine shop and bathroom, is constructed from concrete blocks, while the breakroom appears to be an addition constructed from sheet metal siding. A small chemical storage room is connected to the southern portion of the machine shop and is constructed from sheet metal siding with an interior plywood wall and on a concrete slab that appears to be separate from the main building. Metal doors separate rooms within the building. Chemical-containing consumer products such as cleaners, paints, rust preventers and lubricants are stored in the chemical storage room and are used in the machine shop. PID readings of indoor air varied throughout the E&I Shop. During building reconnaissance activities, PID readings were higher in the chemical storage room (12.5 ppm) at the southern end of the building and lower moving north through the building to the machine shop (10.0 ppm), storage area (2.2 ppm), and breakroom (0.5 ppm). The building has high ceilings (approximately 20 to 25 feet tall) and HVAC ductwork running generally down the north-south centerline of the building.

Benzene, naphthalene, toluene, paracymene, ethylbenzene, and xylene were detected in a sample of groundwater from the water table cross-gradient from the E&I Shop at temporary well point SGW-4. No VI COPCs were detected in groundwater at the water table upgradient of the E&I Shop at temporary well point SGW-3. Two sub-slab soil gas samples were collected from the E&I Shop: sample SSSG-04 was collected from beneath the storage room toward the upgradient end of the building, to the north, and sample SSSG-03 was collected from the southern end of the machine shop near the bathroom, toward the downgradient end of the building, as shown on **Figure 3g**. VI COPCs were not detected in sample SSSG-04 at concentrations above the USEPA commercial VISLs for sub-slab soil gas. However, the same five VI COPCs that were detected in shallow groundwater at temporary well point SGW-4 were also detected in sample SSSG-03, specifically, benzene, ethylbenzene, paracymene, toluene and total xylenes as indicated in **Table 2**. Four VI COPCs were present in sample SSSG-03 at concentrations significantly above their respective USEPA commercial VISLs for sub-slab soil gas, as follows:

- Ethylbenzene (180,000 $\mu g/m^3$)

- Paracymene (3,400,000 µg/m^3)
- Xylenes (130,000 µg/m^3)
- Benzene (2,400 µg/m^3)

Two observations from the desktop forensic review suggest that further effort would be needed to resolve whether the VI pathway is complete at the E&I Shop. First, the same VI COPCs were reported at elevated concentrations in shallow groundwater and in sub-slab soil gas under the machine shop in the southern portion of the building. Second, the concentrations of four VI COPCs in sample SSSG-03 exceed the corresponding USEPA commercial VISLs for sub-slab soil gas. Options for further steps include collecting a round of concurrent samples of sub-slab soil gas, indoor air and outdoor air to evaluate the completeness of the VI pathway; conducting BPC to induce VI; or reviewing mitigation options such as sub-slab venting systems or institutional controls.

4.8 Refrigeration Shop

The Refrigeration Shop (Building No. 11 as shown on **Figure 1**) is a slab-on-grade, concrete-block building that is approximately 960 ft^2 in size and is currently used for storage. The foundation slab is approximately three inches thick. The western half of the Refrigeration Shop contains a storage area used by an electrician at the Brunswick facility, and the eastern half of the building is used for material storage for the Staybelite process. During the August 2019 shallow groundwater investigation, NAPL was observed in shallow groundwater both upgradient and downgradient of the Refrigeration Shop at temporary well points SGW-20 and SGW-21, respectively.

Geosyntec collected sub-slab soil gas sample SSSG-07 from beneath the Staybelite material storage room within the Refrigeration Shop at the location shown on **Figure 3h**. Benzene was the only VI COPC detected in sample SSSG-07 at a concentration of 6,100 µg/m^3, which is exceeds the USEPA commercial VISL for benzene in sub-slab soil gas (52.4 µg/m^3).

The results from sample SSSG-07 suggest that further effort would be needed to evaluate whether the VI pathway is complete at the Refrigeration Shop. Options for further steps include collecting a round of concurrent samples of sub-slab soil gas, indoor air and outdoor air to evaluate the completeness of the VI pathway; conducting BPC to induce VI into the building; or reviewing mitigation options. Mitigation options for the Refrigeration Shop may include institutional controls, demolishing the building and replacing it with a storage structure of similar size but elevated above ground so that outdoor air can circulate under the building, retrofitting openings into the walls and/or door such that outdoor air may circulate more freely through indoor air and thereby make the Refrigeration Shop no longer susceptible to VI, or installing an SSD system.

5. TIER 1 BUILDING RECOMMENDATIONS

In this section of the Tier 1 Report, the building-specific options from Section 4, above, are considered and a course of action is recommended for each of the five Tier 1 buildings where further steps are warranted. As detailed in Section 4, the results of sampling performed pursuant to the Tier 1 Work Plan at the Resin Supervisor's Office, the Liquid Loading Shed and the Stillhouse Cooling Tower Control Room indicate that the VI pathways are not complete at those three buildings and therefore no further actions with respect to vapor intrusion are necessary at those three buildings. Of the remaining five Tier 1 buildings at the Brunswick facility, four buildings had air-phase laboratory data (either sub-slab soil gas sampling results or crawl space air sampling results) above USEPA commercial screening values. These sampling results point to the need for further field forensic evaluations with respect to the VI pathway or potential consideration of mitigation options. One building had no laboratory data, but the revised VI CSM points to the need for either further field forensic evaluation or consideration of mitigation options. A summary of the recommended course of action for each of the five Tier 1 buildings where further steps are warranted as described in this Tier 1 Report is provided on **Table 3**. In addition, **Table 3** describes the outcomes for the other five Tier 1 buildings at the Brunswick facility (i.e., no further actions at three of those buildings and installation of sub-slab depressurization systems at the other two buildings).

5.1 Office Trailer

VI COPCs were detected at concentrations exceeding USEPA commercial indoor air target concentrations in the crawl space air sample collected from beneath the breakroom associated with the Office Trailer. Modifying the concrete block foundation beneath the breakroom as an engineering control is recommended so that the breakroom will no longer be susceptible to VI. Such a modification will involve constructing ventilation openings in the concrete block foundation so that outdoor air can circulate through the crawl space beneath the breakroom. Such a modification can readily and quickly be implemented.

5.2 Terpene Resins Building

The VI pathway evaluation at the Terpene Resins Building focused on a single room—the first-floor switch room—which is part of a much larger, open air industrial process structure. The switch room is accessed by a single exterior door. VI COPCs were detected in a sub-slab soil gas sample at concentrations exceeding the USEPA commercial VISLs for sub-slab soil gas. Installing an SSD system for the first-floor switch room may be difficult due to the active production processes in and around the Terpene Resins Building. Mitigating the potential VI pathway to the switch room is recommended by applying an engineering control by modifying the switch room to render it no longer susceptible to VI. As discussed and agreed to by Pinova, this objective will be achieved by replacing the exterior door to the switch room with a louvered door which will enhance the existing ventilation through the louvers now present in the wall above the door while protecting the switch room against rain.

5.3 Small Office (North of Storeroom)

The Small Office (North of Storeroom) is used for storage of supplies by the landscaper and custodian of the Brunswick facility and for storage of certain personal effects. The Small Office is rarely occupied. No sub-slab soil gas samples could be collected at the Small Office due to water entering the sampling train. However, field screening data suggest that VOCs may be present and several VI COPCs were found in shallow groundwater in proximity to the Small Office. Mitigating the potential VI pathway at the Small Office is recommended. Mitigation of the Small Office has been discussed with Pinova and will include engineering controls by removing the Small Office and using one or more existing buildings where vapor intrusion is not a concern to serve the same functions that the Small Office currently provides. The Small Office's concrete foundation slab will remain following demolition at Pinova's request.

5.4 E&I Shop

In the sub-slab soil gas sample collected from the northern part of the E&I Shop, certain VI COPCs were detected but neither the detected concentrations of VI COPCs nor the MDLs for VI COPCs that were not detected exceeded the USEPA commercial VISLs for sub-slab soil gas. However, several VI COPCs were detected in the sub-slab soil gas sample collected from the southern portion of the E&I Shop at concentrations above USEPA commercial VISLs for sub-slab soil gas, and the data from that sample are generally consistent with sampling results from shallow groundwater samples collected in proximity to the building. The southern portion of the E&I Shop is used as a machine shop and chemicals are stored and used in that area that together likely contribute VOCs to indoor air which would almost certainly complicate interpretation of any indoor air sampling results that might be obtained. Given current conditions and available information, installing a sub-slab ventilation system in the southern portion of the E&I Shop is recommended to mitigate the potential VI pathway in that portion of the E&I Shop. The footprint of the sub-slab ventilation system will be determined through a predesign investigation.

5.5 Refrigeration Shop

The Refrigeration Shop is a small building that is used for storage of supplies by the electrician for the Brunswick facility and Staybelite storage. The Refrigeration Shop is rarely occupied. NAPL was observed in shallow groundwater near the Refrigeration Shop and benzene was detected in the sub-slab soil gas sample beneath the building at a concentration above the USEPA commercial VISL for benzene in sub-slab soil gas. Mitigating the potential VI pathway at the Refrigeration Shop is recommended. Implementing engineering controls by constructing ventilation openings in the walls and/or door of the Refrigeration Shop to enhance ventilation and render the building no longer susceptible to VI has been discussed with Pinova, and is recommended as the mitigation measure to be implemented.

6. TIER 2 BUILDINGS

Sampling results from shallow groundwater samples at the Brunswick facility provided a useful guide to direct the vapor intrusion investigation toward buildings with the potential for a completed VI pathway to be present. Tier 2 buildings were differentiated from Tier 1 buildings at the Brunswick facility largely on the basis of the concentrations of VI COPCs measured in shallow groundwater samples collected from temporary well points near the buildings. The approach for evaluating Tier 2 buildings was presented to EPD during the virtual Triad meeting on March 11, 2021.

7. PROJECT MILESTONE SCHEDULE

Following EPD's receipt of an initial draft of this report, Hercules and Geosyntec met virtually with EPD on February 19, 2021 to discuss key findings from the Tier 1 building investigation activities, mitigation steps that are planned for certain of the Tier 1 buildings, and proposed steps to evaluate Tier 2 buildings. Hercules anticipates submitting a Tier 1VI mitigation work plan to EPD in late April 2021.

8. REFERENCES

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TABLES

Table 1
Tier 1 Building Investigation Sampling Results
Hercules/Pinova Plant, Brunswick, Georgia

Geosyntec Consultants

			Resin Supervisor's Office				E&I Shop		Terpene Resins Building	Liquid Loading Shed	Refrigeration Shop		Stillhouse Cooling Tower Control Room		
			SSSG-01		SSSG-02		SSSG-03	SSSG-04	SSSG-05	SSSG-06	SSSG-07	DUP-02	SSSG-08	SSSG-08	DUP-01
			9/23/2020	3/3/2021	9/23/2020	3/3/2021	9/23/2020	9/23/2020	9/24/2020	9/24/2020	9/24/2020	9/24/2020	9/24/2020	3/3/2021	3/3/2021
Analytes	CAS	USEPA Commercial Subslab VISL	Sub-slab	Sub-slab	Sub-slab	Sub-slab	Sub-slab	Sub-slab	Sub-slab	Sub-slab	Sub-slab	Sub-slab Duplicate	Sub-slab	Sub-slab	Sub-slab Duplicate
Fixed Gasses (% v/v)															
Helium		–	–	–	–	–	< 0.13	–	< 0.12	–	< 0.11	< 0.12	–	–	–
Hydrogen		–	–	–	–	–	< 0.13	–	< 0.12	–	< 0.11	< 0.12	–	–	–
VI COPCs (ug/m³)															
Acetone	67-64-1	451,000	**140**	< 34	**230**	**78 J**	< 63,000	**29 J**	**20,000**	< 68	< 9,000	< 10,000	**12,000**	**50 J**	**55 J**
Benzene	71-43-2	52.4	**0.78 J**	**1.2 J**	**0.57 J**	< 0.64	**2,400**	**1.4 J**	**480 J**	< 1.3	**6,100**	**6,200**	**24 J**	**3.6 J**	**3.4 J**
Carbon disulfide	75-15-0	10,200	**1.8 J**	**3.6 J**	**0.48 J**	**2 J**	**1,600**	< 0.34	< 160	< 1.7	< 230	< 260	< 5.9	< 0.86	< 0.86
Carbon tetrachloride	56-23-5	68.1	**2.5 J**	< 1.1	**5.1**	**2.2 J**	< 2,100	**2 J**	< 210	< 2.2	< 290	< 330	< 7.6	< 1.1	< 1.1
Chlorobenzene	108-90-7	730	< 0.28	< 0.69	< 0.28	< 9.2	< 1,300	< 0.28	< 130	< 1.4	< 180	< 210	< 4.8	< 9.2	< 0.69
Chloroform	67-66-3	17.8	**10**	**1.3 J**	**3.1 J**	**2 J**	< 1,600	**1.3 J**	**1,400 J**	**2.8**	< 230	< 250	**12 J**	**8.2 J**	**8.4 J**
1,2-Dichlorobenzene	95-50-1	2,920	< 1.9	< 4.7	< 1.9	< 4.7	< 8,700	< 1.9	< 870	< 9.3	< 1,200	< 1,400	< 32	< 4.7	< 4.7
1,4-Dichlorobenzene	106-46-7	37.2	< 0.96	< 2.4	< 0.96	< 2.4	< 4,500	< 0.96	< 450	**6.3**	< 640	< 720	< 17	< 2.4	< 2.4
1,1-Dichloroethane	75-34-3	256	< 0.28	< 0.71	< 0.28	< 0.71	< 1,300	< 0.28	< 130	< 1.4	< 190	< 210	< 4.9	< 0.71	< 0.71
1,1-Dichloroethylene	75-35-4	2,920	< 0.32	< 0.79	< 0.32	< 0.79	< 1,500	< 0.32	< 150	< 1.6	< 210	< 240	< 5.5	< 0.79	< 0.79
1,2-Dichloropropane	78-87-5	58.4	< 0.46	< 1.2	< 0.46	< 1.2	< 2,200	< 0.46	< 220	< 2.3	< 310	< 340	< 8	< 1.2	< 1.2
Ethylbenzene	100-41-4	164	< 0.56	< 1.4	< 0.56	**2.6 J**	**180,000**	**0.95 J**	**150,000**	**26**	< 370	< 420	**70**	< 1.4	< 1.4
Methyl Ethyl Ketone (2-Butanone)	78-93-3	73,000	**20**	< 5.4	**27**	**16 J**	< 10,000	**5.4 J**	< 1,000	< 11	< 1,400	< 1,600	**1,100**	< 5.4	< 5.4
Methyl isobutyl ketone	108-10-1	43,800	**16**	< 5.5	**7.7 J**	< 5.5	< 10,000	< 2.2	< 1,000	< 11	< 1,500	< 1,700	**120 J**	< 5.5	< 5.5
Methylene Chloride	75-09-2	8,760	< 14	< 34	< 14	< 34	< 63,000	< 14	< 6,300	< 68	< 9,000	< 10,000	< 230	< 34	< 34
Naphthalene	91-20-3	12	< 4	< 10	< 4	< 10	< 19,000	< 4	< 1,900	< 20	< 2,600	< 3,000	< 69	< 10	< 10
4-Isopropyltoluene (paracymene)	99-87-6	5,840	**2.9 J**	< 3	**8.6**	**260**	**3,400,000**	**57**	**83,000**	**23**	< 800	< 900	**1,300**	< 3	< 3
Styrene	100-42-5	14,600	< 1	< 2.6	< 1	< 2.6	< 4,800	< 1	< 480	< 5.1	< 680	< 760	**39 J**	**18**	**18**
Tetrachloroethylene	127-18-4	584	**25**	**20**	**320**	**230**	< 2,200	**6.9**	< 220	< 2.4	< 310	< 350	< 8.2	**1.6 J**	**2.2 J**
Toluene	108-88-3	73,000	**3.8 J**	**31**	**6.4**	**9.3 J**	**40,000**	**4.3 J**	**1,600 J**	< 15	< 1,900	< 2,200	< 51	**16**	**15**
1,2,4-Trichlorobenzene	120-82-1	29.2	< 4.7	< 12	< 4.7	< 12	< 22,000	< 4.7	< 2,200	< 24	< 3,200	< 3,500	< 82	< 12	< 12
Trichloroethylene	79-01-6	29.2	< 0.32	< 1.7	< 0.32	< 1.7	< 1,500	< 0.32	< 150	< 1.6	< 210	< 240	< 5.6	< 1.7	< 1.7
1,2,3-Trichloropropane	96-18-4	4.38	< 1.8	< 4.5	< 1.8	< 4.5	< 8,500	< 1.8	< 850	< 9	< 1,200	< 1,300	< 31	< 4.5	< 4.5
Vinyl chloride	75-01-4	92.9	< 0.66	< 1.7	< 0.66	< 1.7	< 3,100	< 0.66	< 310	< 3.3	< 440	< 500	< 11	< 1.7	< 1.7
m,p-Xylene	179601-23-1	1,460	< 1.3	< 3.1	< 1.3	< 3.1	**78,000**	< 1.3	**420,000**	**63**	< 840	< 940	**34 J**	< 3.1	< 3.1
Xylene, o-	95-47-6	1,460	< 0.65	< 1.6	**0.79 J**	< 1.6	**55,000**	**0.72 J**	**22,000**	**9.8**	< 430	< 490	**20 J**	< 1.6	< 1.6
Total Xylenes	1330-20-7	1,460	< 1	< 2.6	< 1	< 2.6	**130,000**	< 1	**440,000**	**73**	< 690	< 780	**54 J**	< 2.6	< 2.6

		Office Trailer		
		CS-01	DUP-01	OA-01
		9/24/2020	9/24/2020	9/24/2020
Analytes	USEPA Commercial IA VISL	Crawlspace	Crawlspace Duplicate	Outdoor
Fixed Gasses				
Helium	–	–	–	–
Hydrogen	–	–	–	–
VI COPCs				
Acetone	13,500	**24 J**	**37 J**	**34**
Benzene	1.6	**0.45**	**0.54**	**0.31**
Carbon disulfide	307	**6.6 J**	**45 J**	**0.35 J**
Carbon tetrachloride	2.0	**2.3**	**2.1**	**0.48 J**
Chlorobenzene	21.9	< 0.028	< 0.037	< 0.028
Chloroform	0.5	**5.1**	**4.7**	**0.099 J**
1,2-Dichlorobenzene	87.6	< 0.19	< 0.25	< 0.19
1,4-Dichlorobenzene	1.1	< 0.096	< 0.13	< 0.096
1,1-Dichloroethane	7.7	**0.16 J**	< 0.038 J	< 0.028
1,1-Dichloroethylene	87.6	**0.78 J**	< 0.043 J	< 0.032
1,2-Dichloropropane	1.8	< 0.046	< 0.062	< 0.046
Ethylbenzene	4.9	**0.2 J**	**0.3 J**	**0.22 J**
Methyl Ethyl Ketone (2-Butanone)	2,190	**7.9**	**8.4**	**4.2**
Methyl isobutyl ketone	1,310	**1.4**	**1.6**	**59**
Methylene Chloride	263	< 1.4	< 1.8	**2**
Naphthalene	0.4	< 0.4	< 0.54	< 0.4
4-Isopropyltoluene (paracymene)	175	**6.1**	**5.2**	**1.7**
Styrene	438	< 0.1	< 0.14	< 0.1
Tetrachloroethylene	17.5	**4.2 J**	**0.27 J**	< 0.047
Toluene	2,190	**3**	**3.9**	**2.2**
1,2,4-Trichlorobenzene	0.9	< 0.47	< 0.64	< 0.47
Trichloroethylene	0.9	**0.79 J**	**0.054 J**	< 0.032
1,2,3-Trichloropropane	0.1	< 0.18	< 0.24	< 0.18
Vinyl chloride	2.8	< 0.066	< 0.089	< 0.066
m,p-Xylene	43.8	**0.4 J**	**0.78 J**	**0.71**
Xylene, o-	43.8	**0.25 J**	**0.4 J**	**0.78**
Total Xylenes	43.8	**0.65 J**	**1.2 J**	**1.5**

Notes:
1. Highlighted cells indicate exceedance of applicable EPA screening level or target indoor air concentration.
Bold - Detection
% v/v **-** percent by volume
ug/m³ **-** micrograms per cubic meter
J **-** Result is estimated
IA **-** indoor air
USEPA **-**nited States Environmental Protection Agency
VI COPC **-** vapor intrusion constituent of potential concern
VISL **-** Vapor Intrusion Screening Level

Table 2
VI COPC Concentrations in Subslab Soil Gas and Shallow Groundwater VI (SGW) Results Near Tier 1 Buildings
Hercules/Pinova Plant, Brunswick, Georgia

Building	Resin Supervisor's Office				E&I Shop			
Sample Location	SGW-2 (Upgradient)	SGW-4 (Downgradient)	SSSG-01	SSSG-02	SGW-3 (Upgradient)	SGW-4 (Downgradient)	SSSG-03	SSSG-04
	Groundwater	Groundwater	Observed soil gas	Observed soil gas	Groundwater	Groundwater	Observed soil gas	Observed soil gas
Unit	ug/L	ug/L	ug/m^3	ug/m^3	ug/L	ug/L	ug/m^3	ug/m^3
Sample Date	8/12/2019	8/12/2019			8/12/2019	8/12/2019		
Analyte								
Acetone	< 10	< 50	**140**	**230**	< 10	< 50	< 63,000	**29 J**
Benzene	< 1	**14**	**0.78 J**	**0.57 J**	< 1	**14**	**2,400 J**	**1.4 J**
Carbon disulfide	< 2	< 10	**1.8 J**	**0.48 J**	< 2	< 10	< 1,600	< 0.34
Carbon tetrachloride	< 0.1	< 1	**2.5 J**	**5.1**	< 0.1	< 1	< 2,100	**2 J**
Chlorobenzene	< 1	< 5	< 0.28	< 0.28	< 1	< 5	< 1,300	< 0.28
Chloroform	< 1	< 5	**10**	**3.1 J**	< 1	< 5	< 1,600	**1.3 J**
1,2-Dichlorobenzene	< 1	< 5	< 1.9	< 1.9	< 1	< 5	< 8,700	< 1.9
1,4-Dichlorobenzene	< 1	< 5	< 0.96	< 0.96	< 1	< 5	< 4,500	< 0.96
1,1-Dichloroethane	< 1	< 5	< 0.28	< 0.28	< 1	< 5	< 1,300	< 0.28
1,1-Dichloroethylene	< 1	< 5	< 0.32	< 0.32	< 1	< 5	< 1,500	< 0.32
1,2-Dichloropropane	< 1	< 5	< 0.46	< 0.46	< 1	< 5	< 2,200	< 0.46
Ethylbenzene	< 1	**1,000 E**	< 0.56	< 0.56	< 1	**1,000 E**	**180,000**	**0.95 J**
Methyl Ethyl Ketone (2-Butanone)	< 10	< 50	**20**	**27**	< 10	< 50	< 10,000	**5.4 J**
Methyl Isobutyl Ketone	< 10	< 50	**16**	**7.7 J**	< 10	< 50	< 10,000	< 2.2
Methylene Chloride	< 5	< 25	< 14	< 14	< 5	< 25	< 63,000	< 14
Naphthalene	< 0.5	**23**	< 4	< 4	< 0.5	**23**	< 19,000	< 4
4-Isopropyltoluene (paracymene)	< 1	**5,200 E**	**2.9 J**	**9**	< 1	**5,200 E**	**3,400,000**	**57**
Styrene	< 1	< 5	< 1	< 1	< 1	< 5	< 4,800	< 1
Tetrachloroethylene	< 1	< 5	**25**	**320**	< 1	< 5	< 2,200	**6.9**
Toluene	< 1	**130**	**3.8 J**	**6.4**	< 1	**130**	**40,000**	**4.3 J**
1,2,4-Trichlorobenzene	< 5	< 25	< 4.7	< 4.7	< 5	< 25	< 22,000	< 4.7
Trichloroethylene	< 1	< 5	< 0.32	< 0.32	< 1	< 5	< 1,500	< 0.32
1,2,3-Trichloropropane	< 0.005	< 0.05	< 1.8	< 1.8	< 0.005	< 0.05	< 8,500	< 1.8
Vinyl chloride	< 0.04	< 0.4	< 0.66	< 0.66	< 0.04	< 0.4	< 3,100	< 0.66
Total Xylenes	< 1	**5,100**	< 1	< 1	< 1	**5,100**	**130,000**	< 1

Notes:
ug/L - micrograms per liter
ug/m^3 - micrograms per cubic meter
VI COPC - vapor intrusion constituent of potential concern
SGW- shallow groundwater
E - Result exceeded instrument calibration range
J - Result is estimated
R - Result rejected during data validation
* - Non-aqueous phase liquid (NAPL) was observed at this location and no groundwater samples were collected for analysis for volatile organic compounds by EPA method 8260B

Table 2
VI COPC Concentrations in Subslab Soil Gas and Shallow Groundwater VI (SGW) Results Near Tier 1 Buildings
Hercules/Pinova Plant, Brunswick, Georgia

Building	Terpene Resins Building			Liquid Loading Shed		
Sample Location	SGW-5 (Upgradient)	SGW-7 (Downgradient)	SSSG-05	SGW-5 (Upgradient)	SGW-7 (Downgradient)	SSSG-06
	Groundwater	Groundwater	Observed soil gas	Groundwater	Groundwater	Observed soil gas
Unit	ug/L	ug/L	ug/m^3	ug/L	ug/L	ug/m^3
Sample Date	8/12/2019	8/13/2019	9/24/2020	8/12/2019	8/13/2019	9/24/2020
Analyte						
Acetone	< 1,000	**18**	**20,000 J**	< 1,000	**18**	< 68
Benzene	< 100	< 1	**480 J**	< 100	< 1	< 1.3
Carbon disulfide	< 200	< 2	< 160	< 200	< 2	< 1.7
Carbon tetrachloride	< 1	< 1	< 210	< 1	< 1	< 2.2
Chlorobenzene	< 100	< 1	< 130	< 100	< 1	< 1.4
Chloroform	< 100	< 1	**1,400 J**	< 100	< 1	**2.8 J**
1,2-Dichlorobenzene	< 100	< 1	< 870	< 100	< 1	< 9.3
1,4-Dichlorobenzene	< 100	< 1	< 450	< 100	< 1	**6.3 J**
1,1-Dichloroethane	< 100	< 1	< 130	< 100	< 1	< 1.4
1,1-Dichloroethylene	< 100	< 1	< 150	< 100	< 1	< 1.6
1,2-Dichloropropane	< 100	< 1	< 220	< 100	< 1	< 2.3
Ethylbenzene	< 100	< 1	**150,000**	< 100	< 1	**26**
Methyl Ethyl Ketone (2-Butanone)	< 1,000	< 10	< 1,000	< 1,000	< 10	< 11
Methyl Isobutyl Ketone	< 1,000	< 10	< 1,000	< 1,000	< 10	< 11
Methylene Chloride	< 500	< 5	< 6,300	< 500	< 5	< 68
Naphthalene	< 5	**5.8**	< 1,900	< 5	**5.8**	< 20
4-Isopropyltoluene (paracymene)	**32,000 E**	**3.2**	**83,000**	**32,000 E**	**3.2**	**23**
Styrene	< 100	< 1	< 480	< 100	< 1	< 5.1
Tetrachloroethylene	< 100	< 1	< 220	< 100	< 1	< 2.4
Toluene	< 100	< 1	**1,600 J**	< 100	< 1	< 15
1,2,4-Trichlorobenzene	< 500	< 5	< 2,200	< 500	< 5	< 24
Trichloroethylene	< 100	< 1	< 150	< 100	< 1	< 1.6
1,2,3-Trichloropropane	**1.5**	< 0.05	< 850	**1.5**	< 0.05	< 9
Vinyl chloride	< 0.4	< 0.4	< 310	< 0.4	< 0.4	< 3.3
Total Xylenes	< 100	**23**	**440,000**	< 100	**23**	**73**

Table 2
VI COPC Concentrations in Subslab Soil Gas and Shallow Groundwater VI (SGW) Results Near Tier 1 Buildings
Hercules/Pinova Plant, Brunswick, Georgia

Building	Office Trailer				Refrigeration Shop		
Sample Location	SGW-26 (Upgradient)	SGW-25 (Downgradient)	CS-01	OA-01	SGW-23 (Upgradient)	SGW-23 (Upgradient)	SSSG-07
	Groundwater	Groundwater	Observed Crawlspace Air	Observed Outdoor Air	Groundwater*	Groundwater*	Observed soil gas
Unit	ug/L	ug/L	ug/m^3	ug/m^3	ug/L	ug/L	ug/m^3
Sample Date	8/15/2019	8/15/2019	9/24/2020	9/24/2020	8/15/2019	8/15/2019	9/24/2020
Analyte					NAPL Observed	NAPL Observed	
Acetone	< 100	< 10	**24**	**34**	--	--	< 9,000
Benzene	**970**	< 1	**0.45**	**0.31**	--	--	**6100**
Carbon disulfide	< 20	< 2	**6.6**	**0.35 J**	--	--	< 230
Carbon tetrachloride	< 1	< 0.1	**2.3**	**0.48 J**	--	--	< 290
Chlorobenzene	< 10	< 1	< 0.028	< 0.028	--	--	< 180
Chloroform	< 10	< 1	**5.1**	**0.099 J**	--	--	< 230
1,2-Dichlorobenzene	< 10	< 1	< 0.19	< 0.19	--	--	< 1,200
1,4-Dichlorobenzene	< 10	< 1	< 0.096	< 0.096	--	--	< 640
1,1-Dichloroethane	< 10	< 1	**0.16 J**	< 0.028	--	--	< 190
1,1-Dichloroethylene	< 10	< 1	**0.78**	< 0.032	--	--	< 210
1,2-Dichloropropane	< 10	< 1	< 0.046	< 0.046	--	--	< 310
Ethylbenzene	**11**	< 1	**0.2 J**	**0.22 J**	--	--	< 370
Methyl Ethyl Ketone (2-Butanone)	< 100	< 10	**7.9**	**4.2**	--	--	< 1,400
Methyl Isobutyl Ketone	< 100	< 10	**1.4**	**59**	--	--	< 1,500
Methylene Chloride	< 50	< 5	< 1.4	**2**	--	--	< 9,000
Naphthalene	**26**	< 0.5	< 0.4	< 0.4	--	--	< 2,600
4-Isopropyltoluene (paracymene)	**5,100 E**	< 1	**6.1**	**1.7**	--	--	< 800
Styrene	< 10	< 1	< 0.1	< 0.1	--	--	< 680
Tetrachloroethylene	< 10	< 1	**4.2**	< 0.047	--	--	< 310
Toluene	**58**	< 1	**3**	**2.2**	--	--	< 1,900
1,2,4-Trichlorobenzene	< 50	< 5	< 0.47	< 0.47	--	--	< 3,200
Trichloroethylene	< 10	< 1	**0.79**	< 0.032	--	--	< 210
1,2,3-Trichloropropane	< 0.05	< 0.005	< 0.18	< 0.18	--	--	< 1,200
Vinyl chloride	< 0.4	< 0.04	< 0.066	< 0.066	--	--	< 440
Total Xylenes	< 10	< 1	**0.65 J**	**1.5**	--	--	< 690

Table 2
VI COPC Concentrations in Subslab Soil Gas and Shallow Groundwater VI (SGW) Results Near Tier 1 Buildings
Hercules/Pinova Plant, Brunswick, Georgia

Building	Stillhouse Cooling Tower Control Room			Small Office (North of Storeroom)	
Sample Location	SGW-23 (Upgradient)	SGW-22 (Downgradient)	SSSG-08	SGW-31 (Upgradient)	SGW-33 (Downgradient)
	Groundwater*	Groundwater	Observed soil gas	Groundwater	Groundwater
Unit	ug/L	ug/L	ug/m^3	ug/L	ug/L
Sample Date	8/15/2019	8/15/2019		8/14/2019	8/15/2019
Analyte	NAPL Observed				
Acetone	--	**13**	**12,000**	< 500	< 10
Benzene	--	**1.6**	**24 J**	**330**	< 1
Carbon disulfide	--	< 2	< 5.9	< 100	< 2
Carbon tetrachloride	--	< 0.1	< 7.6	< 0.1	< 0.1
Chlorobenzene	--	**2.3**	< 4.8	< 50	< 1
Chloroform	--	< 1	**12 J**	< 50	< 1
1,2-Dichlorobenzene	--	< 1	< 32	< 50	< 1
1,4-Dichlorobenzene	--	< 1	< 17	< 50	< 1
1,1-Dichloroethane	--	< 1	< 4.9	< 50	< 1
1,1-Dichloroethylene	--	< 1	< 5.5	< 50	< 1
1,2-Dichloropropane	--	< 1	< 8	< 50	< 1
Ethylbenzene	--	**3.1**	**70**	< 50	< 1
Methyl Ethyl Ketone (2-Butanone)	--	< 10	**1,100**	< 500	< 10
Methyl Isobutyl Ketone	--	< 10	**120 J**	< 500	< 10
Methylene Chloride	--	< 5	< 230	< 250	< 5
Naphthalene	--	**3.1**	< 69	< 0.5	< 0.5
4-Isopropyltoluene (paracymene)	--	< 1	**1,300**	**20,000 E**	< 1
Styrene	--	< 1	**39 J**	< 50	< 1
Tetrachloroethylene	--	< 1	< 8.2	< 50	< 1
Toluene	--	< 1	< 51	**210**	< 1
1,2,4-Trichlorobenzene	--	< 5	< 82	< 250	< 5
Trichloroethylene	--	< 1	< 5.6	< 50	< 1
1,2,3-Trichloropropane	--	**0.055**	< 31	< 0.005	< 0.005
Vinyl chloride	--	< 0.04	< 11	**0.042**	< 0.04
Total Xylenes	--	< 1	**54**	< 50	< 1

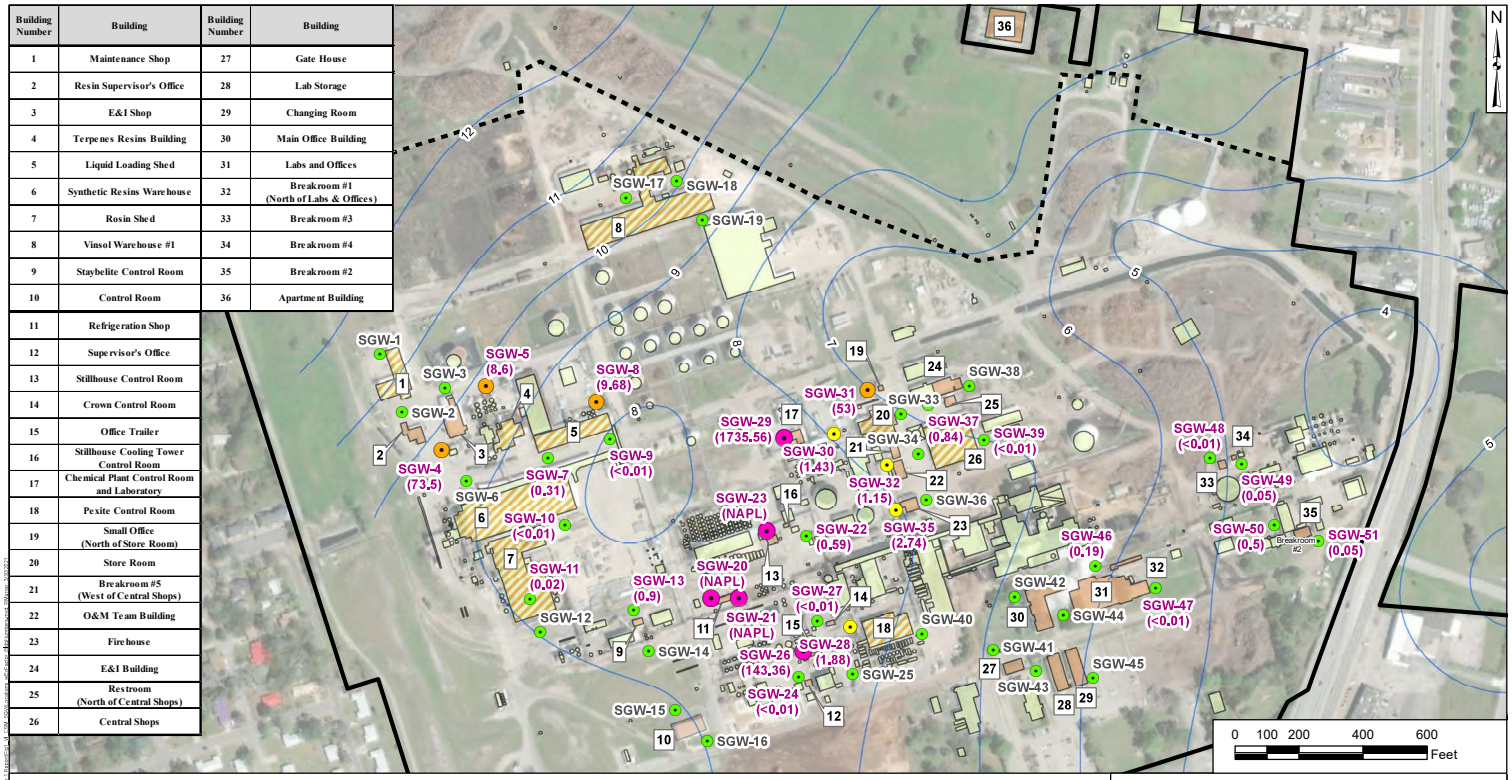
Table 3
Follow-Up Summary for Tier 1 Buildings
Hercules/Pinova Facility, Brunswick, Georgia

Tier 1 Building	Tier 1 Investigation Summary	Next Step Options (Section 4)	Recommended Action (Section 5)
Resin Supervisor's Office	VI COPCs < VISLs	None necessary	No further action
Liquid Loading Shed	VI COPCs < VISLs	None necessary	No further action
Stillhouse Cooling Tower Control Room	VI COPCs < VISLs	None necessary	No further action
Office Trailer	Crawlspace sample: Chloroform, Carbon Tetrachloride	Concurrent SSSG and indoor air samples or mitigation	Mitigation: Ventilate concrete block foundation beneath breakroom
Terpene Resins Building	SSSG-05: Ethylbenzene, Chloroform, Xylene, Benzene, Paracymene	Concurrent SSSG and indoor air samples or mitigation	Mitigation: Replace exterior door with louvered door to ventilate room
Small Office (North of Store Room)	No SSSG sample collected Subslab PID = 103.4 ppmv	Concurrent SSSG and indoor air samples or mitigation	Mitigation: Demolish builing and replace with new, secure raised structure; ventilate building; or, relocate operations
E&I Shop	SSSG-03: Ethylbenzene, Paracymene, Benzene, Xylene	Concurrent SSSG and indoor air samples or mitigation	Mitigation: Install subslab venting system in southern half of building
Refrigeration Shop	SSSG-07: Benzene	Concurrent SSSG and indoor air samples or mitigation	Mitigation: Add ventiliation and/or replace doors with louvered doors to ventilate the building
Chemical Plant Control Room and Laboratory	Mitigation system installed March 2021		
Stillhouse Control Room	Mitigation system installed March 2021		

Notes:
SSSG - subslab soil gas
PID - photoionization detector
ppmv - parts per million volume
VI COPC - vapor intrusion constituent of potential concern
VISL - vapor intrusion screening level

FIGURES

Building Number	Building	Building Number	Building
1	Maintenance Shop	27	Gate House
2	Resin Supervisor's Office	28	Lab Storage
3	E&I Shop	29	Changing Room
4	Terpenes Resins Building	30	Main Office Building
5	Liquid Loading Shed	31	Labs and Offices
6	Synthetic Resins Warehouse	32	Breakroom #1 (North of Labs & Offices)
7	Rosin Shed	33	Breakroom #3
8	Vinsol Warehouse #1	34	Breakroom #4
9	Staybelite Control Room	35	Breakroom #2
10	Control Room	36	Apartment Building
11	Refrigeration Shop		
12	Supervisor's Office		
13	Stillhouse Control Room		
14	Crown Control Room		
15	Office Trailer		
16	Stillhouse Cooling Tower Control Room		
17	Chemical Plant Control Room and Laboratory		
18	Pexite Control Room		
19	Small Office (North of Store Room)		
20	Store Room		
21	Breakroom #5 (West of Central Shops)		
22	O&M Team Building		
23	Firehouse		
24	E&I Building		
25	Restroom (North of Central Shops)		
26	Central Shops		



Shallow Groundwater Sample Location

Cumulative VISL Exceedance Factor

- <1
- >1 and <5
- >5 and <100
- >100

- Structure
- Building Containing Smaller Enclosed and Occupiable Space Susceptible to VI
- Building Determined Susceptible to VI
- December 2018 Groundwater Elevation Contours (feet above mean sea level)
- Site Boundary (dashed where separating Hercules and Pinova properties)

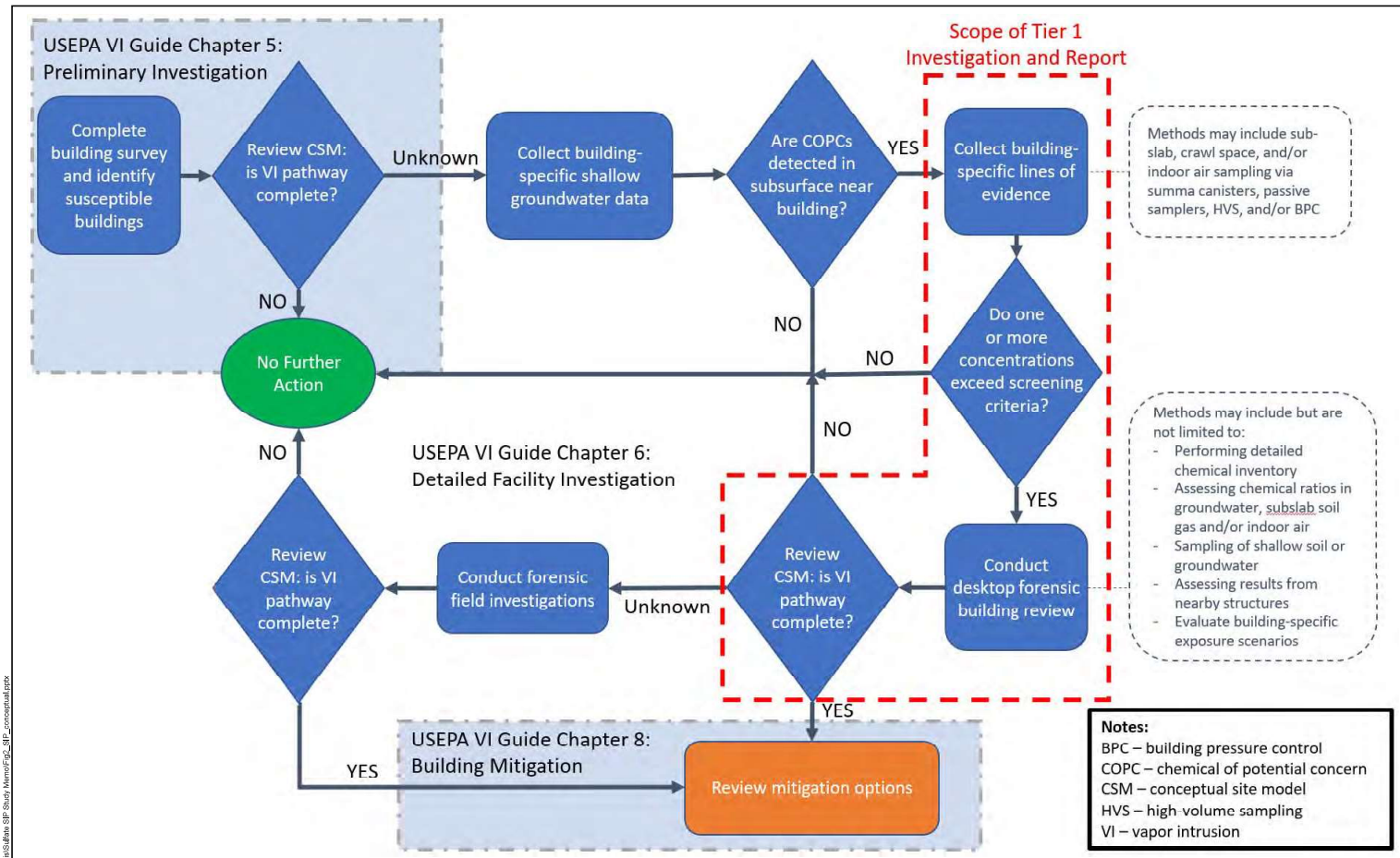
Notes:
1. Locations of shallow groundwater samples shown are approximate based on field observations.
2. Non-aqueous phase liquid (NAPL) was observed at temporary well points SGW-20, SGW-21, and SGW-23. As a result, no groundwater samples were collected from temporary well points SGW-20 and SGW-21 for laboratory analysis. Groundwater samples for analysis of aldrin, formaldehyde, and formic acid only were collected from temporary well point SGW-23.
3. VI COPC - chemical of potential concern for the vapor intrusion pathway
4. VI - vapor intrusion.
5. VISL - vapor intrusion screening level.
6. Cumulative VISL exceedance factor calculated as sum of [detected VI COPC concentration]/[VISL].

Buildings in VI Investigation – Shallow Groundwater Investigation Cumulative VISL Exceedance Factors
Hercules/Pinova Facility, Brunswick, Georgia

Geosyntec consultants

Kennesaw | April 2021

Figure 1



VI Pathway Investigation Flowchart

Hercules/Pinova Facility, Brunswick, GA

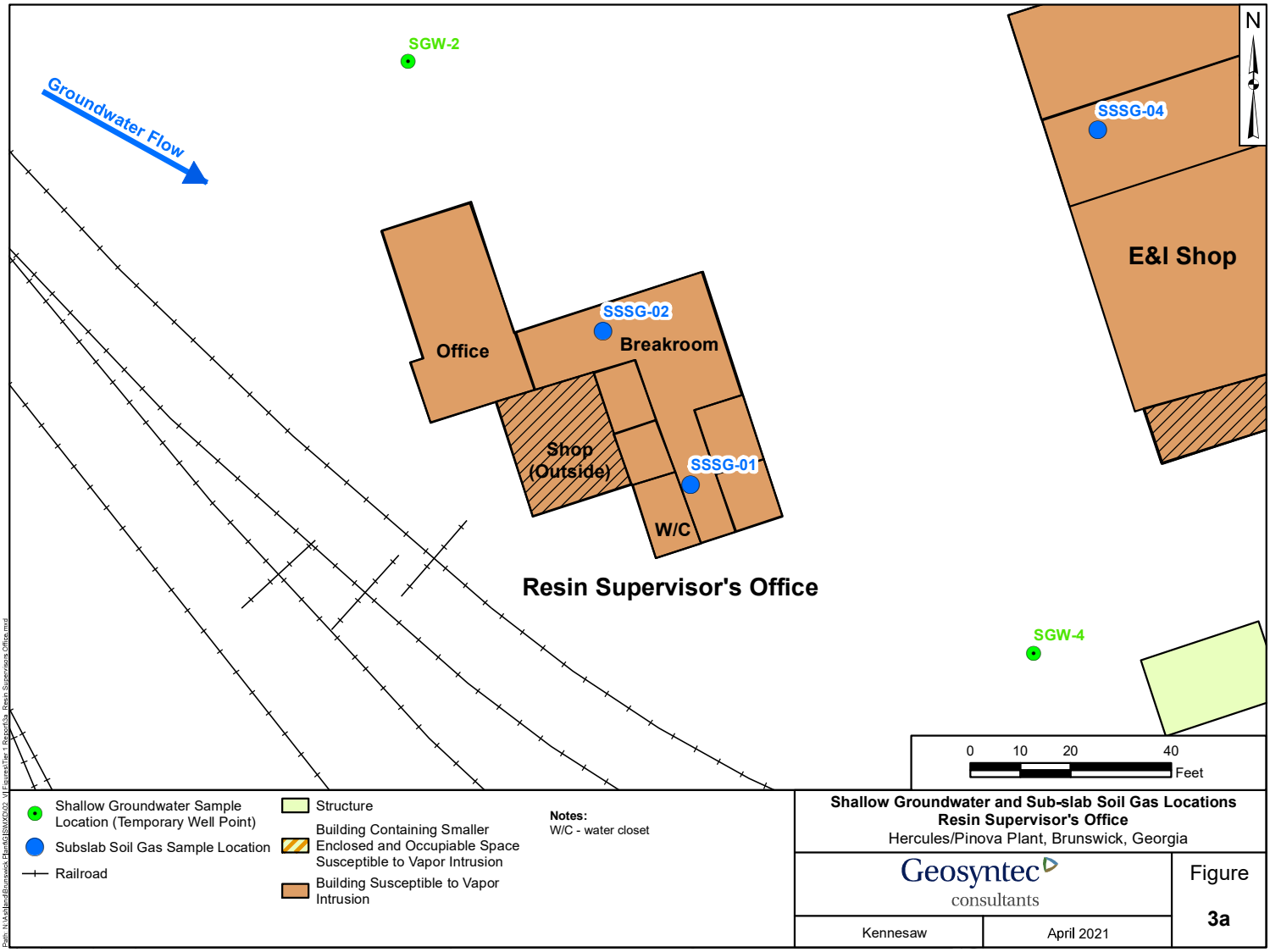
Geosyntec consultants

Figure 2

Kennesaw | April 2021

USEPA. 2015. OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air, Office of Solid Waste and Emergency Management. 9200.2-154. June

N:\C\Chemtronics\Plot Test - Bark Valley\Sulfate Plot\SP Analysis\Sulfate SP Study Memo\Fig2_SP_conceptual.pptx



Shallow Groundwater and Sub-slab Soil Gas Locations
Resin Supervisor's Office
Hercules/Pinova Plant, Brunswick, Georgia

Geosyntec consultants

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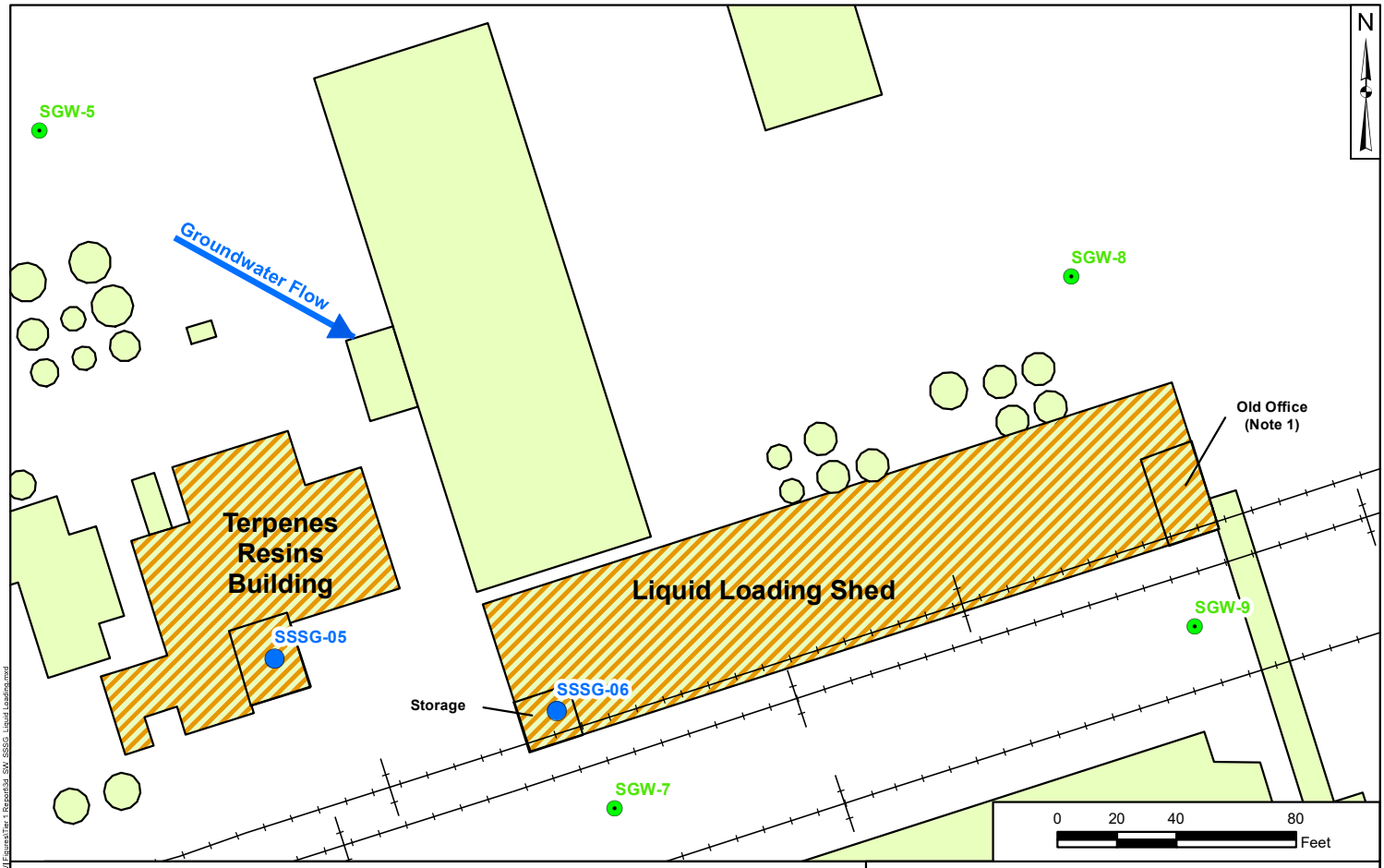
Figure **3a**

Path: N:\Atlanta\Brunswick Sheet\GIS\MXD\02_VI Figures\Tier 1 Report\3a_Resin Supervisors Office.mxd



Shallow Groundwater Sample Location (Temporary Well Point)

Subslab Soil Gas Sample Location

Railroad

Structure

Building Containing Smaller Enclosed and Occupiable Space Susceptible to Vapor Intrusion

Notes:
1. condemned, unoccupied, former office space

Shallow Groundwater and Sub-slab Soil Gas Locations
Liquid Loading Shed
Hercules/Pinova Plant, Brunswick, Georgia

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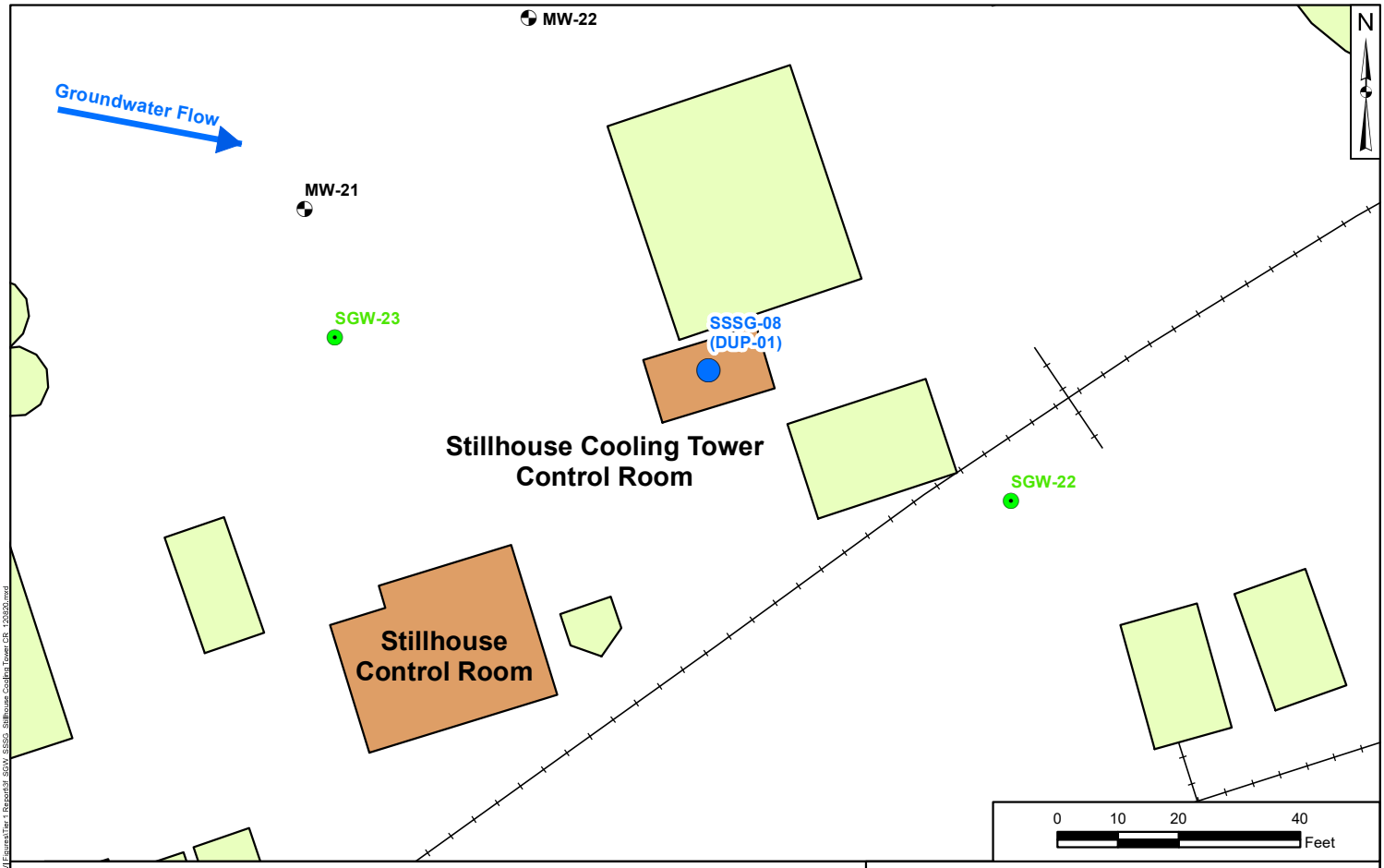
Figure **3b**

Path: N:\Atlanta\Brunswick Plant\GIS\MXD\02_VI Figures\Tier 1 Report\3d_SW_SSSG_Liquid Loading.mxd



Monitoring Well

Shallow Groundwater Sample Location (Temporary Well Point)

Subslab Soil Gas Sample Location

Railroad

Structure

Building Susceptible to Vapor Intrusion

Notes:
1. DUP-01 refers to the duplicate sub-slab soil gas sample collected on 3 March 2021.

Shallow Groundwater and Sub-slab Soil Gas Locations
Stillhouse Cooling Tower Control Room
Hercules/Pinova Plant, Brunswick, Georgia

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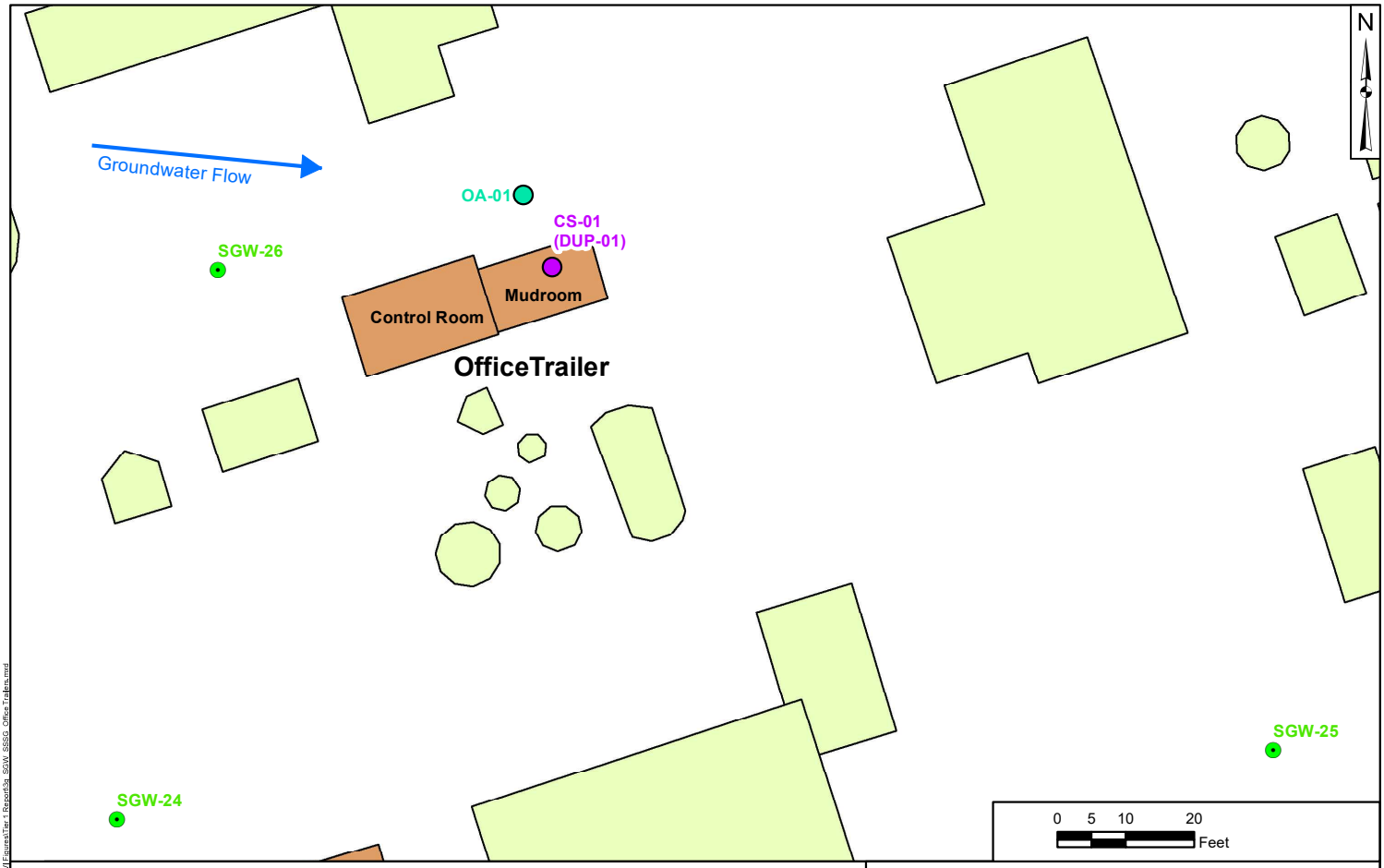
Figure 3c

Path: N:\Atlanta\Brunswick\Plant\GIS\MXD\02_VI Figures\Tier 1 Report\SI_SGW_SSSG_Stillhouse Cooling Tower CR_122920.mxd



Shallow Groundwater Sample Location (Temporary Well Point)

Crawl Space Air Sample Location

Outdoor Air Sample Location

Structure

Building Susceptible to Vapor Intrusion

Notes:
1. DUP-01 refers to the crawlspace duplicate sample collected on 24 September 2020.

Shallow Groundwater and Sub-slab Soil Gas Locations
Office Trailer
Hercules/Pinova Plant, Brunswick, Georgia

Geosyntec consultants

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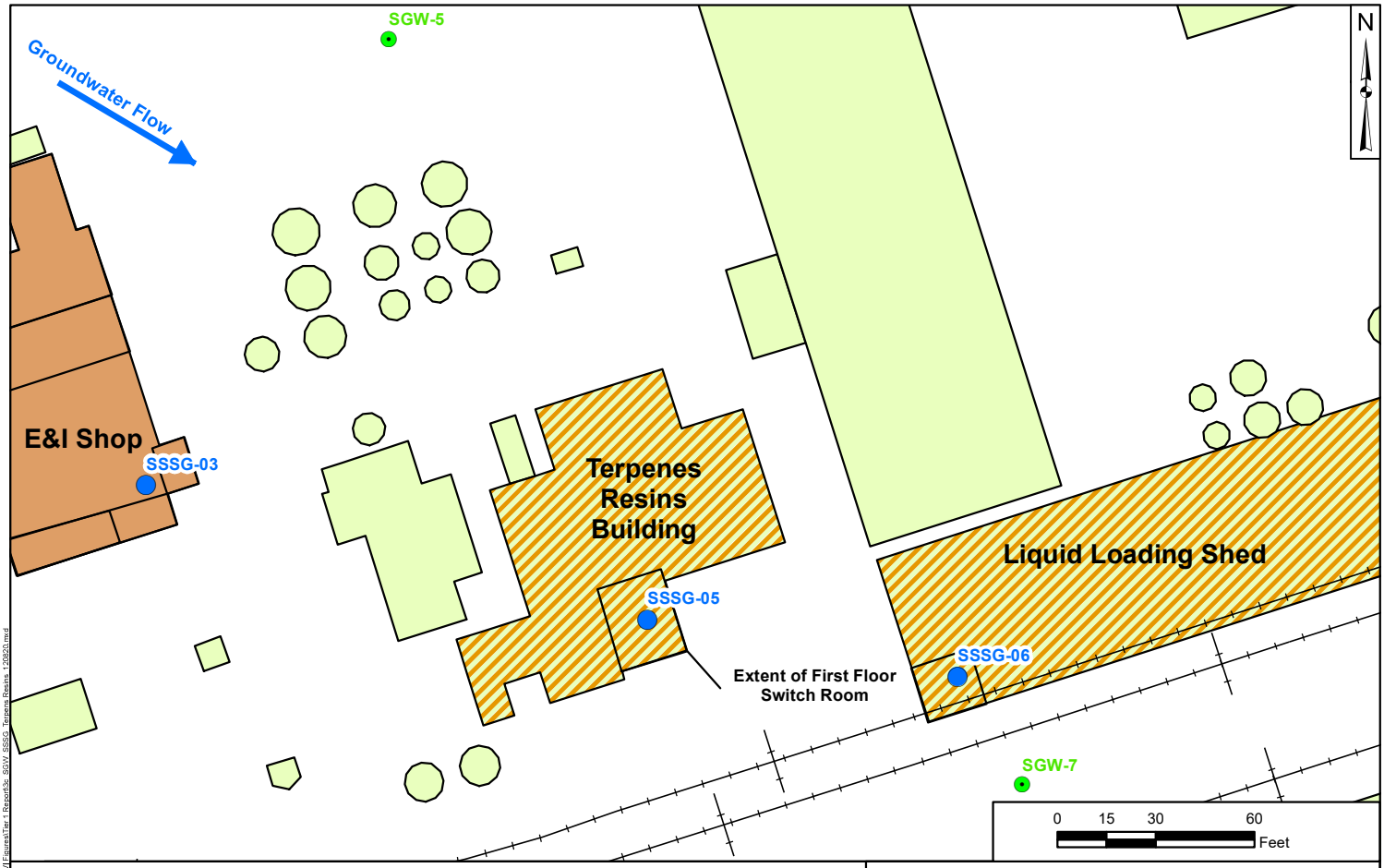
Figure **3d**

Path: N:\Atlanta\Brunswick Plant\GIS\MXD\02_VI Figures\Tier 1 Report\3a_SGW_SSSG_Office_Trailer.mxd



Shallow Groundwater and Sub-slab Soil Gas Locations
Terpene Resins Building
Hercules/Pinova Plant, Brunswick, Georgia

Geosyntec consultants

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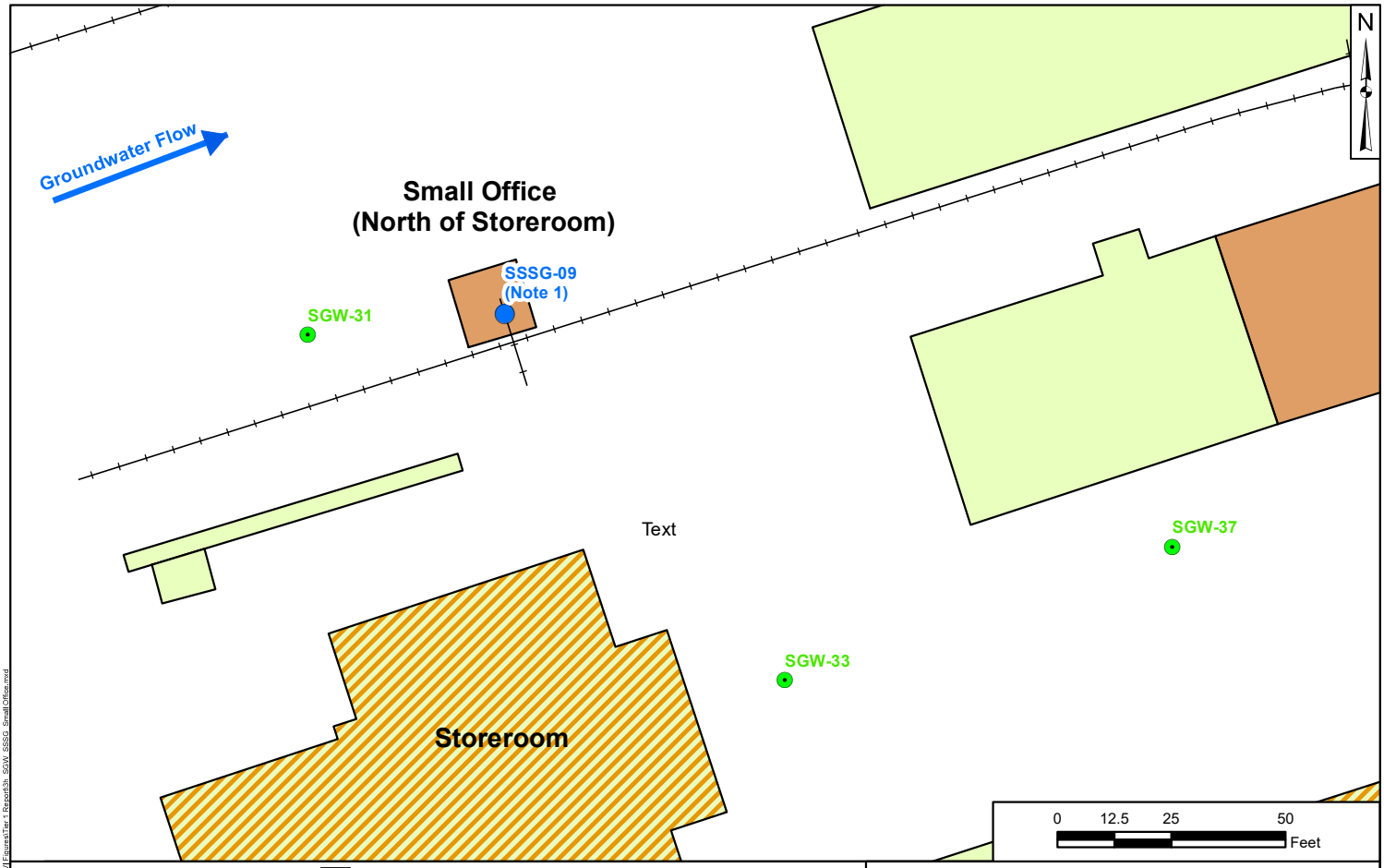
Figure **3e**

Path: N:\Atlanta\Brunswick Plant\GIS\MXD\02_VI Figures\Tier 1 Report\3x_SGW_SSSG_Terpene Resins_120920.mxd



Shallow Groundwater Sample Location (Temporary Well Point)

Subslab Soil Gas Sample Location

Railroad

Structure

Building Containing Smaller Enclosed and Occupiable Space Susceptible to Vapor Intrusion

Building Susceptible to Vapor Intrusion

Notes:
1. SSSG-09 was not collected due to water encountered immediately below the foundation slab. One tedlar bag sample of soil gas was collected for field screening measurements.

Shallow Groundwater and Sub-slab Soil Gas Locations
Small Office (North of Storeroom)
Hercules/Pinova Plant, Brunswick, Georgia

Geosyntec consultants

Figure **3f**

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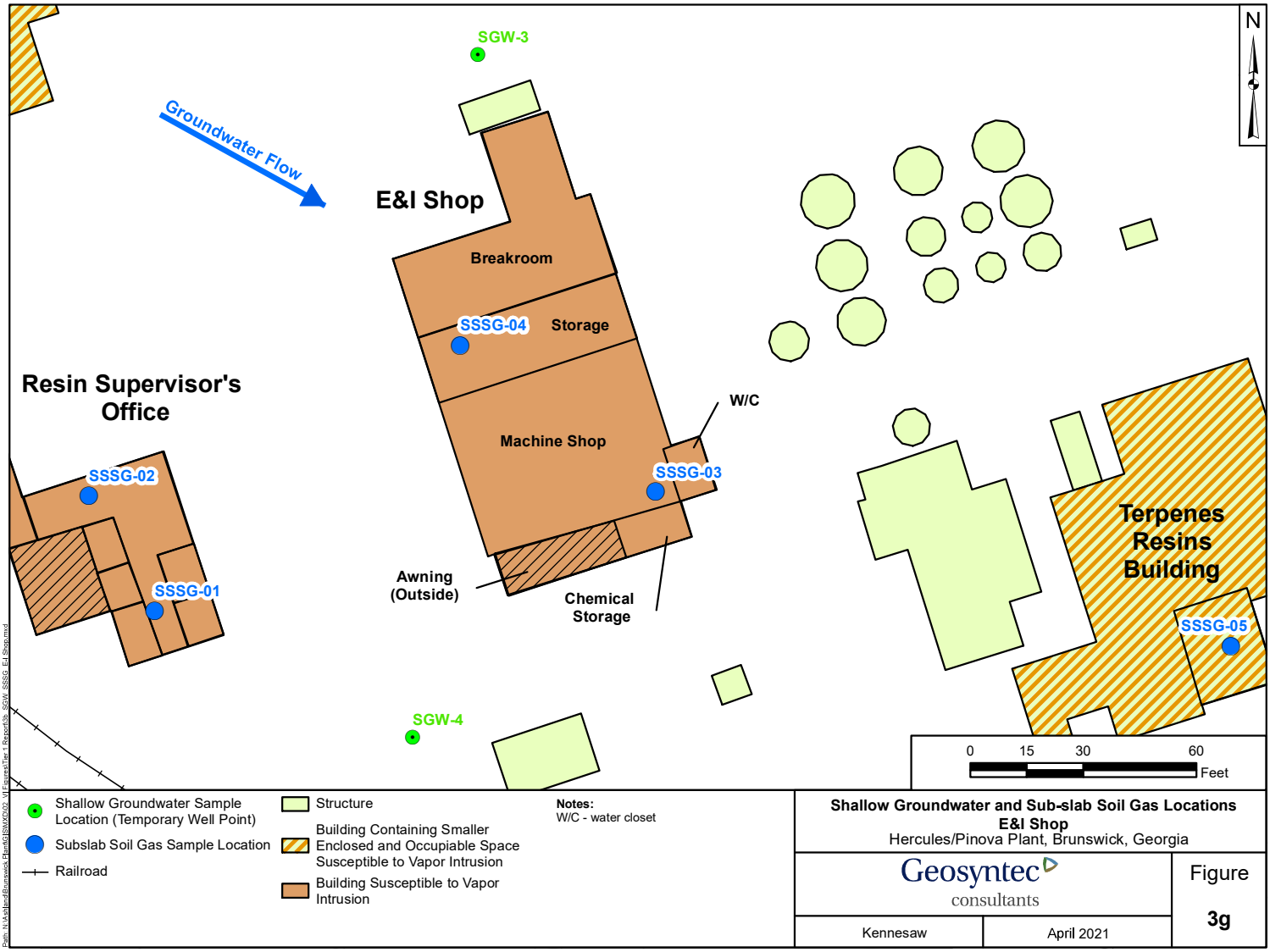
Path: N:\Atlanta\Brunswick Plant\GIS\MXD\02_VI Figures\Tier 1 Report\3x_SGW_SSSG_SmallOffice.mxd



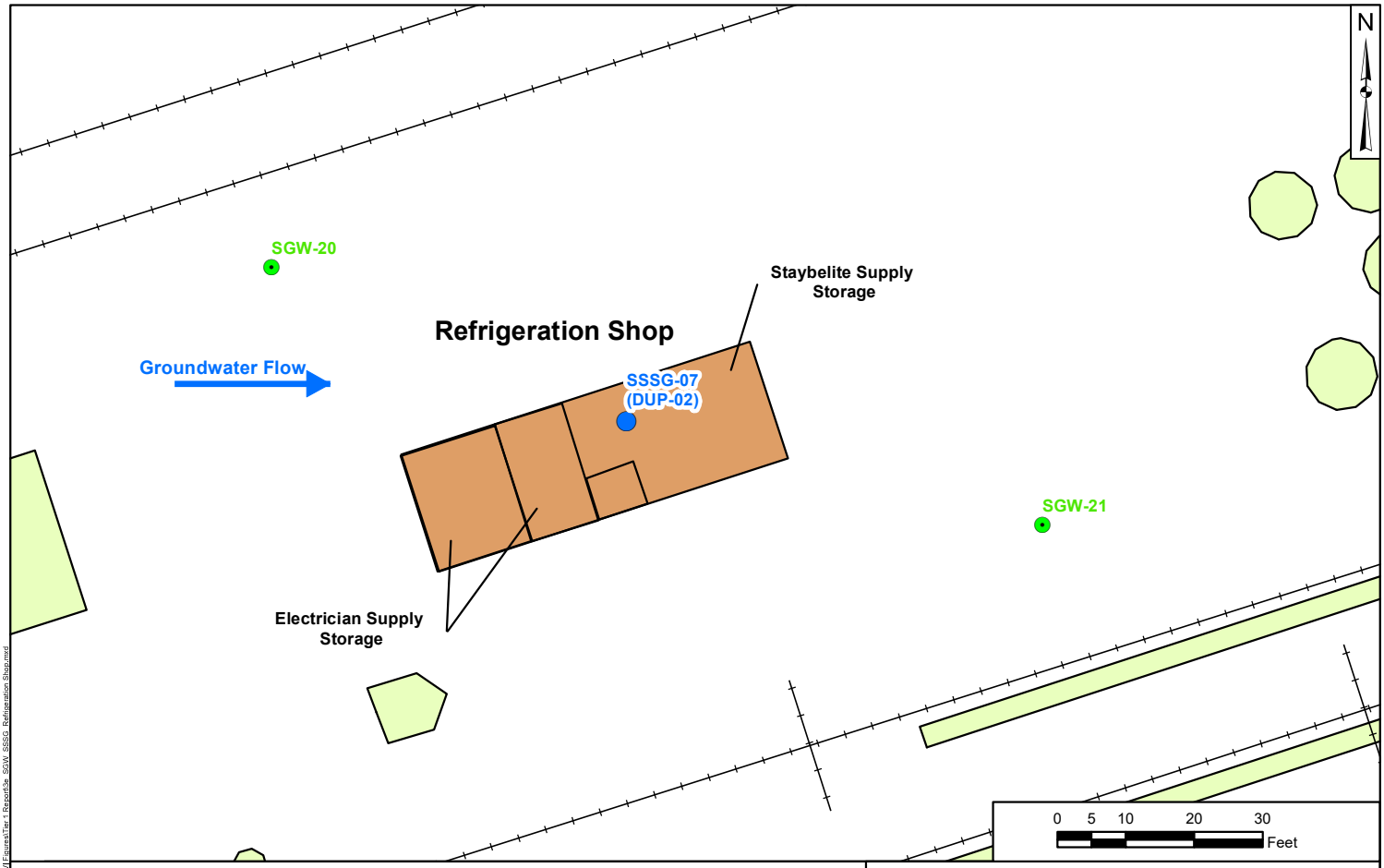
Shallow Groundwater and Sub-slab Soil Gas Locations
E&I Shop
Hercules/Pinova Plant, Brunswick, Georgia

Geosyntec consultants

Kennesaw | April 2021

Figure **3g**

Path: N:\Atlanta\Brunswick Plant\GIS\MXD\02_VI Figures\Tier 1 Report\3g_SGW_SSSG_EI Shop.mxd



Shallow Groundwater and Sub-slab Soil Gas Locations
Refrigeration Shop
Hercules/Pinova Plant, Brunswick, Georgia

Geosyntec consultants

Kennesaw | April 2021

Figure **3h**

Path: N:\Atlanta\Brunswick Plant\GIS\MXD\02_VI Figures\Tier 1 Report\3x_SGW_SSSG_Refrigeration Shop.mxd

APPENDIX A

Sub-slab Soil Gas Sample Logs

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Hercules Brunswick Tier I VI
Date: 09/23/2020 Project Number: GR6881
Site Location: Res.n Supervisor's office
Weather: Sunny 70-80°F
Field Personnel: RM & JB
Recorded By: RM

Probe No.: SSSG-01 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae ~~2000~~ 3000 Serial No.: 592-914196 Lamp (10.6) / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: G501650
MDG 2002 Helium detector Serial No.: N/A
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 4" inches/centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

⑤ Shut in test prior to pneumatic test completed, 7 in. ~~H_2O~~ Hg held for 60 seconds.

④ Initial Vacuum (prior to pumping) 0 in. H_2O

⑥ Start of Pneumatic Test: _____

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time ~~(min)~~ (s)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)
9/23/2020	1025	1025	15	1	4	1.0	0.0	4.1	13.5	17.9	18.2	0	0.8
9/23/2020	1029	1029	15	1	4	2.0	0.0	5.4	11.0	12.8	13.0	0	0.7
9/23/2020	1034	1034	15	1	4	3.0	0.0	5.5	11.0	11.8	11.8	0	0.7

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☒ Yes ☐ No **Note:** 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
9/23/2020	1045	SSSG-01	11891	10678	10678	29.85	2.0

Comments: Background PID in IA = 0.6 - 0.7 ppm.

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Hercules Brunswick Tier 1 VI
Date: 9/23/2020 Project Number: GR6881
Site Location: Resm Supervisor's Office
Weather: Sunny 70-80°F
Field Personnel: RM + JB
Recorded By: RM

Probe No.: SSSG-02 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae ~~3000~~ 2000 Serial No.: 592-914196 Lamp 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: GS01650
MDG 2002 Helium detector Serial No.: N/A
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 4" inches/centimeters ☐ Unknown (i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

④ Initial Vacuum (prior to pumping) 0 in. H_2O

⑤ Shut in test prior to pneumatic test completed, 7 in. ~~H_2O~~ Hg held for 60 seconds.

⑥ Start of Pneumatic Test:

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time ~~(min.)~~ (s)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas: Shroud (%) Min	Tracer Gas: Shroud (%) Max	Tracer Gas: Sample ~~(ppm)~~ (%) (circle one)	VOCs by PID (ppm_v)
9/23/2020	0925	0925	13s	0.75	3.5	0.75	0.0	4.0	16.5	~~18.5~~	13.5	25	1.4
9/23/2020	0928	0928	15s	1	4	1.75	0.0	3.9	16.9	16.1	16.1	150	1.6
9/23/2020	0930	0930	15s	1	4	2.75	0.0	4.3	16.2	16.0	15.9	350	1.2

15.2% Helium

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☒ Yes ☐ No
Note: 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
9/23/2020	0935	SSSG-02	09663	09571	09571	29.88	

Comments: Background PID 0.2 - 0.7 ppm in IA. Bldg. occupied during sampling.

SGP measurements - pneumatic testing.ai

Re-install Vapor Pm @ SSSG-03 FAIL HE-TEST

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Hercules Brunswick Trf 1 V1 Probe No.: SSSG-03 ☒ Sub-slab probe ☐ Soil gas probe
Date: 9/23/2020 Project Number: Mini Rae 2000 Serial No.: 592-914196 Lamp: (0.6) 11.7 eV
Site Location: E+1 Shop Landtech GEM 2000 Landfill Gas Meter Serial No. M: G5Ø165Ø
Weather: MDG 2002 Helium detector Serial No.:
Field Personnel: RM+ JB Tracer Gas: ☒ Helium ☐ Other
Recorded By: RM

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 4 inches/centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

④ Initial Vacuum (prior to pumping) Ø in. H_2O

⑤ Shut in test prior to pneumatic test completed. 8 in. ~~H_2O~~ Hg held for 60 seconds.

⑥ Start of Pneumatic Test:

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time (min.)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)	
9/23/2020	1506	1506	28	1	2.0	≥ 4.0	50.2	24.5	4.8	11.4	11.5	7.6 %	162.3	FAIL
9/23/2020	1518	1518	30	1	2.0	5.0	53.5	24.7	4.5	10.8	11.0	8.3	171.3	
←	1530	ABORT		PURGE									→	

⑩ Helium concentration in ~~field screened~~ samples is less than 5% of minimum concentration in the shroud? ☐ Yes ☐ No
~~Note: 1% helium = 10,000 ppm_v~~

⑪ Shut in test prior to sample collection ~~completed~~? Yes ☐ No ☐

⑫ ~~Sample Collection~~

Date	Time	~~Sample ID~~	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)

Comments: Background PID in IA = 1.8 ppm
ABORTED @ 1530 to rebuild sample train

SOP Measurements - pneumatic testing.ai

FAIL He TEST

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Hercules Brunswick Tier 1 VI
Date: 9/23/2020 Project Number: GR6881
Site Location: E+I Shop
Weather: Sunny 70-80s
Field Personnel: RM + JB
Recorded By: RM

Probe No.: SSSG-03 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 592-914196 Lamp: (10.6) / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: G50165Ø
MDG 2002 Helium detector Serial No.: N/A
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 4" inches/centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

④ Initial Vacuum (prior to pumping) Ø in. H_2O

⑤ Shut in test prior to pneumatic test completed, 9 in. ~~H_2O~~ Hg held for 60 seconds.

⑥ Start of Pneumatic Test:

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time ~~(min.)~~ (s)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)	
9/23/2020	1418	1418	20s	1	3.0	1.0	35.6	18.6	9.2	11.1	11.2	12%	144.3	Fail
↓	1432	1432	20s	1	3.0	2.0	44.4	22.5	6.3	23.2	23.3	7.7%	157.0	Fail
	1445	1445	20	1	3.0	3.0	44.9	22.4	6.3	12.2	12.7	8.3%	157.2	FAIL
↓	1450	ABORT												

⑩ Helium concentration in ~~field screened~~ samples is less than 5% of minimum concentration in the shroud? ☐ Yes ☐ No
~~Note: 1% helium = 10,000 ppm_v~~

⑪ Shut in test prior to sample collection ~~completed~~? Yes ☐ No ☐

⑫ ~~Sample~~ Collection

Date	Time	~~Sample~~ ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
		SSSG-03					

Comments: Background PID in 1A = 1.2 ppm
1420: Tighten connections after failed He Test; 1445: ABORT to reinstall VP after failed He-tests

SOP: measurements - pneumatic testing.doc

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Hercules Brunswick Tier I V1
Date: 9/23/2020 Project Number: GR6881
Site Location: E+I Shop
Weather: Sunny 70-80s
Field Personnel: RM + JB
Recorded By: RM

Probe No.: SSSG-03 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 592-914196 Lamp: 10.3 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: G50/650
MDG 2002 Helium detector Serial No.: N/A
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 4 inches/centimeters ☐ Unknown (i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

④ Initial Vacuum (prior to pumping) 0 in. H_2O

⑤ Shut in test prior to pneumatic test completed, 9 in. ~~H_2O~~ Hg held for 90 seconds.

⑥ Start of Pneumatic Test:

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time (min) (s)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm_v (%) (circle one))	VOCs by PID (ppm_v)
9/23/2020	1553	1553	15	1	4.0	6.0 ~~1.0~~ (L)	44.7	21.7	6.8	10.9	10.9	6.6%	144.2
↓	1616	1616	15	1	4.0	7.0 ~~2.0~~ (L)	53.4	25.6	3.9	12.1	12.3	10.3%	182.6
↓	1626	1626	~~2~~ 30	1	2.0	8.0 ~~3.0~~ (L)	49.9	23.6	5.3	12.4	12.5	6.3%	172.4

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☐ Yes ☒ No* Unknown due to high methane **Note:** 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
9/23/2020	1635	SSSG-03	11824	10916	10916	29.78	2

Comments: Background PID in 1A = 2.5 ppm ; Water dam installed and no leaks observed in purging.
• High He in purge believed to be due to He-meter interference with CH_4 in subsurface
Called Adria Renner (PM) to see if lab can add He analysis.

SOP measurements - pneumatic testing.xlsx

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Hercules Brunswick Tract 1 V1
Date: 9/23/2020 Project Number: GR6881
Site Location: E+I Shop
Weather: Sunny 70-80°F
Field Personnel: RM + JB
Recorded By: RM

Probe No.: SSSG-04 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 592-914196 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: GS01650
MDG 2002 Helium detector Serial No.: N/A
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 4" inches/centimeters ☐ Unknown (i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

④ Initial Vacuum (prior to pumping) 0 in. H_2O

⑤ Shut in test prior to pneumatic test completed, 7 in. ~~H_2O~~ Hg held for 60 seconds.

⑥ Start of Pneumatic Test:

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time ~~(min.)~~ (s)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)
9/23/2020	1220	1220	18	1	3.5	1.0	0.0	6.9	13.1	12.9	12.9	0	0.4
9/23/2020	1325	1325	20	1	3.5	2.0	0.0	~~14.3~~ 7.2	12.9	14.3	14.5	150	0.2
9/23/2020	1327	1327	20	1	3.5	3.0	0.0	6.8	13.4	12.5	12.6	0	0.1
9/23/2020	1330	1330	20	1	3.5	4.0	0.0	6.8	13.2	13.6	13.6	0	0.2

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☒ Yes ☐ No
Note: 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
9/23/2020	1335	SSSG-04	10972	7286	7286	29.63	

Comments: Background PID in IA = 0.6-0.8 ppm.
He meter battery dead @ 1225; wait for charge and resume purge @ 1325

SOP Measurements - pneumatic testing.doc

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Hercules Brunswick Tier 1 V1
Date: 9/24/2020 Project Number: GR
Site Location: Terpenes Resins
Weather: Sunny 80s
Field Personnel: RM + JB
Recorded By: RM

Probe No.: SSSG-05 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 592-914196 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: G5Ø165Ø
MDG 2002 Helium detector Serial No.: N/A
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 13" inches/centimeters ☐ Unknown (i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

⑤ Shut in test prior to pneumatic test completed, 8 in. ~~H_2O~~ Hg held for 60 seconds.

⑥ Start of Pneumatic Test: _____

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

④ Initial Vacuum (prior to pumping) Ø in. H_2O

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time ~~(min.)~~ (s)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas: Shroud (%) Min	Tracer Gas: Shroud (%) Max	Tracer Gas: Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)
9/24/2020	1253	1253	15s	1	4.0	1.0	9.3	13.9	3.3	13.7	13.7	10,750	187.5
↓	1300	1300	15	1	4.0	2.0	9.2	14.4	2.8	10.9	11.0	11,025	203.9
↓	1305	1305	15	1	4.0	3.0	7.3	12.4	6.2	11.1	11.5	10,675	211.2
↓	1308	1308	15	1	4.0	4.0	7.5	13.4	4.3	13.1	13.3	9,000	205.9

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☐ Yes ☒ No Possible CH4 interference **Note:** 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
9/24/2020	7315	SSSG-05	34002434	10889	10889	29.13	2.10

Comments: Background PID = 0.3 ppm. Elevated CH4 maybe causing high He readings. Install H2O dam @ 1255. He in shroud = % when collecting sample. Submit to lab for TO-15 + He analysis

SGP measurements - pneumatic.xlsm

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Hercules Brunswick Tier 1 Y1
Date: 9/24/2020 Project Number: GR6881
Site Location: Liquid Loading
Weather: Sunny 86
Field Personnel: RM + JB
Recorded By: RM

Probe No.: SSSG-06 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: ~~592-916~~ 592-914196 Lamp: (10.6) / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: ~~N/A~~ G501650
MDG 2002 Helium detector Serial No.: N/A
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 4" inches/centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe ______ (L)

④ Initial Vacuum (prior to pumping) Ø in. H_2O

⑤ Shut in test prior to pneumatic test completed. 7 in. ~~H_2O~~ Hg held for 60 seconds.

⑥ ~~Start of Pneumatic Test:~~

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading ______ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time ~~(min.)~~ (s)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)
9/24/2020	1407	1407	15	1	4.0	1.0	0.2	0.2	21.2	10.8	11.1	325	19.2
↓	1415	1415	15	1	4.0	2.0	0.2	0.1	21.1	12.8	12.8	7.25	14.3
	1430	1430	15	1	4.0	3.0	0.2	0.1	21.1	10.9	11.1	Ø	16.3

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☒ Yes ☐ No
Note: 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
9/24/2020	1435	SSSG-06	11807	10693	10693	29.04	2.0"

Comments: Background PID = 0.5 ppm - 0.6 ppm. 1417 - He meter battery dead, wait for charge before continue purge

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: _____
Date: 9/24/2020 Project Number: _____
Site Location: Refrigeration Shop
Weather: Sunny, 80s
Field Personnel: RM + JB
Recorded By: RM

Probe No.: SSSG-07 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 592-914196 Lamp: (10.6) / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: G50165Ø
MDG 2002 Helium detector Serial No.: N/A
Tracer Gas: ☒ Helium ☐ Other _____

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other _____
Surface Thickness 3" inches/centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

⑤ Shut in test prior to pneumatic test completed, 7 in. ~~H2O~~ Hg held for 60 seconds.

⑥ Start of Pneumatic Test: _____

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

④ Initial Vacuum (prior to pumping) Ø in. H_2O

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time ~~(min.)~~ (s)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)
9/24/2020	1551	1551	15	1	4.0	1.0	36.8	14.0	5.1	11.6	11.7	8.5	25.1
9/24/2020	1558	155	15	1	4.0	2.0	38.8	13.8	5.2	11.8	12.1	7.3	24.7
9/24/2020	1602	1602	15	1	4.0	3.0	42.3	14.9	4.1	11.5	11.6	9.6	26.5

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☐ Yes ☒ No Possible interference from Methane **Note:** 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐ with duplicate sample tee in place

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
9/24/2020	1620	SSSG-Ø7	34000656	10903	10903	29.20	~~Ø~~ 25
9/24/2020	1620	DUP-Ø2	34002424	10909	10909	29.35	

Comments: Background PID = 0.3-0.5 ppm. Elevated Methane believed to be causing high He readings
1555: Insta II water dam. 1605: Water dam intact throughout purging. Submit canisters for TO-15 + He

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Hercules Brunswick Tier 1 VI
Date: 9/24/2020 Project Number: GR6881
Site Location: Stillhouse Cooling Tower Control Room
Weather: 80 Sunny
Field Personnel: RM + JB
Recorded By: RM

Probe No.: SSSG-08 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 592-914196 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: G501650
MDG 2002 Helium detector Serial No.: N/A
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other_____
Surface Thickness 10 inches/centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

④ Initial Vacuum (prior to pumping) 0 in. H_2O

⑤ Shut in test prior to pneumatic test completed, 8 in. ~~H_2O~~ Hg held for 60 seconds.

⑥ Start of Pneumatic Test: _____

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
	0.1	
	0.2	
	0.5	

⑦ Field tubing blank reading (ppm_v) completed? ☐ Yes ☒ No PID Reading _____ ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time (min) (s)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas: Shroud (%) Min	Tracer Gas: Shroud (%) Max	Tracer Gas: Sample (ppm_v) (circle one)	VOCs by PID (ppm_v)
9/24/2020	1748	1748	19	1	3.0	1.0	0.7	6.9	5.0	10.3	10.4	0	17.8
9/24/2020	1752	1752	24	1	2.5	2.0	0.6	7.5	4.5	10.3	10.8	0	10.9
9/24/2020	1756	1756	22	1	2.7	3.0	0.7	8.4	3.3	10.0	10.8	0	9.7
9/24/2020	1800	1800	22	1	2.7	4.0	0.7	8.5	3.3	12.5	12.7	0	9.1

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☒ Yes ☐ No
Note: 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
9/24/2020	1805	SSSG-08	3400621	11095	11095	29.58	2" Hg

Comments: Background PID = 0.7 ppm - 0.4 ppm

SOP: measurements - pneumatic testing.doc

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Ashland Brunswick
Date: 3/3/21 Project Number: GR6881
Site Location: Stillhouse Cooling Tower Control Room
Weather: 50s, overcast
Field Personnel: T. Payne
Recorded By: J. Knight

Probe No.: 5556-08 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 032495 Lamp: (10.6) / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: G501650
MDG 2002 Helium detector Serial No.: —
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness ______ inches/centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe ______ (L)

④ Initial Vacuum (prior to pumping) 5.4 in. H_2O

⑤ Shut in test prior to pneumatic test completed. ___ in. H_2O held for ___ seconds. N/A

⑥ Start of Pneumatic Test:

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
N/A	0.1	
	0.2	
	0.5	

⑦ Field tubing blank reading (ppm$_v$) completed? ☒ Yes ☐ No PID Reading 0.0 ppm$_v$

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time (min.)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm$_v$, %) (circle one)	VOCs by PID (ppm$_v$)
3/3/21	1227	1227	30sec	1	2	1	4.9	3.8	14.2	11.5	11.7	0.0	0.0
3/3/21	1230	1230	30sec	1	2	2	5.8	2.4	16.4	13.7	14.2	0.0	0.0
3/3/21	1233	1233	30sec	1	2	3	6.4	3.8	14.6	12.9	13.2	0.0	0.0

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☒ Yes ☐ No
Note: 1% helium = 10,000 ppm$_v$

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
3/3/21	1237	5556-08-03032021	11135	09957	09957	-29	-4.5
3/3/21	1237	~~5556-08-03032021~~ DUP-01	11831	10899	10899	-30	-4

Comments:

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Ashland Brunswick Plant
Date: 3/3/2021 Project Number: GR6881
Site Location: Resin Supervisor's Office
Weather: 50's, overcast, light rain
Field Personnel: T. Payne
Recorded By: J. Knight

Probe No.: 5556-01 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 032495 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: 6501650
MDG 2002 Helium detector Serial No.: —
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 4 inches centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ I Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe _____ (L)

⑤ Shut in test prior to pneumatic test completed N/A in. H_2O held for ___ seconds.

⑥ Start of Pneumatic Test: _____

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
N/A	0.1	
	0.2	
	0.5	

④ Initial Vacuum (prior to pumping) 0.0 in. H_2O

⑦ Field tubing blank reading (ppm_v) completed? ☒ Yes ☐ No PID Reading 0.0 ppm_v

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑨ Purging

Date	Start Time	End Time	Elapsed Time (min.)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm_v, %) (circle one)	VOCs by PID (ppm_v)
3/3/2021	1133	1133	30sec	1	2	1	0.1	3.5	15.8	12.3	12.4	0.0	0.1
3/3/2021	1135	1135	30sec	1	2	2	0.1	5.5	16.2	12.0	12.4	0.0	0.1
3/3/2021	1137	1137	30sec	1	2	3	0.1	5.2	15.9	12.9	13.2	0.0	0.0

⑩ Helium concentration in field screened samples is less than 5% of *minimum* concentration in the shroud? ☒ Yes ☐ No
Note: 1% helium = 10,000 ppm_v

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
03/03/2021	1139	5556-01-03032021	11860	9036	9036	-29	-4

Comments:

SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: Ashland Brunswick plant
Date: 3-3-21 Project Number: GR6881
Site Location: Resin Supervisor's Office
Weather: 50's, overcast, light rain
Field Personnel: Taylor Payne
Recorded By: Justin Knight

Probe No.: SSSG-02 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 032495 Lamp (10.6) / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: G501650
MDG 2002 Helium detector Serial No.: —
Tracer Gas: ☒ Helium ☐ Other

② Surface Type: ☐ Asphalt ☒ Concrete ☐ Grass ☐ Other
Surface Thickness 4-inches inches/centimeters ☐ Unknown
(i.e., asphalt or concrete)

③ 1 Casing Volume
☒ Sub-slab <0.1 L
Soil gas probe ____ (L)

④ Initial Vacuum (prior to pumping) 0.0 in. H_2O

⑦ Field tubing blank reading (ppm$_v$) completed? ☒ Yes ☐ No PID Reading 0.1 ppm$_v$

⑧ Shut in test prior to purging completed? Yes ☒ No ☐

⑤ Shut in test prior to pneumatic test completed. N/A ___ in. H_2O held for ___ seconds.

⑥ Start of Pneumatic Test:

Elapsed Time (min.)	Pump Flow Rate (LPM)	Well Head Vacuum in. H_2O
N/A	0.1	
	0.2	
	0.5	

⑨ Purging

Date	Start Time	End Time	Elapsed Time (min.)	Bag Volume (L)	Purge Rate (LPM)	Cumulative Volume (L)	CH_4 (%)	CO_2 (%)	O_2 (%)	Tracer Gas Shroud (%) Min	Tracer Gas Shroud (%) Max	Tracer Gas Sample (ppm$_v$, %) (circle one)	VOCs by PID (ppm$_v$)
3/3/21	1047	1047	30 sec	1	2	1	0.1	1.1	18.4	14.5	14.5	0	0.3
3/3/21	1049	1049	30 sec	1	2	2	0.1	2.8	17.4	12.5	12.7	0	0.1
3/3/21	1052	1052	30 sec	1	2	3	0.1	2.7	17.9	13.4	13.4	0	0.1

⑩ Helium concentration in field screened samples is less than 5% of minimum concentration in the shroud? ☒ Yes ☐ No
Note: 1% helium = 10,000 ppm$_v$

⑪ Shut in test prior to sample collection completed? Yes ☒ No ☐

⑫ Sample Collection

Date	Time	Sample ID	Summa Canister ID	Flow Controller #	Vacuum Gauge #	Initial Vacuum (in. Hg)	Final Vacuum (in. Hg)
03/03/2021	1058	SSSG-02-03032021	34002455	10889	10889	-29.5	-4

Comments:

APPENDIX B

Laboratory Reports

eurofins | Environment Testing America

ANALYTICAL REPORT

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

Laboratory Job ID: 140-20512-1
Client Project/Site: Ashland – Brunswick Tier 1 VI

For:
Geosyntec Consultants, Inc.
1255 Roberts Blvd, NW
Suite 200
Kennesaw, Georgia 30144

Attn: Laura Kinsman

Kathryn Smith

Authorized for release by:
10/9/2020 8:35:28 AM
Kathryn Smith, Client Service Manager
(912)250-0275
Kathy.Smith@Eurofinset.com

Designee for

Eddie Barnett, Project Manager I
(912)250-0280
Eddie.Barnett@Eurofinset.com

Table of Contents

Definitions/Glossary

Client: Geosyntec Consultants, Inc. Job ID: 140-20512-1
Project/Site: Ashland – Brunswick Tier 1 VI

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Air - GC VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 140-20512-1

Laboratory: Eurofins TestAmerica, Knoxville

Narrative

Receipt
The samples were received on 9/29/2020 12:00 PM; the samples arrived in good condition, and where required, properly preserved and on ice.

Air - GC VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Air - GC/MS VOA
Methods 3005A, TO 15 LL, TO-14A, TO-15: EPA methods TO-14A and TO-15 specify the use of humidified "zero air" as the blank reagent for canister cleaning, instrument calibration and sample analysis. Ultra-high purity humidified nitrogen from a cryogenic reservoir is used in place of "zero air" by TestAmerica Knoxville.

Method TO 15 LL: The following sample was diluted due to the abundance of non-target analytes: SSSG-06 (140-20512-8). Elevated reporting limits (RLs) are provided.

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

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-20512-1	SSSG-01	Air	09/23/20 10:50	09/29/20 12:00	Air Canister (1-Liter) #11891
140-20512-2	SSSG-02	Air	09/23/20 09:40	09/29/20 12:00	Air Canister (1-Liter) #09663
140-20512-3	SSSG-03	Air	09/23/20 16:40	09/29/20 12:00	Air Canister (1-Liter) #11824
140-20512-4	SSSG-04	Air	09/23/20 13:40	09/29/20 12:00	Air Canister (1-Liter) #10972
140-20512-5	SSSG-08	Air	09/24/20 18:10	09/29/20 12:00	Air Canister (1-Liter) #34001621
140-20512-6	SSSG-07	Air	09/24/20 16:25	09/29/20 12:00	Air Canister (1-Liter) #34000656
140-20512-7	DUP-02	Air	09/24/20 00:05	09/29/20 12:00	Air Canister (1-Liter) #34002424
140-20512-8	SSSG-06	Air	09/24/20 14:40	09/29/20 12:00	Air Canister (1-Liter) #11807
140-20512-9	SSSG-05	Air	09/24/20 13:20	09/29/20 12:00	Air Canister (1-Liter) #34002434
140-20512-10	CS-01	Air	09/24/20 17:06	09/29/20 12:00	Air Canister (6-Liter) #34000874
140-20512-11	DUP-01	Air	09/24/20 17:06	09/29/20 12:00	Air Canister (6-Liter) #8149
140-20512-12	OA-01	Air	09/24/20 17:20	09/29/20 12:00	Air Canister (6-Liter) #11563

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Method	Method Description	Protocol	Laboratory
TO 15 LL	Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)	EPA	TAL KNX
D1946	Fixed Gases (Helium)	ASTM	TAL KNX

Protocol References:

ASTM = ASTM International

EPA = US Environmental Protection Agency

Laboratory References:

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

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Client Sample ID: SSSG-01 — Lab Sample ID: 140-20512-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	140		48	14	ug/m3	1		TO 15 LL	Total/NA
Benzene	0.78	J	2.6	0.26	ug/m3	1		TO 15 LL	Total/NA
2-Butanone (MEK)	20		12	2.2	ug/m3	1		TO 15 LL	Total/NA
Carbon disulfide	1.8	J	6.2	0.34	ug/m3	1		TO 15 LL	Total/NA
Carbon tetrachloride	2.5	J	5.0	0.44	ug/m3	1		TO 15 LL	Total/NA
Chloroform	10		3.9	0.34	ug/m3	1		TO 15 LL	Total/NA
4-Isopropyltoluene	2.9	J	4.4	1.2	ug/m3	1		TO 15 LL	Total/NA
Methyl isobutyl ketone	16		8.2	2.2	ug/m3	1		TO 15 LL	Total/NA
Tetrachloroethene	25		5.4	0.47	ug/m3	1		TO 15 LL	Total/NA
Toluene	3.8	J	4.5	2.9	ug/m3	1		TO 15 LL	Total/NA

Client Sample ID: SSSG-02 — Lab Sample ID: 140-20512-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	230		48	14	ug/m3	1		TO 15 LL	Total/NA
Benzene	0.57	J	2.6	0.26	ug/m3	1		TO 15 LL	Total/NA
2-Butanone (MEK)	27		12	2.2	ug/m3	1		TO 15 LL	Total/NA
Carbon disulfide	0.48	J	6.2	0.34	ug/m3	1		TO 15 LL	Total/NA
Carbon tetrachloride	5.1		5.0	0.44	ug/m3	1		TO 15 LL	Total/NA
Chloroform	3.1	J	3.9	0.34	ug/m3	1		TO 15 LL	Total/NA
4-Isopropyltoluene	8.6		4.4	1.2	ug/m3	1		TO 15 LL	Total/NA
Methyl isobutyl ketone	7.7	J	8.2	2.2	ug/m3	1		TO 15 LL	Total/NA
Tetrachloroethene	320		5.4	0.47	ug/m3	1		TO 15 LL	Total/NA
Toluene	6.4		4.5	2.9	ug/m3	1		TO 15 LL	Total/NA
Xylene, o-	0.79	J	3.5	0.65	ug/m3	1		TO 15 LL	Total/NA

Client Sample ID: SSSG-03 — Lab Sample ID: 140-20512-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	2400	J	12000	1200	ug/m3	1873		TO 15 LL	Total/NA
Ethylbenzene	180000		16000	2600	ug/m3	1873		TO 15 LL	Total/NA
4-Isopropyltoluene	3400000		21000	5700	ug/m3	1873		TO 15 LL	Total/NA
m,p-Xylene	78000		16000	5900	ug/m3	1873		TO 15 LL	Total/NA
Toluene	40000		21000	14000	ug/m3	1873		TO 15 LL	Total/NA
Xylene, o-	55000		16000	3000	ug/m3	1873		TO 15 LL	Total/NA
Xylene (total)	130000		33000	4900	ug/m3	1873		TO 15 LL	Total/NA

Client Sample ID: SSSG-04 — Lab Sample ID: 140-20512-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	29	J	48	14	ug/m3	1		TO 15 LL	Total/NA
Benzene	1.4	J	2.6	0.26	ug/m3	1		TO 15 LL	Total/NA
2-Butanone (MEK)	5.4	J	12	2.2	ug/m3	1		TO 15 LL	Total/NA
Carbon tetrachloride	2.0	J	5.0	0.44	ug/m3	1		TO 15 LL	Total/NA
Chloroform	1.3	J	3.9	0.34	ug/m3	1		TO 15 LL	Total/NA
Ethylbenzene	0.95	J	3.5	0.56	ug/m3	1		TO 15 LL	Total/NA
4-Isopropyltoluene	57		4.4	1.2	ug/m3	1		TO 15 LL	Total/NA
Tetrachloroethene	6.9		5.4	0.47	ug/m3	1		TO 15 LL	Total/NA
Toluene	4.3	J	4.5	2.9	ug/m3	1		TO 15 LL	Total/NA
Xylene, o-	0.72	J	3.5	0.65	ug/m3	1		TO 15 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Client Sample ID: SSSG-08 — Lab Sample ID: 140-20512-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	12000		820	230	ug/m3	3.45		TO 15 LL	Total/NA
Benzene	24	J	44	4.4	ug/m3	3.45		TO 15 LL	Total/NA
2-Butanone (MEK)	1100		200	37	ug/m3	3.45		TO 15 LL	Total/NA
Chloroform	12	J	67	5.9	ug/m3	3.45		TO 15 LL	Total/NA
Ethylbenzene	70		60	9.7	ug/m3	3.45		TO 15 LL	Total/NA
4-Isopropyltoluene	1300		76	21	ug/m3	3.45		TO 15 LL	Total/NA
Methyl isobutyl ketone	120	J	140	38	ug/m3	3.45		TO 15 LL	Total/NA
m,p-Xylene	34	J	60	22	ug/m3	3.45		TO 15 LL	Total/NA
Styrene	39	J	59	18	ug/m3	3.45		TO 15 LL	Total/NA
Xylene, o-	20	J	60	11	ug/m3	3.45		TO 15 LL	Total/NA
Xylene (total)	54	J	120	18	ug/m3	3.45		TO 15 LL	Total/NA

Client Sample ID: SSSG-07 — Lab Sample ID: 140-20512-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	6100		1700	170	ug/m3	663.36		TO 15 LL	Total/NA

Client Sample ID: DUP-02 — Lab Sample ID: 140-20512-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	6200		1900	190	ug/m3	746.02		TO 15 LL	Total/NA

Client Sample ID: SSSG-06 — Lab Sample ID: 140-20512-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloroform	2.8	J	20	1.7	ug/m3	1		TO 15 LL	Total/NA
1,4-Dichlorobenzene	6.3	J	24	4.8	ug/m3	1		TO 15 LL	Total/NA
Ethylbenzene	26		17	2.8	ug/m3	1		TO 15 LL	Total/NA
4-Isopropyltoluene	23		22	6.0	ug/m3	1		TO 15 LL	Total/NA
m,p-Xylene	63		17	6.3	ug/m3	1		TO 15 LL	Total/NA
Xylene, o-	9.8	J	17	3.3	ug/m3	1		TO 15 LL	Total/NA
Xylene (total)	73		35	5.2	ug/m3	1		TO 15 LL	Total/NA

Client Sample ID: SSSG-05 — Lab Sample ID: 140-20512-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	20000	J	22000	6300	ug/m3	280.46		TO 15 LL	Total/NA
Benzene	480	J	1200	120	ug/m3	280.46		TO 15 LL	Total/NA
Chloroform	1400	J	1800	160	ug/m3	280.46		TO 15 LL	Total/NA
Ethylbenzene	150000		1600	260	ug/m3	280.46		TO 15 LL	Total/NA
4-Isopropyltoluene	83000		2100	560	ug/m3	280.46		TO 15 LL	Total/NA
m,p-Xylene	420000		1600	590	ug/m3	280.46		TO 15 LL	Total/NA
Toluene	1600	J	2100	1400	ug/m3	280.46		TO 15 LL	Total/NA
Xylene, o-	22000		1600	300	ug/m3	280.46		TO 15 LL	Total/NA
Xylene (total)	440000		3200	490	ug/m3	280.46		TO 15 LL	Total/NA

Client Sample ID: CS-01 — Lab Sample ID: 140-20512-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	24		4.8	1.4	ug/m3	1		TO 15 LL	Total/NA
Benzene	0.45		0.26	0.026	ug/m3	1		TO 15 LL	Total/NA
2-Butanone (MEK)	7.9		1.2	0.22	ug/m3	1		TO 15 LL	Total/NA
Carbon disulfide	6.6		0.62	0.034	ug/m3	1		TO 15 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: CS-01 (Continued) — Lab Sample ID: 140-20512-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Carbon tetrachloride	2.3		0.50	0.044	ug/m3	1		TO 15 LL	Total/NA
Chloroform	5.1		0.39	0.034	ug/m3	1		TO 15 LL	Total/NA
1,1-Dichloroethane	0.16	J	0.32	0.028	ug/m3	1		TO 15 LL	Total/NA
1,1-Dichloroethene	0.78		0.32	0.032	ug/m3	1		TO 15 LL	Total/NA
Ethylbenzene	0.20	J	0.35	0.056	ug/m3	1		TO 15 LL	Total/NA
4-Isopropyltoluene	6.1		0.44	0.12	ug/m3	1		TO 15 LL	Total/NA
Methyl isobutyl ketone	1.4		0.82	0.22	ug/m3	1		TO 15 LL	Total/NA
m,p-Xylene	0.40		0.35	0.13	ug/m3	1		TO 15 LL	Total/NA
Tetrachloroethene	4.2		0.54	0.047	ug/m3	1		TO 15 LL	Total/NA
Toluene	3.0		0.45	0.29	ug/m3	1		TO 15 LL	Total/NA
Trichloroethene	0.79		0.21	0.032	ug/m3	1		TO 15 LL	Total/NA
Xylene, o-	0.25	J	0.35	0.065	ug/m3	1		TO 15 LL	Total/NA
Xylene (total)	0.65	J	0.69	0.10	ug/m3	1		TO 15 LL	Total/NA

Client Sample ID: DUP-01 — Lab Sample ID: 140-20512-11

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	37		6.4	1.8	ug/m3	2.15		TO 15 LL	Total/NA
Benzene	0.54		0.34	0.034	ug/m3	2.15		TO 15 LL	Total/NA
2-Butanone (MEK)	8.4		1.6	0.29	ug/m3	2.15		TO 15 LL	Total/NA
Carbon disulfide	45		0.84	0.046	ug/m3	2.15		TO 15 LL	Total/NA
Carbon tetrachloride	2.1		0.68	0.059	ug/m3	2.15		TO 15 LL	Total/NA
Chloroform	4.7		0.52	0.046	ug/m3	2.15		TO 15 LL	Total/NA
Ethylbenzene	0.30	J	0.47	0.076	ug/m3	2.15		TO 15 LL	Total/NA
4-Isopropyltoluene	5.2		0.59	0.16	ug/m3	2.15		TO 15 LL	Total/NA
Methyl isobutyl ketone	1.6		1.1	0.30	ug/m3	2.15		TO 15 LL	Total/NA
m,p-Xylene	0.78		0.47	0.17	ug/m3	2.15		TO 15 LL	Total/NA
Tetrachloroethene	0.27	J	0.73	0.064	ug/m3	2.15		TO 15 LL	Total/NA
Toluene	3.9		0.61	0.39	ug/m3	2.15		TO 15 LL	Total/NA
Trichloroethene	0.054	J	0.29	0.043	ug/m3	2.15		TO 15 LL	Total/NA
Xylene, o-	0.40	J	0.47	0.088	ug/m3	2.15		TO 15 LL	Total/NA
Xylene (total)	1.2		0.93	0.14	ug/m3	2.15		TO 15 LL	Total/NA

Client Sample ID: OA-01 — Lab Sample ID: 140-20512-12

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	34		4.8	1.4	ug/m3	1.5		TO 15 LL	Total/NA
Benzene	0.31		0.26	0.026	ug/m3	1.5		TO 15 LL	Total/NA
2-Butanone (MEK)	4.2		1.2	0.22	ug/m3	1.5		TO 15 LL	Total/NA
Carbon disulfide	0.35	J	0.62	0.034	ug/m3	1.5		TO 15 LL	Total/NA
Carbon tetrachloride	0.48	J	0.50	0.044	ug/m3	1.5		TO 15 LL	Total/NA
Chloroform	0.099	J	0.39	0.034	ug/m3	1.5		TO 15 LL	Total/NA
Ethylbenzene	0.22	J	0.35	0.056	ug/m3	1.5		TO 15 LL	Total/NA
4-Isopropyltoluene	1.7		0.44	0.12	ug/m3	1.5		TO 15 LL	Total/NA
Methylene Chloride	2.0		1.4	1.4	ug/m3	1.5		TO 15 LL	Total/NA
Methyl isobutyl ketone	59		0.82	0.22	ug/m3	1.5		TO 15 LL	Total/NA
m,p-Xylene	0.71		0.35	0.13	ug/m3	1.5		TO 15 LL	Total/NA
Toluene	2.2		0.45	0.29	ug/m3	1.5		TO 15 LL	Total/NA
Xylene, o-	0.78		0.35	0.065	ug/m3	1.5		TO 15 LL	Total/NA
Xylene (total)	1.5		0.69	0.10	ug/m3	1.5		TO 15 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Client Sample ID: SSSG-01

Lab Sample ID: 140-20512-1
Matrix: Air
Date Collected: 09/23/20 10:50
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**140**		48	14	ug/m3			09/30/20 16:14	1
Benzene	**0.78**	**J**	2.6	0.26	ug/m3			09/30/20 16:14	1
2-Butanone (MEK)	**20**		12	2.2	ug/m3			09/30/20 16:14	1
Carbon disulfide	**1.8**	**J**	6.2	0.34	ug/m3			09/30/20 16:14	1
Carbon tetrachloride	**2.5**	**J**	5.0	0.44	ug/m3			09/30/20 16:14	1
Chlorobenzene	0.28	U	3.7	0.28	ug/m3			09/30/20 16:14	1
Chloroform	**10**		3.9	0.34	ug/m3			09/30/20 16:14	1
1,2-Dichlorobenzene	1.9	U	4.8	1.9	ug/m3			09/30/20 16:14	1
1,4-Dichlorobenzene	0.96	U	4.8	0.96	ug/m3			09/30/20 16:14	1
1,1-Dichloroethane	0.28	U	3.2	0.28	ug/m3			09/30/20 16:14	1
1,1-Dichloroethene	0.32	U	3.2	0.32	ug/m3			09/30/20 16:14	1
1,2-Dichloropropane	0.46	U	3.7	0.46	ug/m3			09/30/20 16:14	1
Ethylbenzene	0.56	U	3.5	0.56	ug/m3			09/30/20 16:14	1
4-Isopropyltoluene	**2.9**	**J**	4.4	1.2	ug/m3			09/30/20 16:14	1
Methylene Chloride	14	U	14	14	ug/m3			09/30/20 16:14	1
Methyl isobutyl ketone	**16**		8.2	2.2	ug/m3			09/30/20 16:14	1
m,p-Xylene	1.3	U	3.5	1.3	ug/m3			09/30/20 16:14	1
Naphthalene	4.0	U	10	4.0	ug/m3			09/30/20 16:14	1
Styrene	1.0	U	3.4	1.0	ug/m3			09/30/20 16:14	1
Tetrachloroethene	**25**		5.4	0.47	ug/m3			09/30/20 16:14	1
Toluene	**3.8**	**J**	4.5	2.9	ug/m3			09/30/20 16:14	1
1,2,4-Trichlorobenzene	4.7	U	30	4.7	ug/m3			09/30/20 16:14	1
Trichloroethene	0.32	U	2.1	0.32	ug/m3			09/30/20 16:14	1
1,2,3-Trichloropropane	1.8	U	12	1.8	ug/m3			09/30/20 16:14	1
Vinyl chloride	0.66	U	1.0	0.66	ug/m3			09/30/20 16:14	1
Xylene, o-	0.65	U	3.5	0.65	ug/m3			09/30/20 16:14	1
Xylene (total)	1.0	U	6.9	1.0	ug/m3			09/30/20 16:14	1

Client Sample ID: SSSG-02

Lab Sample ID: 140-20512-2
Matrix: Air
Date Collected: 09/23/20 09:40
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**230**		48	14	ug/m3			09/30/20 17:16	1
Benzene	**0.57**	**J**	2.6	0.26	ug/m3			09/30/20 17:16	1
2-Butanone (MEK)	**27**		12	2.2	ug/m3			09/30/20 17:16	1
Carbon disulfide	**0.48**	**J**	6.2	0.34	ug/m3			09/30/20 17:16	1
Carbon tetrachloride	**5.1**		5.0	0.44	ug/m3			09/30/20 17:16	1
Chlorobenzene	0.28	U	3.7	0.28	ug/m3			09/30/20 17:16	1
Chloroform	**3.1**	**J**	3.9	0.34	ug/m3			09/30/20 17:16	1
1,2-Dichlorobenzene	1.9	U	4.8	1.9	ug/m3			09/30/20 17:16	1
1,4-Dichlorobenzene	0.96	U	4.8	0.96	ug/m3			09/30/20 17:16	1
1,1-Dichloroethane	0.28	U	3.2	0.28	ug/m3			09/30/20 17:16	1
1,1-Dichloroethene	0.32	U	3.2	0.32	ug/m3			09/30/20 17:16	1
1,2-Dichloropropane	0.46	U	3.7	0.46	ug/m3			09/30/20 17:16	1
Ethylbenzene	0.56	U	3.5	0.56	ug/m3			09/30/20 17:16	1
4-Isopropyltoluene	**8.6**		4.4	1.2	ug/m3			09/30/20 17:16	1

Client Sample ID: SSSG-02

Lab Sample ID: 140-20512-2

Date Collected: 09/23/20 09:40
Matrix: Air
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methylene Chloride	14	U	14	14	ug/m3			09/30/20 17:16	1
Methyl isobutyl ketone	**7.7**	**J**	8.2	2.2	ug/m3			09/30/20 17:16	1
m,p-Xylene	1.3	U	3.5	1.3	ug/m3			09/30/20 17:16	1
Naphthalene	4.0	U	10	4.0	ug/m3			09/30/20 17:16	1
Styrene	1.0	U	3.4	1.0	ug/m3			09/30/20 17:16	1
Tetrachloroethene	**320**		5.4	0.47	ug/m3			09/30/20 17:16	1
Toluene	**6.4**		4.5	2.9	ug/m3			09/30/20 17:16	1
1,2,4-Trichlorobenzene	4.7	U	30	4.7	ug/m3			09/30/20 17:16	1
Trichloroethene	0.32	U	2.1	0.32	ug/m3			09/30/20 17:16	1
1,2,3-Trichloropropane	1.8	U	12	1.8	ug/m3			09/30/20 17:16	1
Vinyl chloride	0.66	U	1.0	0.66	ug/m3			09/30/20 17:16	1
Xylene, o-	**0.79**	**J**	3.5	0.65	ug/m3			09/30/20 17:16	1
Xylene (total)	1.0	U	6.9	1.0	ug/m3			09/30/20 17:16	1

Client Sample ID: SSSG-03

Lab Sample ID: 140-20512-3

Date Collected: 09/23/20 16:40
Matrix: Air
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	63000	U	220000	63000	ug/m3			09/30/20 18:18	1873
Benzene	**2400**	**J**	12000	1200	ug/m3			09/30/20 18:18	1873
2-Butanone (MEK)	10000	U	55000	10000	ug/m3			09/30/20 18:18	1873
Carbon disulfide	1600	U	29000	1600	ug/m3			09/30/20 18:18	1873
Carbon tetrachloride	2100	U	24000	2100	ug/m3			09/30/20 18:18	1873
Chlorobenzene	1300	U	17000	1300	ug/m3			09/30/20 18:18	1873
Chloroform	1600	U	18000	1600	ug/m3			09/30/20 18:18	1873
1,2-Dichlorobenzene	8700	U	23000	8700	ug/m3			09/30/20 18:18	1873
1,4-Dichlorobenzene	4500	U	23000	4500	ug/m3			09/30/20 18:18	1873
1,1-Dichloroethane	1300	U	15000	1300	ug/m3			09/30/20 18:18	1873
1,1-Dichloroethene	1500	U	15000	1500	ug/m3			09/30/20 18:18	1873
1,2-Dichloropropane	2200	U	17000	2200	ug/m3			09/30/20 18:18	1873
Ethylbenzene	**180000**		16000	2600	ug/m3			09/30/20 18:18	1873
4-Isopropyltoluene	**3400000**		21000	5700	ug/m3			09/30/20 18:18	1873
Methylene Chloride	63000	U	65000	63000	ug/m3			09/30/20 18:18	1873
Methyl isobutyl ketone	10000	U	38000	10000	ug/m3			09/30/20 18:18	1873
m,p-Xylene	**78000**		16000	5900	ug/m3			09/30/20 18:18	1873
Naphthalene	19000	U	49000	19000	ug/m3			09/30/20 18:18	1873
Styrene	4800	U	16000	4800	ug/m3			09/30/20 18:18	1873
Tetrachloroethene	2200	U	25000	2200	ug/m3			09/30/20 18:18	1873
Toluene	**40000**		21000	14000	ug/m3			09/30/20 18:18	1873
1,2,4-Trichlorobenzene	22000	U	140000	22000	ug/m3			09/30/20 18:18	1873
Trichloroethene	1500	U	10000	1500	ug/m3			09/30/20 18:18	1873
1,2,3-Trichloropropane	8500	U	56000	8500	ug/m3			09/30/20 18:18	1873
Vinyl chloride	3100	U	4800	3100	ug/m3			09/30/20 18:18	1873
Xylene, o-	**55000**		16000	3000	ug/m3			09/30/20 18:18	1873
Xylene (total)	**130000**		33000	4900	ug/m3			09/30/20 18:18	1873

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Client Sample ID: SSSG-03

Lab Sample ID: 140-20512-3
Matrix: Air
Date Collected: 09/23/20 16:40
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: D1946 - Fixed Gases (Helium)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Helium	0.13	U	0.13	0.13	% v/v			10/01/20 11:59	1.31
Hydrogen	0.13	U	0.13	0.13	% v/v			10/01/20 11:59	1.31

Client Sample ID: SSSG-04

Lab Sample ID: 140-20512-4
Matrix: Air
Date Collected: 09/23/20 13:40
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**29**	**J**	48	14	ug/m3			09/30/20 19:20	1
Benzene	**1.4**	**J**	2.6	0.26	ug/m3			09/30/20 19:20	1
2-Butanone (MEK)	**5.4**	**J**	12	2.2	ug/m3			09/30/20 19:20	1
Carbon disulfide	0.34	U	6.2	0.34	ug/m3			09/30/20 19:20	1
Carbon tetrachloride	**2.0**	**J**	5.0	0.44	ug/m3			09/30/20 19:20	1
Chlorobenzene	0.28	U	3.7	0.28	ug/m3			09/30/20 19:20	1
Chloroform	**1.3**	**J**	3.9	0.34	ug/m3			09/30/20 19:20	1
1,2-Dichlorobenzene	1.9	U	4.8	1.9	ug/m3			09/30/20 19:20	1
1,4-Dichlorobenzene	0.96	U	4.8	0.96	ug/m3			09/30/20 19:20	1
1,1-Dichloroethane	0.28	U	3.2	0.28	ug/m3			09/30/20 19:20	1
1,1-Dichloroethene	0.32	U	3.2	0.32	ug/m3			09/30/20 19:20	1
1,2-Dichloropropane	0.46	U	3.7	0.46	ug/m3			09/30/20 19:20	1
Ethylbenzene	**0.95**	**J**	3.5	0.56	ug/m3			09/30/20 19:20	1
4-Isopropyltoluene	**57**		4.4	1.2	ug/m3			09/30/20 19:20	1
Methylene Chloride	14	U	14	14	ug/m3			09/30/20 19:20	1
Methyl isobutyl ketone	2.2	U	8.2	2.2	ug/m3			09/30/20 19:20	1
m,p-Xylene	1.3	U	3.5	1.3	ug/m3			09/30/20 19:20	1
Naphthalene	4.0	U	10	4.0	ug/m3			09/30/20 19:20	1
Styrene	1.0	U	3.4	1.0	ug/m3			09/30/20 19:20	1
Tetrachloroethene	**6.9**		5.4	0.47	ug/m3			09/30/20 19:20	1
Toluene	**4.3**	**J**	4.5	2.9	ug/m3			09/30/20 19:20	1
1,2,4-Trichlorobenzene	4.7	U	30	4.7	ug/m3			09/30/20 19:20	1
Trichloroethene	0.32	U	2.1	0.32	ug/m3			09/30/20 19:20	1
1,2,3-Trichloropropane	1.8	U	12	1.8	ug/m3			09/30/20 19:20	1
Vinyl chloride	0.66	U	1.0	0.66	ug/m3			09/30/20 19:20	1
Xylene, o-	**0.72**	**J**	3.5	0.65	ug/m3			09/30/20 19:20	1
Xylene (total)	1.0	U	6.9	1.0	ug/m3			09/30/20 19:20	1

Client Sample ID: SSSG-08

Lab Sample ID: 140-20512-5
Matrix: Air
Date Collected: 09/24/20 18:10
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**12000**		820	230	ug/m3			10/01/20 23:57	3.45
Benzene	**24**	**J**	44	4.4	ug/m3			10/01/20 23:57	3.45
2-Butanone (MEK)	**1100**		200	37	ug/m3			10/01/20 23:57	3.45
Carbon disulfide	5.9	U	110	5.9	ug/m3			10/01/20 23:57	3.45

Client Sample ID: SSSG-08 — Lab Sample ID: 140-20512-5

Date Collected: 09/24/20 18:10 — **Matrix: Air**
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	7.6	U	87	7.6	ug/m3			10/01/20 23:57	3.45
Chlorobenzene	4.8	U	64	4.8	ug/m3			10/01/20 23:57	3.45
Chloroform	**12**	**J**	67	5.9	ug/m3			10/01/20 23:57	3.45
1,2-Dichlorobenzene	32	U	83	32	ug/m3			10/01/20 23:57	3.45
1,4-Dichlorobenzene	17	U	83	17	ug/m3			10/01/20 23:57	3.45
1,1-Dichloroethane	4.9	U	56	4.9	ug/m3			10/01/20 23:57	3.45
1,1-Dichloroethene	5.5	U	55	5.5	ug/m3			10/01/20 23:57	3.45
1,2-Dichloropropane	8.0	U	64	8.0	ug/m3			10/01/20 23:57	3.45
Ethylbenzene	**70**		60	9.7	ug/m3			10/01/20 23:57	3.45
4-Isopropyltoluene	**1300**		76	21	ug/m3			10/01/20 23:57	3.45
Methylene Chloride	230	U	240	230	ug/m3			10/01/20 23:57	3.45
Methyl isobutyl ketone	**120**	**J**	140	38	ug/m3			10/01/20 23:57	3.45
m,p-Xylene	**34**	**J**	60	22	ug/m3			10/01/20 23:57	3.45
Naphthalene	69	U	180	69	ug/m3			10/01/20 23:57	3.45
Styrene	**39**	**J**	59	18	ug/m3			10/01/20 23:57	3.45
Tetrachloroethene	8.2	U	94	8.2	ug/m3			10/01/20 23:57	3.45
Toluene	51	U	78	51	ug/m3			10/01/20 23:57	3.45
1,2,4-Trichlorobenzene	82	U	510	82	ug/m3			10/01/20 23:57	3.45
Trichloroethene	5.6	U	37	5.6	ug/m3			10/01/20 23:57	3.45
1,2,3-Trichloropropane	31	U	210	31	ug/m3			10/01/20 23:57	3.45
Vinyl chloride	11	U	18	11	ug/m3			10/01/20 23:57	3.45
Xylene, o-	**20**	**J**	60	11	ug/m3			10/01/20 23:57	3.45
Xylene (total)	**54**	**J**	120	18	ug/m3			10/01/20 23:57	3.45

Client Sample ID: SSSG-07 — Lab Sample ID: 140-20512-6

Date Collected: 09/24/20 16:25 — **Matrix: Air**
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	9000	U	32000	9000	ug/m3			10/02/20 10:09	663.36
Benzene	**6100**		1700	170	ug/m3			10/02/20 10:09	663.36
2-Butanone (MEK)	1400	U	7800	1400	ug/m3			10/02/20 10:09	663.36
Carbon disulfide	230	U	4100	230	ug/m3			10/02/20 10:09	663.36
Carbon tetrachloride	290	U	3300	290	ug/m3			10/02/20 10:09	663.36
Chlorobenzene	180	U	2400	180	ug/m3			10/02/20 10:09	663.36
Chloroform	230	U	2600	230	ug/m3			10/02/20 10:09	663.36
1,2-Dichlorobenzene	1200	U	3200	1200	ug/m3			10/02/20 10:09	663.36
1,4-Dichlorobenzene	640	U	3200	640	ug/m3			10/02/20 10:09	663.36
1,1-Dichloroethane	190	U	2100	190	ug/m3			10/02/20 10:09	663.36
1,1-Dichloroethene	210	U	2100	210	ug/m3			10/02/20 10:09	663.36
1,2-Dichloropropane	310	U	2500	310	ug/m3			10/02/20 10:09	663.36
Ethylbenzene	370	U	2300	370	ug/m3			10/02/20 10:09	663.36
4-Isopropyltoluene	800	U	2900	800	ug/m3			10/02/20 10:09	663.36
Methylene Chloride	9000	U	9200	9000	ug/m3			10/02/20 10:09	663.36
Methyl isobutyl ketone	1500	U	5400	1500	ug/m3			10/02/20 10:09	663.36
m,p-Xylene	840	U	2300	840	ug/m3			10/02/20 10:09	663.36
Naphthalene	2600	U	7000	2600	ug/m3			10/02/20 10:09	663.36

Client Sample ID: SSSG-07 — Lab Sample ID: 140-20512-6

Date Collected: 09/24/20 16:25 — **Matrix: Air**
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Styrene	680	U	2300	680	ug/m3			10/02/20 10:09	663.36
Tetrachloroethene	310	U	3600	310	ug/m3			10/02/20 10:09	663.36
Toluene	1900	U	3000	1900	ug/m3			10/02/20 10:09	663.36
1,2,4-Trichlorobenzene	3200	U	20000	3200	ug/m3			10/02/20 10:09	663.36
Trichloroethene	210	U	1400	210	ug/m3			10/02/20 10:09	663.36
1,2,3-Trichloropropane	1200	U	8000	1200	ug/m3			10/02/20 10:09	663.36
Vinyl chloride	440	U	680	440	ug/m3			10/02/20 10:09	663.36
Xylene, o-	430	U	2300	430	ug/m3			10/02/20 10:09	663.36
Xylene (total)	690	U	4600	690	ug/m3			10/02/20 10:09	663.36

Method: D1946 - Fixed Gases (Helium)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Helium	0.11	U	0.11	0.11	% v/v			10/01/20 12:17	1.11
Hydrogen	0.11	U	0.11	0.11	% v/v			10/01/20 12:17	1.11

Client Sample ID: DUP-02 — Lab Sample ID: 140-20512-7

Date Collected: 09/24/20 00:05 — **Matrix: Air**
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	10000	U	35000	10000	ug/m3			10/02/20 10:57	746.02
Benzene	**6200**		1900	190	ug/m3			10/02/20 10:57	746.02
2-Butanone (MEK)	1600	U	8800	1600	ug/m3			10/02/20 10:57	746.02
Carbon disulfide	260	U	4600	260	ug/m3			10/02/20 10:57	746.02
Carbon tetrachloride	330	U	3800	330	ug/m3			10/02/20 10:57	746.02
Chlorobenzene	210	U	2700	210	ug/m3			10/02/20 10:57	746.02
Chloroform	250	U	2900	250	ug/m3			10/02/20 10:57	746.02
1,2-Dichlorobenzene	1400	U	3600	1400	ug/m3			10/02/20 10:57	746.02
1,4-Dichlorobenzene	720	U	3600	720	ug/m3			10/02/20 10:57	746.02
1,1-Dichloroethane	210	U	2400	210	ug/m3			10/02/20 10:57	746.02
1,1-Dichloroethene	240	U	2400	240	ug/m3			10/02/20 10:57	746.02
1,2-Dichloropropane	340	U	2800	340	ug/m3			10/02/20 10:57	746.02
Ethylbenzene	420	U	2600	420	ug/m3			10/02/20 10:57	746.02
4-Isopropyltoluene	900	U	3300	900	ug/m3			10/02/20 10:57	746.02
Methylene Chloride	10000	U	10000	10000	ug/m3			10/02/20 10:57	746.02
Methyl isobutyl ketone	1700	U	6100	1700	ug/m3			10/02/20 10:57	746.02
m,p-Xylene	940	U	2600	940	ug/m3			10/02/20 10:57	746.02
Naphthalene	3000	U	7800	3000	ug/m3			10/02/20 10:57	746.02
Styrene	760	U	2500	760	ug/m3			10/02/20 10:57	746.02
Tetrachloroethene	350	U	4000	350	ug/m3			10/02/20 10:57	746.02
Toluene	2200	U	3400	2200	ug/m3			10/02/20 10:57	746.02
1,2,4-Trichlorobenzene	3500	U	22000	3500	ug/m3			10/02/20 10:57	746.02
Trichloroethene	240	U	1600	240	ug/m3			10/02/20 10:57	746.02
1,2,3-Trichloropropane	1300	U	9000	1300	ug/m3			10/02/20 10:57	746.02
Vinyl chloride	500	U	760	500	ug/m3			10/02/20 10:57	746.02
Xylene, o-	490	U	2600	490	ug/m3			10/02/20 10:57	746.02
Xylene (total)	780	U	5200	780	ug/m3			10/02/20 10:57	746.02

Client Sample ID: DUP-02 Lab Sample ID: 140-20512-7

Date Collected: 09/24/20 00:05 **Matrix: Air**
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: D1946 - Fixed Gases (Helium)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Helium	0.12	U	0.12	0.12	% v/v			10/01/20 12:34	1.19
Hydrogen	0.12	U	0.12	0.12	% v/v			10/01/20 12:34	1.19

Client Sample ID: SSSG-06 Lab Sample ID: 140-20512-8

Date Collected: 09/24/20 14:40 **Matrix: Air**
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	68	U	240	68	ug/m3			10/02/20 03:57	1
Benzene	1.3	U	13	1.3	ug/m3			10/02/20 03:57	1
2-Butanone (MEK)	11	U	59	11	ug/m3			10/02/20 03:57	1
Carbon disulfide	1.7	U	31	1.7	ug/m3			10/02/20 03:57	1
Carbon tetrachloride	2.2	U	25	2.2	ug/m3			10/02/20 03:57	1
Chlorobenzene	1.4	U	18	1.4	ug/m3			10/02/20 03:57	1
Chloroform	**2.8**	**J**	20	1.7	ug/m3			10/02/20 03:57	1
1,2-Dichlorobenzene	9.3	U	24	9.3	ug/m3			10/02/20 03:57	1
1,4-Dichlorobenzene	**6.3**	**J**	24	4.8	ug/m3			10/02/20 03:57	1
1,1-Dichloroethane	1.4	U	16	1.4	ug/m3			10/02/20 03:57	1
1,1-Dichloroethene	1.6	U	16	1.6	ug/m3			10/02/20 03:57	1
1,2-Dichloropropane	2.3	U	18	2.3	ug/m3			10/02/20 03:57	1
Ethylbenzene	**26**		17	2.8	ug/m3			10/02/20 03:57	1
4-Isopropyltoluene	**23**		22	6.0	ug/m3			10/02/20 03:57	1
Methylene Chloride	68	U	69	68	ug/m3			10/02/20 03:57	1
Methyl isobutyl ketone	11	U	41	11	ug/m3			10/02/20 03:57	1
m,p-Xylene	**63**		17	6.3	ug/m3			10/02/20 03:57	1
Naphthalene	20	U	52	20	ug/m3			10/02/20 03:57	1
Styrene	5.1	U	17	5.1	ug/m3			10/02/20 03:57	1
Tetrachloroethene	2.4	U	27	2.4	ug/m3			10/02/20 03:57	1
Toluene	15	U	23	15	ug/m3			10/02/20 03:57	1
1,2,4-Trichlorobenzene	24	U	150	24	ug/m3			10/02/20 03:57	1
Trichloroethene	1.6	U	11	1.6	ug/m3			10/02/20 03:57	1
1,2,3-Trichloropropane	9.0	U	60	9.0	ug/m3			10/02/20 03:57	1
Vinyl chloride	3.3	U	5.1	3.3	ug/m3			10/02/20 03:57	1
Xylene, o-	**9.8**	**J**	17	3.3	ug/m3			10/02/20 03:57	1
Xylene (total)	**73**		35	5.2	ug/m3			10/02/20 03:57	1

Client Sample ID: SSSG-05 Lab Sample ID: 140-20512-9

Date Collected: 09/24/20 13:20 **Matrix: Air**
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**20000**	**J**	22000	6300	ug/m3			10/03/20 00:20	280.46
Benzene	**480**	**J**	1200	120	ug/m3			10/03/20 00:20	280.46
2-Butanone (MEK)	1000	U	5500	1000	ug/m3			10/03/20 00:20	280.46
Carbon disulfide	160	U	2900	160	ug/m3			10/03/20 00:20	280.46

Client Sample ID: SSSG-05

Lab Sample ID: 140-20512-9

Date Collected: 09/24/20 13:20

Matrix: Air

Date Received: 09/29/20 12:00

Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Carbon tetrachloride	210	U	2400	210	ug/m3			10/03/20 00:20	280.46
Chlorobenzene	130	U	1700	130	ug/m3			10/03/20 00:20	280.46
Chloroform	**1400**	**J**	1800	160	ug/m3			10/03/20 00:20	280.46
1,2-Dichlorobenzene	870	U	2200	870	ug/m3			10/03/20 00:20	280.46
1,4-Dichlorobenzene	450	U	2200	450	ug/m3			10/03/20 00:20	280.46
1,1-Dichloroethane	130	U	1500	130	ug/m3			10/03/20 00:20	280.46
1,1-Dichloroethene	150	U	1500	150	ug/m3			10/03/20 00:20	280.46
1,2-Dichloropropane	220	U	1700	220	ug/m3			10/03/20 00:20	280.46
Ethylbenzene	**150000**		1600	260	ug/m3			10/03/20 00:20	280.46
4-Isopropyltoluene	**83000**		2100	560	ug/m3			10/03/20 00:20	280.46
Methylene Chloride	6300	U	6500	6300	ug/m3			10/03/20 00:20	280.46
Methyl isobutyl ketone	1000	U	3800	1000	ug/m3			10/03/20 00:20	280.46
m,p-Xylene	**420000**		1600	590	ug/m3			10/03/20 00:20	280.46
Naphthalene	1900	U	4900	1900	ug/m3			10/03/20 00:20	280.46
Styrene	480	U	1600	480	ug/m3			10/03/20 00:20	280.46
Tetrachloroethene	220	U	2500	220	ug/m3			10/03/20 00:20	280.46
Toluene	**1600**	**J**	2100	1400	ug/m3			10/03/20 00:20	280.46
1,2,4-Trichlorobenzene	2200	U	14000	2200	ug/m3			10/03/20 00:20	280.46
Trichloroethene	150	U	1000	150	ug/m3			10/03/20 00:20	280.46
1,2,3-Trichloropropane	850	U	5600	850	ug/m3			10/03/20 00:20	280.46
Vinyl chloride	310	U *	480	310	ug/m3			10/03/20 00:20	280.46
Xylene, o-	**22000**		1600	300	ug/m3			10/03/20 00:20	280.46
Xylene (total)	**440000**		3200	490	ug/m3			10/03/20 00:20	280.46

Method: D1946 - Fixed Gases (Helium)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Helium	0.12	U	0.12	0.12	% v/v			10/01/20 12:51	1.17
Hydrogen	0.12	U	0.12	0.12	% v/v			10/01/20 12:51	1.17

Client Sample ID: CS-01

Lab Sample ID: 140-20512-10

Date Collected: 09/24/20 17:06

Matrix: Air

Date Received: 09/29/20 12:00

Sample Container: Summa Canister 6L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**24**		4.8	1.4	ug/m3			10/01/20 21:23	1
Benzene	**0.45**		0.26	0.026	ug/m3			10/01/20 21:23	1
2-Butanone (MEK)	**7.9**		1.2	0.22	ug/m3			10/01/20 21:23	1
Carbon disulfide	**6.6**		0.62	0.034	ug/m3			10/01/20 21:23	1
Carbon tetrachloride	**2.3**		0.50	0.044	ug/m3			10/01/20 21:23	1
Chlorobenzene	0.028	U	0.37	0.028	ug/m3			10/01/20 21:23	1
Chloroform	**5.1**		0.39	0.034	ug/m3			10/01/20 21:23	1
1,2-Dichlorobenzene	0.19	U	0.48	0.19	ug/m3			10/01/20 21:23	1
1,4-Dichlorobenzene	0.096	U	0.48	0.096	ug/m3			10/01/20 21:23	1
1,1-Dichloroethane	**0.16**	**J**	0.32	0.028	ug/m3			10/01/20 21:23	1
1,1-Dichloroethene	**0.78**		0.32	0.032	ug/m3			10/01/20 21:23	1
1,2-Dichloropropane	0.046	U	0.37	0.046	ug/m3			10/01/20 21:23	1
Ethylbenzene	**0.20**	**J**	0.35	0.056	ug/m3			10/01/20 21:23	1

Client Sample ID: CS-01

Lab Sample ID: 140-20512-10

Date Collected: 09/24/20 17:06
Matrix: Air
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 6L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4-Isopropyltoluene	**6.1**		0.44	0.12	ug/m3			10/01/20 21:23	1
Methylene Chloride	1.4	U	1.4	1.4	ug/m3			10/01/20 21:23	1
Methyl isobutyl ketone	**1.4**		0.82	0.22	ug/m3			10/01/20 21:23	1
m,p-Xylene	**0.40**		0.35	0.13	ug/m3			10/01/20 21:23	1
Naphthalene	0.40	U	1.0	0.40	ug/m3			10/01/20 21:23	1
Styrene	0.10	U	0.34	0.10	ug/m3			10/01/20 21:23	1
Tetrachloroethene	**4.2**		0.54	0.047	ug/m3			10/01/20 21:23	1
Toluene	**3.0**		0.45	0.29	ug/m3			10/01/20 21:23	1
1,2,4-Trichlorobenzene	0.47	U	3.0	0.47	ug/m3			10/01/20 21:23	1
Trichloroethene	**0.79**		0.21	0.032	ug/m3			10/01/20 21:23	1
1,2,3-Trichloropropane	0.18	U	1.2	0.18	ug/m3			10/01/20 21:23	1
Vinyl chloride	0.066	U	0.10	0.066	ug/m3			10/01/20 21:23	1
Xylene, o-	**0.25**	**J**	0.35	0.065	ug/m3			10/01/20 21:23	1
Xylene (total)	**0.65**	**J**	0.69	0.10	ug/m3			10/01/20 21:23	1

Client Sample ID: DUP-01

Lab Sample ID: 140-20512-11

Date Collected: 09/24/20 17:06
Matrix: Air
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 6L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**37**		6.4	1.8	ug/m3			10/01/20 22:18	2.15
Benzene	**0.54**		0.34	0.034	ug/m3			10/01/20 22:18	2.15
2-Butanone (MEK)	**8.4**		1.6	0.29	ug/m3			10/01/20 22:18	2.15
Carbon disulfide	**45**		0.84	0.046	ug/m3			10/01/20 22:18	2.15
Carbon tetrachloride	**2.1**		0.68	0.059	ug/m3			10/01/20 22:18	2.15
Chlorobenzene	0.037	U	0.49	0.037	ug/m3			10/01/20 22:18	2.15
Chloroform	**4.7**		0.52	0.046	ug/m3			10/01/20 22:18	2.15
1,2-Dichlorobenzene	0.25	U	0.65	0.25	ug/m3			10/01/20 22:18	2.15
1,4-Dichlorobenzene	0.13	U	0.65	0.13	ug/m3			10/01/20 22:18	2.15
1,1-Dichloroethane	0.038	U	0.44	0.038	ug/m3			10/01/20 22:18	2.15
1,1-Dichloroethene	0.043	U	0.43	0.043	ug/m3			10/01/20 22:18	2.15
1,2-Dichloropropane	0.062	U	0.50	0.062	ug/m3			10/01/20 22:18	2.15
Ethylbenzene	**0.30**	**J**	0.47	0.076	ug/m3			10/01/20 22:18	2.15
4-Isopropyltoluene	**5.2**		0.59	0.16	ug/m3			10/01/20 22:18	2.15
Methylene Chloride	1.8	U	1.9	1.8	ug/m3			10/01/20 22:18	2.15
Methyl isobutyl ketone	**1.6**		1.1	0.30	ug/m3			10/01/20 22:18	2.15
m,p-Xylene	**0.78**		0.47	0.17	ug/m3			10/01/20 22:18	2.15
Naphthalene	0.54	U	1.4	0.54	ug/m3			10/01/20 22:18	2.15
Styrene	0.14	U	0.46	0.14	ug/m3			10/01/20 22:18	2.15
Tetrachloroethene	**0.27**	**J**	0.73	0.064	ug/m3			10/01/20 22:18	2.15
Toluene	**3.9**		0.61	0.39	ug/m3			10/01/20 22:18	2.15
1,2,4-Trichlorobenzene	0.64	U	4.0	0.64	ug/m3			10/01/20 22:18	2.15
Trichloroethene	**0.054**	**J**	0.29	0.043	ug/m3			10/01/20 22:18	2.15
1,2,3-Trichloropropane	0.24	U	1.6	0.24	ug/m3			10/01/20 22:18	2.15
Vinyl chloride	0.089	U	0.14	0.089	ug/m3			10/01/20 22:18	2.15
Xylene, o-	**0.40**	**J**	0.47	0.088	ug/m3			10/01/20 22:18	2.15
Xylene (total)	**1.2**		0.93	0.14	ug/m3			10/01/20 22:18	2.15

Client Sample ID: OA-01

Lab Sample ID: 140-20512-12

Date Collected: 09/24/20 17:20
Matrix: Air
Date Received: 09/29/20 12:00
Sample Container: Summa Canister 6L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**34**		4.8	1.4	ug/m3			10/01/20 20:31	1.5
Benzene	**0.31**		0.26	0.026	ug/m3			10/01/20 20:31	1.5
2-Butanone (MEK)	**4.2**		1.2	0.22	ug/m3			10/01/20 20:31	1.5
Carbon disulfide	**0.35**	**J**	0.62	0.034	ug/m3			10/01/20 20:31	1.5
Carbon tetrachloride	**0.48**	**J**	0.50	0.044	ug/m3			10/01/20 20:31	1.5
Chlorobenzene	0.028	U	0.37	0.028	ug/m3			10/01/20 20:31	1.5
Chloroform	**0.099**	**J**	0.39	0.034	ug/m3			10/01/20 20:31	1.5
1,2-Dichlorobenzene	0.19	U	0.48	0.19	ug/m3			10/01/20 20:31	1.5
1,4-Dichlorobenzene	0.096	U	0.48	0.096	ug/m3			10/01/20 20:31	1.5
1,1-Dichloroethane	0.028	U	0.32	0.028	ug/m3			10/01/20 20:31	1.5
1,1-Dichloroethene	0.032	U	0.32	0.032	ug/m3			10/01/20 20:31	1.5
1,2-Dichloropropane	0.046	U	0.37	0.046	ug/m3			10/01/20 20:31	1.5
Ethylbenzene	**0.22**	**J**	0.35	0.056	ug/m3			10/01/20 20:31	1.5
4-Isopropyltoluene	**1.7**		0.44	0.12	ug/m3			10/01/20 20:31	1.5
Methylene Chloride	**2.0**		1.4	1.4	ug/m3			10/01/20 20:31	1.5
Methyl isobutyl ketone	**59**		0.82	0.22	ug/m3			10/01/20 20:31	1.5
m,p-Xylene	**0.71**		0.35	0.13	ug/m3			10/01/20 20:31	1.5
Naphthalene	0.40	U	1.0	0.40	ug/m3			10/01/20 20:31	1.5
Styrene	0.10	U	0.34	0.10	ug/m3			10/01/20 20:31	1.5
Tetrachloroethene	0.047	U	0.54	0.047	ug/m3			10/01/20 20:31	1.5
Toluene	**2.2**		0.45	0.29	ug/m3			10/01/20 20:31	1.5
1,2,4-Trichlorobenzene	0.47	U	3.0	0.47	ug/m3			10/01/20 20:31	1.5
Trichloroethene	0.032	U	0.21	0.032	ug/m3			10/01/20 20:31	1.5
1,2,3-Trichloropropane	0.18	U	1.2	0.18	ug/m3			10/01/20 20:31	1.5
Vinyl chloride	0.066	U	0.10	0.066	ug/m3			10/01/20 20:31	1.5
Xylene, o-	**0.78**		0.35	0.065	ug/m3			10/01/20 20:31	1.5
Xylene (total)	**1.5**		0.69	0.10	ug/m3			10/01/20 20:31	1.5

Default Detection Limits

Client: Geosyntec Consultants, Inc.
Job ID: 140-20512-1
Project/Site: Ashland – Brunswick Tier 1 VI

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	RL	MDL	Units
1,1-Dichloroethane	0.32	0.028	ug/m3
1,1-Dichloroethene	0.32	0.032	ug/m3
1,2,3-Trichloropropane	1.2	0.18	ug/m3
1,2,4-Trichlorobenzene	3.0	0.47	ug/m3
1,2-Dichlorobenzene	0.48	0.19	ug/m3
1,2-Dichloropropane	0.37	0.046	ug/m3
1,4-Dichlorobenzene	0.48	0.096	ug/m3
2-Butanone (MEK)	1.2	0.22	ug/m3
4-Isopropyltoluene	0.44	0.12	ug/m3
Acetone	4.8	1.4	ug/m3
Benzene	0.26	0.026	ug/m3
Carbon disulfide	0.62	0.034	ug/m3
Carbon tetrachloride	0.50	0.044	ug/m3
Chlorobenzene	0.37	0.028	ug/m3
Chloroform	0.39	0.034	ug/m3
Ethylbenzene	0.35	0.056	ug/m3
m,p-Xylene	0.35	0.13	ug/m3
Methyl isobutyl ketone	0.82	0.22	ug/m3
Methylene Chloride	1.4	1.4	ug/m3
Naphthalene	1.0	0.40	ug/m3
Styrene	0.34	0.10	ug/m3
Tetrachloroethene	0.54	0.047	ug/m3
Toluene	0.45	0.29	ug/m3
Trichloroethene	0.21	0.032	ug/m3
Vinyl chloride	0.10	0.066	ug/m3
Xylene (total)	0.69	0.10	ug/m3
Xylene, o-	0.35	0.065	ug/m3

Method: D1946 - Fixed Gases (Helium)

Analyte	RL	RL	Units
Helium	0.10	0.10	% v/v
Hydrogen	0.10	0.10	% v/v

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Lab Sample ID: MB 140-43142/4
Matrix: Air
Analysis Batch: 43142

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1.4	U	4.8	1.4	ug/m3			09/30/20 15:13	1
Benzene	0.026	U	0.26	0.026	ug/m3			09/30/20 15:13	1
2-Butanone (MEK)	0.22	U	1.2	0.22	ug/m3			09/30/20 15:13	1
Carbon disulfide	0.034	U	0.62	0.034	ug/m3			09/30/20 15:13	1
Carbon tetrachloride	0.044	U	0.50	0.044	ug/m3			09/30/20 15:13	1
Chlorobenzene	0.028	U	0.37	0.028	ug/m3			09/30/20 15:13	1
Chloroform	0.034	U	0.39	0.034	ug/m3			09/30/20 15:13	1
1,2-Dichlorobenzene	0.19	U	0.48	0.19	ug/m3			09/30/20 15:13	1
1,4-Dichlorobenzene	0.096	U	0.48	0.096	ug/m3			09/30/20 15:13	1
1,1-Dichloroethane	0.028	U	0.32	0.028	ug/m3			09/30/20 15:13	1
1,1-Dichloroethene	0.032	U	0.32	0.032	ug/m3			09/30/20 15:13	1
1,2-Dichloropropane	0.046	U	0.37	0.046	ug/m3			09/30/20 15:13	1
Ethylbenzene	0.056	U	0.35	0.056	ug/m3			09/30/20 15:13	1
4-Isopropyltoluene	0.12	U	0.44	0.12	ug/m3			09/30/20 15:13	1
Methylene Chloride	1.4	U	1.4	1.4	ug/m3			09/30/20 15:13	1
Methyl isobutyl ketone	0.22	U	0.82	0.22	ug/m3			09/30/20 15:13	1
m,p-Xylene	0.13	U	0.35	0.13	ug/m3			09/30/20 15:13	1
Naphthalene	0.40	U	1.0	0.40	ug/m3			09/30/20 15:13	1
Styrene	0.10	U	0.34	0.10	ug/m3			09/30/20 15:13	1
Tetrachloroethene	0.047	U	0.54	0.047	ug/m3			09/30/20 15:13	1
Toluene	0.29	U	0.45	0.29	ug/m3			09/30/20 15:13	1
1,2,4-Trichlorobenzene	0.47	U	3.0	0.47	ug/m3			09/30/20 15:13	1
Trichloroethene	0.032	U	0.21	0.032	ug/m3			09/30/20 15:13	1
1,2,3-Trichloropropane	0.18	U	1.2	0.18	ug/m3			09/30/20 15:13	1
Vinyl chloride	0.066	U	0.10	0.066	ug/m3			09/30/20 15:13	1
Xylene, o-	0.065	U	0.35	0.065	ug/m3			09/30/20 15:13	1
Xylene (total)	0.10	U	0.69	0.10	ug/m3			09/30/20 15:13	1

Lab Sample ID: LCS 140-43142/1002
Matrix: Air
Analysis Batch: 43142

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	4.75	4.63	J	ug/m3		97	60 - 140
Benzene	6.39	6.46		ug/m3		101	70 - 130
2-Butanone (MEK)	5.90	5.65		ug/m3		96	60 - 140
Carbon disulfide	6.23	6.39		ug/m3		103	70 - 130
Carbon tetrachloride	12.6	13.5		ug/m3		108	70 - 130
Chlorobenzene	9.21	8.26		ug/m3		90	70 - 130
Chloroform	9.77	9.86		ug/m3		101	70 - 130
1,2-Dichlorobenzene	12.0	11.1		ug/m3		92	70 - 130
1,4-Dichlorobenzene	12.0	11.7		ug/m3		98	70 - 130
1,1-Dichloroethane	8.09	8.73		ug/m3		108	70 - 130
1,1-Dichloroethene	7.93	7.67		ug/m3		97	70 - 130
1,2-Dichloropropane	9.24	9.57		ug/m3		104	70 - 130
Ethylbenzene	8.68	7.83		ug/m3		90	70 - 130
4-Isopropyltoluene	11.0	10.2		ug/m3		93	70 - 130
Methylene Chloride	6.95	6.95		ug/m3		100	70 - 130
Methyl isobutyl ketone	8.19	9.45		ug/m3		115	60 - 140

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Lab Sample ID: LCS 140-43142/1002
Matrix: Air
Analysis Batch: 43142

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m,p-Xylene	17.4	15.4		ug/m3		89	70 - 130
Naphthalene	10.5	12.3		ug/m3		118	60 - 140
Styrene	8.52	8.35		ug/m3		98	70 - 130
Tetrachloroethene	13.6	11.0		ug/m3		81	70 - 130
Toluene	7.54	6.58		ug/m3		87	70 - 130
1,2,4-Trichlorobenzene	14.8	14.7		ug/m3		99	60 - 140
Trichloroethene	10.7	10.3		ug/m3		96	70 - 130
1,2,3-Trichloropropane	12.1	11.4		ug/m3		94	60 - 140
Vinyl chloride	5.11	5.88		ug/m3		115	70 - 130
Xylene, o-	8.68	7.54		ug/m3		87	70 - 130

Lab Sample ID: MB 140-43178/4
Matrix: Air
Analysis Batch: 43178

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1.4	U	4.8	1.4	ug/m3			10/01/20 14:49	1
Benzene	0.026	U	0.26	0.026	ug/m3			10/01/20 14:49	1
2-Butanone (MEK)	0.22	U	1.2	0.22	ug/m3			10/01/20 14:49	1
Carbon disulfide	0.034	U	0.62	0.034	ug/m3			10/01/20 14:49	1
Carbon tetrachloride	0.044	U	0.50	0.044	ug/m3			10/01/20 14:49	1
Chlorobenzene	0.028	U	0.37	0.028	ug/m3			10/01/20 14:49	1
Chloroform	0.034	U	0.39	0.034	ug/m3			10/01/20 14:49	1
1,2-Dichlorobenzene	0.19	U	0.48	0.19	ug/m3			10/01/20 14:49	1
1,4-Dichlorobenzene	0.096	U	0.48	0.096	ug/m3			10/01/20 14:49	1
1,1-Dichloroethane	0.028	U	0.32	0.028	ug/m3			10/01/20 14:49	1
1,1-Dichloroethene	0.032	U	0.32	0.032	ug/m3			10/01/20 14:49	1
1,2-Dichloropropane	0.046	U	0.37	0.046	ug/m3			10/01/20 14:49	1
Ethylbenzene	0.056	U	0.35	0.056	ug/m3			10/01/20 14:49	1
4-Isopropyltoluene	0.12	U	0.44	0.12	ug/m3			10/01/20 14:49	1
Methylene Chloride	1.4	U	1.4	1.4	ug/m3			10/01/20 14:49	1
Methyl isobutyl ketone	0.22	U	0.82	0.22	ug/m3			10/01/20 14:49	1
m,p-Xylene	0.13	U	0.35	0.13	ug/m3			10/01/20 14:49	1
Naphthalene	0.40	U	1.0	0.40	ug/m3			10/01/20 14:49	1
Styrene	0.10	U	0.34	0.10	ug/m3			10/01/20 14:49	1
Tetrachloroethene	0.047	U	0.54	0.047	ug/m3			10/01/20 14:49	1
Toluene	0.29	U	0.45	0.29	ug/m3			10/01/20 14:49	1
1,2,4-Trichlorobenzene	0.47	U	3.0	0.47	ug/m3			10/01/20 14:49	1
Trichloroethene	0.032	U	0.21	0.032	ug/m3			10/01/20 14:49	1
1,2,3-Trichloropropane	0.18	U	1.2	0.18	ug/m3			10/01/20 14:49	1
Vinyl chloride	0.066	U	0.10	0.066	ug/m3			10/01/20 14:49	1
Xylene, o-	0.065	U	0.35	0.065	ug/m3			10/01/20 14:49	1
Xylene (total)	0.10	U	0.69	0.10	ug/m3			10/01/20 14:49	1

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Lab Sample ID: LCS 140-43178/1002
Matrix: Air
Analysis Batch: 43178

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	4.75	5.00		ug/m3		105	60 - 140
Benzene	6.39	6.45		ug/m3		101	70 - 130
2-Butanone (MEK)	5.90	6.25		ug/m3		106	60 - 140
Carbon disulfide	6.23	6.78		ug/m3		109	70 - 130
Carbon tetrachloride	12.6	13.8		ug/m3		110	70 - 130
Chlorobenzene	9.21	8.38		ug/m3		91	70 - 130
Chloroform	9.77	10.3		ug/m3		106	70 - 130
1,2-Dichlorobenzene	12.0	11.0		ug/m3		92	70 - 130
1,4-Dichlorobenzene	12.0	11.7		ug/m3		97	70 - 130
1,1-Dichloroethane	8.09	9.15		ug/m3		113	70 - 130
1,1-Dichloroethene	7.93	8.11		ug/m3		102	70 - 130
1,2-Dichloropropane	9.24	9.09		ug/m3		98	70 - 130
Ethylbenzene	8.68	7.95		ug/m3		92	70 - 130
4-Isopropyltoluene	11.0	10.5		ug/m3		95	70 - 130
Methylene Chloride	6.95	7.60		ug/m3		109	70 - 130
Methyl isobutyl ketone	8.19	9.16		ug/m3		112	60 - 140
m,p-Xylene	17.4	16.2		ug/m3		93	70 - 130
Naphthalene	10.5	11.5		ug/m3		110	60 - 140
Styrene	8.52	8.31		ug/m3		98	70 - 130
Tetrachloroethene	13.6	11.6		ug/m3		85	70 - 130
Toluene	7.54	6.61		ug/m3		88	70 - 130
1,2,4-Trichlorobenzene	14.8	14.2		ug/m3		96	60 - 140
Trichloroethene	10.7	9.80		ug/m3		91	70 - 130
1,2,3-Trichloropropane	12.1	11.1		ug/m3		92	60 - 140
Vinyl chloride	5.11	6.09		ug/m3		119	70 - 130
Xylene, o-	8.68	7.65		ug/m3		88	70 - 130

Lab Sample ID: MB 140-43208/3
Matrix: Air
Analysis Batch: 43208

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1.4	U	4.8	1.4	ug/m3			10/02/20 14:38	1
Benzene	0.026	U	0.26	0.026	ug/m3			10/02/20 14:38	1
2-Butanone (MEK)	0.22	U	1.2	0.22	ug/m3			10/02/20 14:38	1
Carbon disulfide	0.034	U	0.62	0.034	ug/m3			10/02/20 14:38	1
Carbon tetrachloride	0.044	U	0.50	0.044	ug/m3			10/02/20 14:38	1
Chlorobenzene	0.028	U	0.37	0.028	ug/m3			10/02/20 14:38	1
Chloroform	0.034	U	0.39	0.034	ug/m3			10/02/20 14:38	1
1,2-Dichlorobenzene	0.19	U	0.48	0.19	ug/m3			10/02/20 14:38	1
1,4-Dichlorobenzene	0.096	U	0.48	0.096	ug/m3			10/02/20 14:38	1
1,1-Dichloroethane	0.028	U	0.32	0.028	ug/m3			10/02/20 14:38	1
1,1-Dichloroethene	0.032	U	0.32	0.032	ug/m3			10/02/20 14:38	1
1,2-Dichloropropane	0.046	U	0.37	0.046	ug/m3			10/02/20 14:38	1
Ethylbenzene	0.056	U	0.35	0.056	ug/m3			10/02/20 14:38	1
4-Isopropyltoluene	0.12	U	0.44	0.12	ug/m3			10/02/20 14:38	1
Methylene Chloride	1.4	U	1.4	1.4	ug/m3			10/02/20 14:38	1

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Lab Sample ID: MB 140-43208/3
Matrix: Air
Analysis Batch: 43208

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methyl isobutyl ketone	0.22	U	0.82	0.22	ug/m3			10/02/20 14:38	1
m,p-Xylene	0.13	U	0.35	0.13	ug/m3			10/02/20 14:38	1
Naphthalene	0.40	U	1.0	0.40	ug/m3			10/02/20 14:38	1
Styrene	0.10	U	0.34	0.10	ug/m3			10/02/20 14:38	1
Tetrachloroethene	0.047	U	0.54	0.047	ug/m3			10/02/20 14:38	1
Toluene	0.29	U	0.45	0.29	ug/m3			10/02/20 14:38	1
1,2,4-Trichlorobenzene	0.47	U	3.0	0.47	ug/m3			10/02/20 14:38	1
Trichloroethene	0.032	U	0.21	0.032	ug/m3			10/02/20 14:38	1
1,2,3-Trichloropropane	0.18	U	1.2	0.18	ug/m3			10/02/20 14:38	1
Vinyl chloride	0.066	U	0.10	0.066	ug/m3			10/02/20 14:38	1
Xylene, o-	0.065	U	0.35	0.065	ug/m3			10/02/20 14:38	1
Xylene (total)	0.10	U	0.69	0.10	ug/m3			10/02/20 14:38	1

Lab Sample ID: LCS 140-43208/1002
Matrix: Air
Analysis Batch: 43208

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	3.80	4.36	J	ug/m3		115	60 - 140
Benzene	5.11	5.67		ug/m3		111	70 - 130
2-Butanone (MEK)	4.72	4.89		ug/m3		104	60 - 140
Carbon disulfide	4.98	5.67		ug/m3		114	70 - 130
Carbon tetrachloride	10.1	12.4		ug/m3		123	70 - 130
Chlorobenzene	7.37	8.37		ug/m3		114	70 - 130
Chloroform	7.81	8.41		ug/m3		108	70 - 130
1,2-Dichlorobenzene	9.62	11.8		ug/m3		123	70 - 130
1,4-Dichlorobenzene	9.62	11.6		ug/m3		121	70 - 130
1,1-Dichloroethane	6.48	6.99		ug/m3		108	70 - 130
1,1-Dichloroethene	6.34	6.91		ug/m3		109	70 - 130
1,2-Dichloropropane	7.39	7.63		ug/m3		103	70 - 130
Ethylbenzene	6.95	8.25		ug/m3		119	70 - 130
4-Isopropyltoluene	8.78	11.0		ug/m3		126	70 - 130
Methylene Chloride	5.56	6.01		ug/m3		108	70 - 130
Methyl isobutyl ketone	6.55	6.92		ug/m3		106	60 - 140
m,p-Xylene	13.9	17.8		ug/m3		128	70 - 130
Naphthalene	8.39	10.7		ug/m3		128	60 - 140
Styrene	6.82	8.89		ug/m3		130	70 - 130
Tetrachloroethene	10.9	11.5		ug/m3		106	70 - 130
Toluene	6.03	6.90		ug/m3		115	70 - 130
1,2,4-Trichlorobenzene	11.9	14.8		ug/m3		125	60 - 140
Trichloroethene	8.60	9.21		ug/m3		107	70 - 130
1,2,3-Trichloropropane	9.65	10.9		ug/m3		113	60 - 140
Vinyl chloride	4.09	5.71	*	ug/m3		140	70 - 130
Xylene, o-	6.95	8.50		ug/m3		122	70 - 130

Method: D1946 - Fixed Gases (Helium)

Lab Sample ID: MB 140-43217/2
Matrix: Air
Analysis Batch: 43217

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

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Helium	0.10	U	0.10	0.10	% v/v			10/01/20 11:22	1
Hydrogen	0.10	U	0.10	0.10	% v/v			10/01/20 11:22	1

Lab Sample ID: LCS 140-43217/1001
Matrix: Air
Analysis Batch: 43217

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Helium	4.90	4.89		% v/v		100	75 - 125
Hydrogen	4.90	4.90		% v/v		100	75 - 125

QC Association Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Air - GC/MS VOA

Analysis Batch: 43142

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-20512-1	SSSG-01	Total/NA	Air	TO 15 LL	
140-20512-2	SSSG-02	Total/NA	Air	TO 15 LL	
140-20512-3	SSSG-03	Total/NA	Air	TO 15 LL	
140-20512-4	SSSG-04	Total/NA	Air	TO 15 LL	
MB 140-43142/4	Method Blank	Total/NA	Air	TO 15 LL	
LCS 140-43142/1002	Lab Control Sample	Total/NA	Air	TO 15 LL	

Analysis Batch: 43178

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-20512-5	SSSG-08	Total/NA	Air	TO 15 LL	
140-20512-6	SSSG-07	Total/NA	Air	TO 15 LL	
140-20512-7	DUP-02	Total/NA	Air	TO 15 LL	
140-20512-8	SSSG-06	Total/NA	Air	TO 15 LL	
140-20512-10	CS-01	Total/NA	Air	TO 15 LL	
140-20512-11	DUP-01	Total/NA	Air	TO 15 LL	
140-20512-12	OA-01	Total/NA	Air	TO 15 LL	
MB 140-43178/4	Method Blank	Total/NA	Air	TO 15 LL	
LCS 140-43178/1002	Lab Control Sample	Total/NA	Air	TO 15 LL	

Analysis Batch: 43208

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-20512-9	SSSG-05	Total/NA	Air	TO 15 LL	
MB 140-43208/3	Method Blank	Total/NA	Air	TO 15 LL	
LCS 140-43208/1002	Lab Control Sample	Total/NA	Air	TO 15 LL	

Air - GC VOA

Analysis Batch: 43217

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-20512-3	SSSG-03	Total/NA	Air	D1946	
140-20512-6	SSSG-07	Total/NA	Air	D1946	
140-20512-7	DUP-02	Total/NA	Air	D1946	
140-20512-9	SSSG-05	Total/NA	Air	D1946	
MB 140-43217/2	Method Blank	Total/NA	Air	D1946	
LCS 140-43217/1001	Lab Control Sample	Total/NA	Air	D1946	

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Client Sample ID: SSSG-01
Date Collected: 09/23/20 10:50
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-1
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	50 mL	500 mL	43142	09/30/20 16:14	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: SSSG-02
Date Collected: 09/23/20 09:40
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-2
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	50 mL	500 mL	43142	09/30/20 17:16	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: SSSG-03
Date Collected: 09/23/20 16:40
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-3
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1873	20 mL	500 mL	43142	09/30/20 18:18	S1K	TAL KNX
	Instrument ID: MR									
Total/NA	Analysis	D1946		1.31	500 uL	500 uL	43217	10/01/20 11:59	BKK	TAL KNX
	Instrument ID: GR									

Client Sample ID: SSSG-04
Date Collected: 09/23/20 13:40
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-4
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	50 mL	500 mL	43142	09/30/20 19:20	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: SSSG-08
Date Collected: 09/24/20 18:10
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-5
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		3.45	10 mL	500 mL	43178	10/01/20 23:57	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: SSSG-07
Date Collected: 09/24/20 16:25
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-6
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		663.36	50 mL	500 mL	43178	10/02/20 10:09	S1K	TAL KNX
	Instrument ID: MR									
Total/NA	Analysis	D1946		1.11	500 uL	500 uL	43217	10/01/20 12:17	BKK	TAL KNX
	Instrument ID: GR									

Client Sample ID: DUP-02
Date Collected: 09/24/20 00:05
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-7
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		746.02	50 mL	500 mL	43178	10/02/20 10:57	S1K	TAL KNX
	Instrument ID: MR									
Total/NA	Analysis	D1946		1.19	500 uL	500 uL	43217	10/01/20 12:34	BKK	TAL KNX
	Instrument ID: GR									

Client Sample ID: SSSG-06
Date Collected: 09/24/20 14:40
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-8
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	10 mL	500 mL	43178	10/02/20 03:57	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: SSSG-05
Date Collected: 09/24/20 13:20
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-9
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		280.46	30 mL	500 mL	43208	10/03/20 00:20	S1K	TAL KNX
	Instrument ID: MH									
Total/NA	Analysis	D1946		1.17	500 uL	500 uL	43217	10/01/20 12:51	BKK	TAL KNX
	Instrument ID: GR									

Client Sample ID: CS-01
Date Collected: 09/24/20 17:06
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-10
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	500 mL	500 mL	43178	10/01/20 21:23	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: DUP-01
Date Collected: 09/24/20 17:06
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-11
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		2.15	800 mL	500 mL	43178	10/01/20 22:18	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: OA-01
Date Collected: 09/24/20 17:20
Date Received: 09/29/20 12:00

Lab Sample ID: 140-20512-12
Matrix: Air

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1.5	750 mL	500 mL	43178	10/01/20 20:31	S1K	TAL KNX
	Instrument ID: MR									

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Client Sample ID: Method Blank
Lab Sample ID: MB 140-43142/4
Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	500 mL	500 mL	43142	09/30/20 15:13	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-43178/4
Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	500 mL	500 mL	43178	10/01/20 14:49	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-43208/3
Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	500 mL	500 mL	43208	10/02/20 14:38	S1K	TAL KNX
	Instrument ID: MH									

Client Sample ID: Method Blank
Lab Sample ID: MB 140-43217/2
Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D1946		1	500 uL	500 uL	43217	10/01/20 11:22	BKK	TAL KNX
	Instrument ID: GR									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-43142/1002
Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	500 mL	500 mL	43142	09/30/20 11:23	S1K	TAL KNX
	Instrument ID: MR									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-43178/1002
Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	500 mL	500 mL	43178	10/01/20 12:06	S1K	TAL KNX
	Instrument ID: MR									

Lab Chronicle

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job ID: 140-20512-1

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-43208/1002

Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	500 mL	500 mL	43208	10/02/20 12:30	S1K	TAL KNX
	Instrument ID: MH									

Client Sample ID: Lab Control Sample
Lab Sample ID: LCS 140-43217/1001

Date Collected: N/A
Matrix: Air
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D1946		1	500 uL	500 uL	43217	10/01/20 11:02	BKK	TAL KNX
	Instrument ID: GR									

Laboratory References:

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

Accreditation/Certification Summary

Client: Geosyntec Consultants, Inc. Job ID: 140-20512-1
Project/Site: Ashland – Brunswick Tier 1 VI

Laboratory: Eurofins TestAmerica, Knoxville

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

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-22
ANAB	Dept. of Energy	L2311.01	02-13-22
ANAB	ISO/IEC 17025	L2311	02-13-22
ANAB	ISO/IEC 17025	L2311	02-14-22
Arkansas DEQ	State	88-0688	06-17-21
California	State	2423	06-30-21
Colorado	State	TN00009	02-28-21
Connecticut	State	PH-0223	09-30-21
Florida	NELAP	E87177	07-01-21
Georgia (DW)	State	906	12-11-22
Hawaii	State	NA	12-11-21
Kansas	NELAP	E-10349	11-01-20
Kentucky (DW)	State	90101	01-01-21
Louisiana	NELAP	LA110001	12-31-12 *
Louisiana	NELAP	83979	06-30-21
Louisiana (DW)	State	LA019	12-31-20
Maryland	State	277	03-31-21
Michigan	State	9933	12-11-22
Nevada	State	TN00009	07-31-21
New Hampshire	NELAP	299919	01-17-21
New Jersey	NELAP	TN001	07-01-21
New York	NELAP	10781	03-31-21
North Carolina (DW)	State	21705	07-31-21
North Carolina (WW/SW)	State	64	12-31-20
Ohio VAP	State	CL0059	06-02-23
Oklahoma	State	9415	08-31-21
Oregon	NELAP	TNI0189	01-02-21
Pennsylvania	NELAP	68-00576	12-31-20
Tennessee	State	02014	12-11-22
Texas	NELAP	T104704380-18-12	08-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-21
Virginia	NELAP	460176	09-14-21
Washington	State	C593	01-19-21
West Virginia (DW)	State	9955C	01-01-21
West Virginia DEP	State	345	05-01-21
Wisconsin	State	998044300	08-31-21

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike
Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

Canister Samples Chain of Custody Record

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

140-20512 Chain of Custody

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact Information	Client Project Manager: Adria Remer	Samples Collected By: Rich Murray	COC No:
Company Name: ~~Ashland~~ Geosyntec	Phone: 678-202-9500		1 of 2 COCs
Address: 1255 Roberts Blvd. Ste 200	Email:		TALS Project #:
City/State/Zip Kennesaw, GA, 30144			For Lab Use Only:
Phone: 678-202-9500	Site Contact:		Walk-in Client:
FAX:	Tel/Fax		Lab Sampling:
Project Name: Ashland Brunswick Tier 1 VI	Analysis Turnaround Time		Job / SDG No.:
Site/Location: Brunswick, GA	Standard (Specific):		(See below for Add'l Items)
P O #	Rush (Specify):		

Sample Identification	Sample Start Date	Time Start	Sample End Date	Time Stop	Canister Vacuum in Field, "Hg (Start)	Canister Vacuum in Field, "Hg (Stop)	Flow Controller ID	Canister ID	TO-14/15 (Standard / Low Level)	TO-15 SIM	EPA 3C	EPA 25C	ASTM D-1946	EPA 15/16	Other (Please specify in notes section)	Sample Type	Indoor Air/Ambient Air	Sub-Slab	Soil Gas	Soil Vapor Extraction (SVE)	Landfill Gas	Other (Please specify in notes section)	Sample Specific Notes:
SSSG-01	9/23/20	1045	9/23/20	1050	29.85	2.0	10678	11891	X									X					PID=0.7
SSSG-02	9/23/20	0935	9/23/20	0940	29.88	2.0	09571	09663	X									X					PID=1.2
SSSG-03	9/23/20	1635	9/23/20	1646	29.78	2.0	10916	11824	X						X			X					Helium and TO-15 LL
SSSG-04	9/23/20	1335	9/23/20	1346	29.63	3.0	~~10~~ 7286	10972	X									X					PID=0.2
SSSG-08	9/24/20	1805	9/24/20	1810	29.58	2.0	11095	34001621	X						X			X					~~Helium~~ -TO-15 (~~PID=26.5~~)
SSSG-07	9/24/20	1620	9/24/20	1625	29.20	2.0	10903	34000656	X						X			X					Helium +TO-15 (PID=26.5)
DUP-02	9/24/20	0000	9/24/20	0005	29.35	2.0	10909	34002424	X						X			X					Helium +TO-15 (PID=26.5)
SSSG-06	9/24/20	1435	9/24/20	1440	29.04	2.0	~~10690~~	11807	X									2					Flow Controller #: 10693
~~SSSG-05~~	~~9/24/20~~	~~1315~~	~~9/24/20~~	~~1320~~	~~29.13~~	~~2.0~~	~~34002434~~																Flow
SSSG-05	9/24/20	1315	9/24/20	1320	29.13	2.0	10889	34002434	X						X			X					Helium +TO-15 (PID=26.9)

Temperature (Fahrenheit)			
Start	Interior	Ambient	
Stop			

Pressure (inches of Hg)			
Start	Interior	Ambient	
Stop			

Received @ ambient, 2 boxes, FedEx G trk# 9028 0926 1850, Custody seal intact
1840
KL 9/29/20

Special Instructions/QC Requirements & Comments: TO-15 Low Level select analyte list; SSSG-03 PID = 172.4; SSSG-08 PID = 9.1

Samples Shipped by:	Date / Time:	Samples Received by: ETA 9/29/20 1200	10 KR, 3 flows
Samples Relinquished by:	Date / Time:	Received by:	13 cans, 2T
Relinquished by:	Date / Time:	Received by:	

Lab Use Only: Shipper Name: Opened by: Condition:

Form No. CA-C-WI-003, Rev. 2.23, dated 5/4/2020

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike

Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

Canister Samples Chain of Custody Record

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

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TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact Information	**Client Project Manager:** Adria Reimer	**Samples Collected By:** Rich Murray	COC No: 2 of 2 COCs
Company Name: Geosyntec	Phone:		TALS Project #:
Address: 1255 Roberts Blvd,	Email:		For Lab Use Only:
City/State/Zip Kennesaw, GA 30144			Walk-in Client:
Phone: 678-202-9500	Site Contact:		Lab Sampling:
FAX:	Tel/Fax		
Project Name:	**Analysis Turnaround Time**		Job / SDG No.:
Site/Location:	Standard (Specific):		(See below for Add'l Items)
P O #	Rush (Specifiy):		

Sample Identification	Sample Start Date	Time Start	Sample End Date	Time Stop	Canister Vacuum in Field, "Hg (Start)	Canister Vacuum in Field, "Hg (Stop)	Flow Controller ID	Canister ID	TO-14/15 (Standard / Low Level)	TO-15 SIM	EPA 3C	EPA 25C	ASTM D-1946	EPA 15/16	Other (Please specify in notes section)	Sample Type	Indoor Air/Ambient Air	Sub-Slab	Soil Gas	Soil Vapor Extraction (SVE)	Landfill Gas	Other (Please specify in notes section)	Sample Specific Notes:
CS-01	9/24/20	0906	9/24/20	1706	30.13	~~30.13~~ 5.0	11525	34000874	X								X						Vacuum Stop = 5" Hg
DUP-01	9/24/20	0906	9/24/20	1706	30.12	~~30.12~~ 16.0	0008	8149	X								X						Vacuum Stop = 16" Hg
OA-01	9/24/20	0926	9/24/20	1720	30.14	~~30.14~~ 4.0	7252	11563	X								X						Vacuum Stop = 4" Hg

Temperature (Fahrenheit)			
Start	Interior	Ambient	
Stop			

Pressure (inches of Hg)			
Start	Interior	Ambient	
Stop			

Special Instructions/QC Requirements & Comments:

TO-15 Select Analyte List

Samples Shipped by:	**Date / Time:**	**Samples Received by:** ETA 9/29/20 1200
Samples Relinquished by:	**Date / Time:**	**Received by:**
Relinquished by:	**Date / Time:**	**Received by:**

Lab Use Only: **Shipper Name:** **Opened by:** **Condition:**

EUROFINS/TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST **Log In Number:** Loc: 140 **20512**

Review Items	Yes	No	NA	If No, what was the problem?
1. Are the shipping containers intact?	✓			☐ **Containers, Broken**
2. Were ambient air containers received intact?			✓	☑ Checked in lab
3. The coolers/containers custody seal if present, is it intact?	✓			☐ Yes ☐ NA
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID :_____ Correction factor: _____			✓	☐ **Cooler Out of Temp, Client Contacted, Proceed/Cancel** ☐ **Cooler Out of Temp, Same Day Receipt**
5. Were all of the sample containers received intact?	✓			☐ **Containers, Broken**
6. Were samples received in appropriate containers?	✓			☐ **Containers, Improper; Client Contacted; Proceed/Cancel**
7. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ **COC & Samples Do Not Match** ☐ **COC Incorrect/Incomplete** ☐ **COC Not Received**
8. Were all of the samples listed on the COC received?	✓			☐ **Sample Received, Not on COC** ☐ **Sample on COC, Not Received**
9. Is the date/time of sample collection noted?	✓			☐ **COC; No Date/Time; Client Contacted**
10. Was the sampler identified on the COC?	✓			☐ **Sampler Not Listed on COC**
11. Is the client and project name/# identified?	✓			☐ **COC Incorrect/Incomplete**
12. Are tests/parameters listed for each sample?	✓			☐ **COC No tests on COC**
13. Is the matrix of the samples noted?	✓			☐ **COC Incorrect/Incomplete**
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **COC Incorrect/Incomplete**
15. Were samples received within holding time?	✓			☐ **Holding Time - Receipt**
16. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ **pH Adjusted, pH Included (See box 16A)** ☐ **Incorrect Preservative**
17. Were VOA samples received without headspace?			✓	☐ **Headspace (VOA only)**
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number:_____			✓	☐ **Residual Chlorine**
19. For 1613B water samples is pH<9?			✓	☐ If no, notify lab to adjust
20. For rad samples was sample activity info. Provided?			✓	☐ Project missing info

Comments/Actions Taken

Labeling Verified by: **Date:**

pH test strip lot number:

	Box 16A: pH Preservation	Box 18A: Residual Chlorine
Preservative:		
Lot Number:		
Exp Date:		
Analyst:		
Date:		
Time:		

Project #: 68022943 PM Instructions: _____

Sample Receiving Associate: _____ Date: 9/29/20

QA026R32.doc, 062719

TestAmerica Knoxville - Air Canister Initial Pressure Check

Gauge ID: G5
Date: 9/30/2020

Analyst	Sample ID	Asset #	Cleaning Job	Cert	Size (L)	Pressure @ Receipt (-in Hg or +psig)	Time	Comments
BRS	140-20512-a-1	11891	20316	B	1	-2.4	9:57	
BRS	140-20512-a-2	09663	20316	B	1	-1.5	9:58	
BRS	140-20512-a-3	11824	20316	B	1	-1.2	9:59	
BRS	140-20512-a-4	10972	20316	B	1	-1.5	10:00	
BRS	140-20512-a-5	34001621	20316	B	1	-2.5	10:01	
BRS	140-20512-a-6	34000656	20316	B	1	-1.2	10:02	
BRS	140-20512-a-7	34002424	20316	B	1	-3.0	10:03	
BRS	140-20512-a-8	11807	20316	B	1	-1.4	10:04	
BRS	140-20512-a-9	34002434	20316	B	1	-2.4	10:05	
BRS	140-20512-a-10	34000874	20007	IND	6	-5.0	10:06	
BRS	140-20512-a-11	8149	19581	IND	6	-16.0	10:07	0
BRS	140-20512-a-12	11563	20007	IND	6	-4.8	10:08	

□ Receiving –Air Can –Calve Open (NCM #_____)
□ Air - Can P -24 to -25 " - Flow Contr. Works (NCM#_____)
□ Air - Can P -24 to -25 " - Flow Contr. Faulty (NCM#_____)
□ Air - Can P Out -26" - Flow Contr. Works (NCM#_____)
□ Air - Can P Out -26" - Flow Contr. Faulty (NCM#_____)
□ Air - Can P Low -24 to -25 " - Grab Sample (NCM#_____)
□ Air - Can P Low -26 "- Grab Sample (NCM#_____)

Summa Canister Dilution Worksheet

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland – Brunswick Tier 1 VI

Job No.: 140-20512-1

Lab Sample ID	Canister Volume (L)	Preadjusted Pressure ("Hg)	Preadjusted Pressure (atm)	Preadjusted Volume (L)	Adjusted Pressure (psig)	Adjusted Pressure (atm)	Adjusted Volume (L)	Initial Volume (mL)	Dilution Factor	Final Dilution Factor	Pressure Gauge ID	Date	Analyst Initals
140-20512-3	1	-1.2	0.96	0.96	3.8	1.26	1.26		1.31	1.31	G5	09/30/20 13:29	AFB
140-20512-3	6	0	1.00	6.00	2.8	1.19	7.14	5	1428.57	1873.00	G5	09/30/20 13:32	AFB
140-20512-5	1	-3.9	0.87	0.87	29.4	3.00	3.00		3.45	3.45	g5	10/01/20 7:59	BRS
140-20512-6	1	-1.2	0.96	0.96	0.9	1.06	1.06		1.11	1.11	G5	10/01/20 8:10	BRS
140-20512-6	6	0	1.00	6.00	0.0	1.00	6.00	10	600.00	663.36	G5 8219	10/01/20 8:21	BRS
140-20512-7	1	-3.0	0.90	0.90	1.1	1.07	1.07		1.19	1.19	G5	10/01/20 8:12	BRS
140-20512-7	6	0	1.00	6.00	0.6	1.04	6.24	10	624.49	746.02	G5 09824	10/01/20 8:26	BRS
140-20512-9	1	-2.4	0.92	0.92	1.1	1.07	1.07		1.17	1.17	G5	10/01/20 8:13	BRS
140-20512-9	6	0	1.00	6.00	0.0	1.00	6.00	25	240.00	280.46	G5 10276	10/01/20 8:32	BRS
140-20512-11	6	-16.0	0.47	2.79	0.0	1.00	6.00		2.15	2.15	G5	09/30/20 10:36	BRS
140-20512-12	6	-8.4	0.72	4.32	1.2	1.08	6.49		1.50	1.50	G5	10/01/20 8:01	BRS

Formulae:

Preadjusted Volume (L) = (Preadjusted Pressure ("Hg) + 29.92 "Hg * Vol L) / 29.92 "Hg
Adjusted Volume (L) = (Adjusted Pressure (psig) + 14.7 psig * Vol L) / 14.7 psig
Dilution Factor = Adjusted Volume (L) / Preadjusted Volume (L)

Where:

29.92 "Hg = Standard atmospheric pressure in inches of Mercury (“Hg)
14.7 psig = Standard atmospheric pressure in pounds per square inch gauge (psig)

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ANALYTICAL REPORT

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

Laboratory Job ID: 140-22202-1
Client Project/Site: Ashland - Brunswick Treatability Study

For:
Geosyntec Consultants, Inc.
1255 Roberts Blvd, NW
Suite 200
Kennesaw, Georgia 30144

Attn: Laura Kinsman

Authorized for release by:
3/15/2021 8:15:26 AM

Eddie Barnett, Project Manager I
(912)250-0280
Eddie.Barnett@Eurofinset.com

Table of Contents

Definitions/Glossary

Client: Geosyntec Consultants, Inc. Job ID: 140-22202-1
Project/Site: Ashland - Brunswick Treatability Study

Qualifiers

Air - GC/MS VOA

Qualifier	Qualifier Description
*+	LCS and/or LCSD is outside acceptance limits, high biased.
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 140-22202-1

Laboratory: Eurofins TestAmerica, Knoxville

Narrative

Job Narrative
140-22202-1

Comments
No additional comments.

Receipt
The samples were received on 3/8/2021 11:00 AM.

Air - GC/MS VOA
The laboratory control sample (LCS) for analytical batch 140-47515 recovered outside control limits for the following analytes: Naphthalene and Vinyl chloride. These analytes were biased high in the LCS and were not detected above the reporting limit (RL) in the associated samples; therefore, the data have been reported

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

Sample Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Treatability Study

Job ID: 140-22202-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
140-22202-1	SSSG-02-03032021	Air	03/03/21 11:03	03/08/21 11:00	Air Canister (1-Liter) #34002455
140-22202-2	SSSG-01-03032021	Air	03/03/21 11:44	03/08/21 11:00	Air Canister (1-Liter) #11860
140-22202-3	SSSG-08-03032021	Air	03/03/21 12:42	03/08/21 11:00	Air Canister (1-Liter) #11135
140-22202-4	DUP-01	Air	03/03/21 00:00	03/08/21 11:00	Air Canister (1-Liter) #11831

Method Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Treatability Study

Job ID: 140-22202-1

Method	Method Description	Protocol	Laboratory
TO 15 LL	Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)	EPA	TAL KNX

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

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

Detection Summary

Client: Geosyntec Consultants, Inc.
Project/Site: Ashland - Brunswick Treatability Study

Job ID: 140-22202-1

Client Sample ID: SSSG-02-03032021 — Lab Sample ID: 140-22202-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	78	J	120	34	ug/m3	1		TO 15 LL	Total/NA
2-Butanone (MEK)	16	J	29	5.4	ug/m3	1		TO 15 LL	Total/NA
Carbon disulfide	2.0	J	16	0.86	ug/m3	1		TO 15 LL	Total/NA
Carbon tetrachloride	2.2	J	13	1.1	ug/m3	1		TO 15 LL	Total/NA
Chlorobenzene	0.91	J B	9.2	0.69	ug/m3	1		TO 15 LL	Total/NA
Chloroform	2.0	J	9.8	0.85	ug/m3	1		TO 15 LL	Total/NA
Ethylbenzene	2.6	J	8.7	1.4	ug/m3	1		TO 15 LL	Total/NA
4-Isopropyltoluene	260		11	3.0	ug/m3	1		TO 15 LL	Total/NA
Tetrachloroethene	230		14	1.2	ug/m3	1		TO 15 LL	Total/NA
Toluene	9.3	J	11	7.3	ug/m3	1		TO 15 LL	Total/NA

Client Sample ID: SSSG-01-03032021 — Lab Sample ID: 140-22202-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	1.2	J	6.4	0.64	ug/m3	1		TO 15 LL	Total/NA
Carbon disulfide	3.6	J	16	0.86	ug/m3	1		TO 15 LL	Total/NA
Chloroform	1.3	J	9.8	0.85	ug/m3	1		TO 15 LL	Total/NA
Tetrachloroethene	20		14	1.2	ug/m3	1		TO 15 LL	Total/NA
Toluene	31		11	7.3	ug/m3	1		TO 15 LL	Total/NA

Client Sample ID: SSSG-08-03032021 — Lab Sample ID: 140-22202-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	50	J	120	34	ug/m3	1		TO 15 LL	Total/NA
Benzene	3.6	J	6.4	0.64	ug/m3	1		TO 15 LL	Total/NA
Chlorobenzene	0.76	J B	9.2	0.69	ug/m3	1		TO 15 LL	Total/NA
Chloroform	8.2	J	9.8	0.85	ug/m3	1		TO 15 LL	Total/NA
Styrene	18		8.5	2.6	ug/m3	1		TO 15 LL	Total/NA
Tetrachloroethene	1.6	J	14	1.2	ug/m3	1		TO 15 LL	Total/NA
Toluene	16		11	7.3	ug/m3	1		TO 15 LL	Total/NA

Client Sample ID: DUP-01 — Lab Sample ID: 140-22202-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Acetone	55	J	120	34	ug/m3	1		TO 15 LL	Total/NA
Benzene	3.4	J	6.4	0.64	ug/m3	1		TO 15 LL	Total/NA
Chloroform	8.4	J	9.8	0.85	ug/m3	1		TO 15 LL	Total/NA
Styrene	18		8.5	2.6	ug/m3	1		TO 15 LL	Total/NA
Tetrachloroethene	2.2	J	14	1.2	ug/m3	1		TO 15 LL	Total/NA
Toluene	15		11	7.3	ug/m3	1		TO 15 LL	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: SSSG-02-03032021 Lab Sample ID: 140-22202-1

Date Collected: 03/03/21 11:03 **Matrix: Air**
Date Received: 03/08/21 11:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**78**	**J**	120	34	ug/m3			03/09/21 23:25	1
Benzene	0.64	U	6.4	0.64	ug/m3			03/09/21 23:25	1
2-Butanone (MEK)	**16**	**J**	29	5.4	ug/m3			03/09/21 23:25	1
Carbon disulfide	**2.0**	**J**	16	0.86	ug/m3			03/09/21 23:25	1
Carbon tetrachloride	**2.2**	**J**	13	1.1	ug/m3			03/09/21 23:25	1
Chlorobenzene	**0.91**	**J B**	9.2	0.69	ug/m3			03/09/21 23:25	1
Chloroform	**2.0**	**J**	9.8	0.85	ug/m3			03/09/21 23:25	1
1,2-Dichlorobenzene	4.7	U	12	4.7	ug/m3			03/09/21 23:25	1
1,4-Dichlorobenzene	2.4	U	12	2.4	ug/m3			03/09/21 23:25	1
1,1-Dichloroethane	0.71	U	8.1	0.71	ug/m3			03/09/21 23:25	1
1,1-Dichloroethene	0.79	U	7.9	0.79	ug/m3			03/09/21 23:25	1
1,2-Dichloropropane	1.2	U	9.2	1.2	ug/m3			03/09/21 23:25	1
Ethylbenzene	**2.6**	**J**	8.7	1.4	ug/m3			03/09/21 23:25	1
4-Isopropyltoluene	**260**		11	3.0	ug/m3			03/09/21 23:25	1
Methylene Chloride	34	U	35	34	ug/m3			03/09/21 23:25	1
Methyl isobutyl ketone	5.5	U	20	5.5	ug/m3			03/09/21 23:25	1
m,p-Xylene	3.1	U	8.7	3.1	ug/m3			03/09/21 23:25	1
Naphthalene	10	U *+	26	10	ug/m3			03/09/21 23:25	1
Styrene	2.6	U	8.5	2.6	ug/m3			03/09/21 23:25	1
Tetrachloroethene	**230**		14	1.2	ug/m3			03/09/21 23:25	1
Toluene	**9.3**	**J**	11	7.3	ug/m3			03/09/21 23:25	1
1,2,4-Trichlorobenzene	12	U	74	12	ug/m3			03/09/21 23:25	1
Trichloroethene	1.7	U	5.4	1.7	ug/m3			03/09/21 23:25	1
1,2,3-Trichloropropane	4.5	U	30	4.5	ug/m3			03/09/21 23:25	1
Vinyl chloride	1.7	U *+	2.6	1.7	ug/m3			03/09/21 23:25	1
Xylene, o-	1.6	U	8.7	1.6	ug/m3			03/09/21 23:25	1
Xylene (total)	2.6	U	17	2.6	ug/m3			03/09/21 23:25	1

Client Sample ID: SSSG-01-03032021 Lab Sample ID: 140-22202-2

Date Collected: 03/03/21 11:44 **Matrix: Air**
Date Received: 03/08/21 11:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	34	U	120	34	ug/m3			03/10/21 00:07	1
Benzene	**1.2**	**J**	6.4	0.64	ug/m3			03/10/21 00:07	1
2-Butanone (MEK)	5.4	U	29	5.4	ug/m3			03/10/21 00:07	1
Carbon disulfide	**3.6**	**J**	16	0.86	ug/m3			03/10/21 00:07	1
Carbon tetrachloride	1.1	U	13	1.1	ug/m3			03/10/21 00:07	1
Chlorobenzene	0.69	U	9.2	0.69	ug/m3			03/10/21 00:07	1
Chloroform	**1.3**	**J**	9.8	0.85	ug/m3			03/10/21 00:07	1
1,2-Dichlorobenzene	4.7	U	12	4.7	ug/m3			03/10/21 00:07	1
1,4-Dichlorobenzene	2.4	U	12	2.4	ug/m3			03/10/21 00:07	1
1,1-Dichloroethane	0.71	U	8.1	0.71	ug/m3			03/10/21 00:07	1
1,1-Dichloroethene	0.79	U	7.9	0.79	ug/m3			03/10/21 00:07	1
1,2-Dichloropropane	1.2	U	9.2	1.2	ug/m3			03/10/21 00:07	1
Ethylbenzene	1.4	U	8.7	1.4	ug/m3			03/10/21 00:07	1
4-Isopropyltoluene	3.0	U	11	3.0	ug/m3			03/10/21 00:07	1

Client Sample ID: SSSG-01-03032021 Lab Sample ID: 140-22202-2

Date Collected: 03/03/21 11:44 **Matrix: Air**
Date Received: 03/08/21 11:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Methylene Chloride	34	U	35	34	ug/m3			03/10/21 00:07	1
Methyl isobutyl ketone	5.5	U	20	5.5	ug/m3			03/10/21 00:07	1
m,p-Xylene	3.1	U	8.7	3.1	ug/m3			03/10/21 00:07	1
Naphthalene	10	U *+	26	10	ug/m3			03/10/21 00:07	1
Styrene	2.6	U	8.5	2.6	ug/m3			03/10/21 00:07	1
Tetrachloroethene	**20**		14	1.2	ug/m3			03/10/21 00:07	1
Toluene	**31**		11	7.3	ug/m3			03/10/21 00:07	1
1,2,4-Trichlorobenzene	12	U	74	12	ug/m3			03/10/21 00:07	1
Trichloroethene	1.7	U	5.4	1.7	ug/m3			03/10/21 00:07	1
1,2,3-Trichloropropane	4.5	U	30	4.5	ug/m3			03/10/21 00:07	1
Vinyl chloride	1.7	U *+	2.6	1.7	ug/m3			03/10/21 00:07	1
Xylene, o-	1.6	U	8.7	1.6	ug/m3			03/10/21 00:07	1
Xylene (total)	2.6	U	17	2.6	ug/m3			03/10/21 00:07	1

Client Sample ID: SSSG-08-03032021 Lab Sample ID: 140-22202-3

Date Collected: 03/03/21 12:42 **Matrix: Air**
Date Received: 03/08/21 11:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**50**	**J**	120	34	ug/m3			03/10/21 00:49	1
Benzene	**3.6**	**J**	6.4	0.64	ug/m3			03/10/21 00:49	1
2-Butanone (MEK)	5.4	U	29	5.4	ug/m3			03/10/21 00:49	1
Carbon disulfide	0.86	U	16	0.86	ug/m3			03/10/21 00:49	1
Carbon tetrachloride	1.1	U	13	1.1	ug/m3			03/10/21 00:49	1
Chlorobenzene	**0.76**	**J B**	9.2	0.69	ug/m3			03/10/21 00:49	1
Chloroform	**8.2**	**J**	9.8	0.85	ug/m3			03/10/21 00:49	1
1,2-Dichlorobenzene	4.7	U	12	4.7	ug/m3			03/10/21 00:49	1
1,4-Dichlorobenzene	2.4	U	12	2.4	ug/m3			03/10/21 00:49	1
1,1-Dichloroethane	0.71	U	8.1	0.71	ug/m3			03/10/21 00:49	1
1,1-Dichloroethene	0.79	U	7.9	0.79	ug/m3			03/10/21 00:49	1
1,2-Dichloropropane	1.2	U	9.2	1.2	ug/m3			03/10/21 00:49	1
Ethylbenzene	1.4	U	8.7	1.4	ug/m3			03/10/21 00:49	1
4-Isopropyltoluene	3.0	U	11	3.0	ug/m3			03/10/21 00:49	1
Methylene Chloride	34	U	35	34	ug/m3			03/10/21 00:49	1
Methyl isobutyl ketone	5.5	U	20	5.5	ug/m3			03/10/21 00:49	1
m,p-Xylene	3.1	U	8.7	3.1	ug/m3			03/10/21 00:49	1
Naphthalene	10	U *+	26	10	ug/m3			03/10/21 00:49	1
Styrene	**18**		8.5	2.6	ug/m3			03/10/21 00:49	1
Tetrachloroethene	**1.6**	**J**	14	1.2	ug/m3			03/10/21 00:49	1
Toluene	**16**		11	7.3	ug/m3			03/10/21 00:49	1
1,2,4-Trichlorobenzene	12	U	74	12	ug/m3			03/10/21 00:49	1
Trichloroethene	1.7	U	5.4	1.7	ug/m3			03/10/21 00:49	1
1,2,3-Trichloropropane	4.5	U	30	4.5	ug/m3			03/10/21 00:49	1
Vinyl chloride	1.7	U *+	2.6	1.7	ug/m3			03/10/21 00:49	1
Xylene, o-	1.6	U	8.7	1.6	ug/m3			03/10/21 00:49	1
Xylene (total)	2.6	U	17	2.6	ug/m3			03/10/21 00:49	1

Client: Geosyntec Consultants, Inc.
Job ID: 140-22202-1
Project/Site: Ashland - Brunswick Treatability Study

Client Sample ID: DUP-01
Lab Sample ID: 140-22202-4
Date Collected: 03/03/21 00:00
Matrix: Air
Date Received: 03/08/21 11:00
Sample Container: Summa Canister 1L

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**55**	**J**	120	34	ug/m3			03/10/21 02:13	1
Benzene	**3.4**	**J**	6.4	0.64	ug/m3			03/10/21 02:13	1
2-Butanone (MEK)	5.4	U	29	5.4	ug/m3			03/10/21 02:13	1
Carbon disulfide	0.86	U	16	0.86	ug/m3			03/10/21 02:13	1
Carbon tetrachloride	1.1	U	13	1.1	ug/m3			03/10/21 02:13	1
Chlorobenzene	0.69	U	9.2	0.69	ug/m3			03/10/21 02:13	1
Chloroform	**8.4**	**J**	9.8	0.85	ug/m3			03/10/21 02:13	1
1,2-Dichlorobenzene	4.7	U	12	4.7	ug/m3			03/10/21 02:13	1
1,4-Dichlorobenzene	2.4	U	12	2.4	ug/m3			03/10/21 02:13	1
1,1-Dichloroethane	0.71	U	8.1	0.71	ug/m3			03/10/21 02:13	1
1,1-Dichloroethene	0.79	U	7.9	0.79	ug/m3			03/10/21 02:13	1
1,2-Dichloropropane	1.2	U	9.2	1.2	ug/m3			03/10/21 02:13	1
Ethylbenzene	1.4	U	8.7	1.4	ug/m3			03/10/21 02:13	1
4-Isopropyltoluene	3.0	U	11	3.0	ug/m3			03/10/21 02:13	1
Methylene Chloride	34	U	35	34	ug/m3			03/10/21 02:13	1
Methyl isobutyl ketone	5.5	U	20	5.5	ug/m3			03/10/21 02:13	1
m,p-Xylene	3.1	U	8.7	3.1	ug/m3			03/10/21 02:13	1
Naphthalene	10	U *+	26	10	ug/m3			03/10/21 02:13	1
Styrene	**18**		8.5	2.6	ug/m3			03/10/21 02:13	1
Tetrachloroethene	**2.2**	**J**	14	1.2	ug/m3			03/10/21 02:13	1
Toluene	**15**		11	7.3	ug/m3			03/10/21 02:13	1
1,2,4-Trichlorobenzene	12	U	74	12	ug/m3			03/10/21 02:13	1
Trichloroethene	1.7	U	5.4	1.7	ug/m3			03/10/21 02:13	1
1,2,3-Trichloropropane	4.5	U	30	4.5	ug/m3			03/10/21 02:13	1
Vinyl chloride	1.7	U *+	2.6	1.7	ug/m3			03/10/21 02:13	1
Xylene, o-	1.6	U	8.7	1.6	ug/m3			03/10/21 02:13	1
Xylene (total)	2.6	U	17	2.6	ug/m3			03/10/21 02:13	1

Default Detection Limits

Client: Geosyntec Consultants, Inc. Job ID: 140-22202-1
Project/Site: Ashland - Brunswick Treatability Study

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Analyte	RL	MDL	Units
1,1-Dichloroethane	0.32	0.028	ug/m3
1,1-Dichloroethene	0.32	0.032	ug/m3
1,2,3-Trichloropropane	1.2	0.18	ug/m3
1,2,4-Trichlorobenzene	3.0	0.47	ug/m3
1,2-Dichlorobenzene	0.48	0.19	ug/m3
1,2-Dichloropropane	0.37	0.046	ug/m3
1,4-Dichlorobenzene	0.48	0.096	ug/m3
2-Butanone (MEK)	1.2	0.22	ug/m3
4-Isopropyltoluene	0.44	0.12	ug/m3
Acetone	4.8	1.4	ug/m3
Benzene	0.26	0.026	ug/m3
Carbon disulfide	0.62	0.034	ug/m3
Carbon tetrachloride	0.50	0.044	ug/m3
Chlorobenzene	0.37	0.028	ug/m3
Chloroform	0.39	0.034	ug/m3
Ethylbenzene	0.35	0.056	ug/m3
m,p-Xylene	0.35	0.13	ug/m3
Methyl isobutyl ketone	0.82	0.22	ug/m3
Methylene Chloride	1.4	1.4	ug/m3
Naphthalene	1.0	0.40	ug/m3
Styrene	0.34	0.10	ug/m3
Tetrachloroethene	0.54	0.047	ug/m3
Toluene	0.45	0.29	ug/m3
Trichloroethene	0.21	0.070	ug/m3
Vinyl chloride	0.10	0.066	ug/m3
Xylene (total)	0.69	0.10	ug/m3
Xylene, o-	0.35	0.065	ug/m3

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS)

Lab Sample ID: MB 140-47515/4
Matrix: Air
Analysis Batch: 47515

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	1.4	U	4.8	1.4	ug/m3			03/09/21 11:48	1
Benzene	0.026	U	0.26	0.026	ug/m3			03/09/21 11:48	1
2-Butanone (MEK)	0.22	U	1.2	0.22	ug/m3			03/09/21 11:48	1
Carbon disulfide	0.034	U	0.62	0.034	ug/m3			03/09/21 11:48	1
Carbon tetrachloride	0.044	U	0.50	0.044	ug/m3			03/09/21 11:48	1
Chlorobenzene	0.0324	J	0.37	0.028	ug/m3			03/09/21 11:48	1
Chloroform	0.034	U	0.39	0.034	ug/m3			03/09/21 11:48	1
1,2-Dichlorobenzene	0.19	U	0.48	0.19	ug/m3			03/09/21 11:48	1
1,4-Dichlorobenzene	0.096	U	0.48	0.096	ug/m3			03/09/21 11:48	1
1,1-Dichloroethane	0.028	U	0.32	0.028	ug/m3			03/09/21 11:48	1
1,1-Dichloroethene	0.032	U	0.32	0.032	ug/m3			03/09/21 11:48	1
1,2-Dichloropropane	0.046	U	0.37	0.046	ug/m3			03/09/21 11:48	1
Ethylbenzene	0.056	U	0.35	0.056	ug/m3			03/09/21 11:48	1
4-Isopropyltoluene	0.12	U	0.44	0.12	ug/m3			03/09/21 11:48	1
Methylene Chloride	1.4	U	1.4	1.4	ug/m3			03/09/21 11:48	1
Methyl isobutyl ketone	0.22	U	0.82	0.22	ug/m3			03/09/21 11:48	1
m,p-Xylene	0.13	U	0.35	0.13	ug/m3			03/09/21 11:48	1
Naphthalene	0.40	U	1.0	0.40	ug/m3			03/09/21 11:48	1
Styrene	0.10	U	0.34	0.10	ug/m3			03/09/21 11:48	1
Tetrachloroethene	0.047	U	0.54	0.047	ug/m3			03/09/21 11:48	1
Toluene	0.29	U	0.45	0.29	ug/m3			03/09/21 11:48	1
1,2,4-Trichlorobenzene	0.47	U	3.0	0.47	ug/m3			03/09/21 11:48	1
Trichloroethene	0.070	U	0.21	0.070	ug/m3			03/09/21 11:48	1
1,2,3-Trichloropropane	0.18	U	1.2	0.18	ug/m3			03/09/21 11:48	1
Vinyl chloride	0.066	U	0.10	0.066	ug/m3			03/09/21 11:48	1
Xylene, o-	0.065	U	0.35	0.065	ug/m3			03/09/21 11:48	1
Xylene (total)	0.10	U	0.69	0.10	ug/m3			03/09/21 11:48	1

Lab Sample ID: LCS 140-47515/1002
Matrix: Air
Analysis Batch: 47515

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acetone	4.75	5.36		ug/m3		113	60 - 140
Benzene	6.39	7.22		ug/m3		113	70 - 130
2-Butanone (MEK)	5.90	5.50		ug/m3		93	60 - 140
Carbon disulfide	6.23	7.09		ug/m3		114	70 - 130
Carbon tetrachloride	12.6	13.0		ug/m3		103	70 - 130
Chlorobenzene	9.21	10.2		ug/m3		110	70 - 130
Chloroform	9.77	10.3		ug/m3		106	70 - 130
1,2-Dichlorobenzene	12.0	14.4		ug/m3		119	70 - 130
1,4-Dichlorobenzene	12.0	13.2		ug/m3		110	70 - 130
1,1-Dichloroethane	8.09	8.41		ug/m3		104	70 - 130
1,1-Dichloroethene	7.93	8.06		ug/m3		102	70 - 130
1,2-Dichloropropane	9.24	10.1		ug/m3		109	70 - 130
Ethylbenzene	8.68	8.91		ug/m3		103	70 - 130
4-Isopropyltoluene	11.0	12.8		ug/m3		117	70 - 130
Methylene Chloride	6.95	7.78		ug/m3		112	70 - 130
Methyl isobutyl ketone	8.19	7.71		ug/m3		94	60 - 140

Method: TO 15 LL - Volatile Organic Compounds in Ambient Air, Low Concentration (GC/MS) (Continued)

Lab Sample ID: LCS 140-47515/1002
Matrix: Air
Analysis Batch: 47515

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

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m,p-Xylene	17.4	19.5		ug/m3		112	70 - 130
Naphthalene	10.5	15.5	*+	ug/m3		148	60 - 140
Styrene	8.52	9.47		ug/m3		111	70 - 130
Tetrachloroethene	13.6	13.8		ug/m3		102	70 - 130
Toluene	7.54	7.59		ug/m3		101	70 - 130
1,2,4-Trichlorobenzene	14.8	19.3		ug/m3		130	60 - 140
Trichloroethene	10.7	10.8		ug/m3		100	70 - 130
1,2,3-Trichloropropane	12.1	12.7		ug/m3		105	60 - 140
Vinyl chloride	5.11	6.86	*+	ug/m3		134	70 - 130
Xylene, o-	8.68	9.17		ug/m3		106	70 - 130

QC Association Summary

Client: Geosyntec Consultants, Inc.
Job ID: 140-22202-1
Project/Site: Ashland - Brunswick Treatability Study

Air - GC/MS VOA

Analysis Batch: 47515

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
140-22202-1	SSSG-02-03032021	Total/NA	Air	TO 15 LL	
140-22202-2	SSSG-01-03032021	Total/NA	Air	TO 15 LL	
140-22202-3	SSSG-08-03032021	Total/NA	Air	TO 15 LL	
140-22202-4	DUP-01	Total/NA	Air	TO 15 LL	
MB 140-47515/4	Method Blank	Total/NA	Air	TO 15 LL	
LCS 140-47515/1002	Lab Control Sample	Total/NA	Air	TO 15 LL	

Lab Chronicle

Client: Geosyntec Consultants, Inc. Job ID: 140-22202-1
Project/Site: Ashland - Brunswick Treatability Study

Client Sample ID: SSSG-02-03032021 — Lab Sample ID: 140-22202-1

Date Collected: 03/03/21 11:03 — **Matrix: Air**
Date Received: 03/08/21 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	20 mL	500 mL	47515	03/09/21 23:25	S1K	TAL KNX
	Instrument ID: MH									

Client Sample ID: SSSG-01-03032021 — Lab Sample ID: 140-22202-2

Date Collected: 03/03/21 11:44 — **Matrix: Air**
Date Received: 03/08/21 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	20 mL	500 mL	47515	03/10/21 00:07	S1K	TAL KNX
	Instrument ID: MH									

Client Sample ID: SSSG-08-03032021 — Lab Sample ID: 140-22202-3

Date Collected: 03/03/21 12:42 — **Matrix: Air**
Date Received: 03/08/21 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	20 mL	500 mL	47515	03/10/21 00:49	S1K	TAL KNX
	Instrument ID: MH									

Client Sample ID: DUP-01 — Lab Sample ID: 140-22202-4

Date Collected: 03/03/21 00:00 — **Matrix: Air**
Date Received: 03/08/21 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	20 mL	500 mL	47515	03/10/21 02:13	S1K	TAL KNX
	Instrument ID: MH									

Client Sample ID: Method Blank — Lab Sample ID: MB 140-47515/4

Date Collected: N/A — **Matrix: Air**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	500 mL	500 mL	47515	03/09/21 11:48	S1K	TAL KNX
	Instrument ID: MH									

Client Sample ID: Lab Control Sample — Lab Sample ID: LCS 140-47515/1002

Date Collected: N/A — **Matrix: Air**
Date Received: N/A

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	TO 15 LL		1	500 mL	500 mL	47515	03/09/21 09:05	S1K	TAL KNX
	Instrument ID: MH									

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

Accreditation/Certification Summary

Client: Geosyntec Consultants, Inc. Job ID: 140-22202-1
Project/Site: Ashland - Brunswick Treatability Study

Laboratory: Eurofins TestAmerica, Knoxville

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

Authority	Program	Identification Number	Expiration Date
	AFCEE	N/A	
ANAB	Dept. of Defense ELAP	L2311	02-13-22
ANAB	Dept. of Energy	L2311.01	02-13-22
ANAB	ISO/IEC 17025	L2311	02-13-22
ANAB	ISO/IEC 17025	L2311	02-14-22
Arkansas DEQ	State	88-0688	06-17-21
California	State	2423	06-30-22
Colorado	State	TN00009	02-28-21 *
Connecticut	State	PH-0223	09-30-21
Florida	NELAP	E87177	07-01-21
Georgia (DW)	State	906	12-11-22
Hawaii	State	NA	12-11-21
Kansas	NELAP	E-10349	10-31-21
Kentucky (DW)	State	90101	12-31-21
Louisiana	NELAP	83979	06-30-21
Louisiana (DW)	State	LA019	12-31-21
Maryland	State	277	03-31-22
Michigan	State	9933	12-11-22
Nevada	State	TN00009	07-31-21
New Hampshire	NELAP	299919	01-17-22
New Jersey	NELAP	TN001	07-01-21
New York	NELAP	10781	04-01-21
North Carolina (DW)	State	21705	07-31-21
North Carolina (WW/SW)	State	64	12-31-21
Ohio VAP	State	CL0059	06-02-23
Oklahoma	State	9415	08-31-21
Oregon	NELAP	TNI0189	01-01-22
Pennsylvania	NELAP	68-00576	12-31-21
Tennessee	State	02014	12-11-22
Texas	NELAP	T104704380-18-12	08-31-21
US Fish & Wildlife	US Federal Programs	058448	07-31-21
USDA	US Federal Programs	P330-19-00236	08-20-22
Utah	NELAP	TN00009	07-31-21
Virginia	NELAP	460176	09-14-21
Washington	State	C593	01-19-22
West Virginia (DW)	State	9955C	01-02-22
West Virginia DEP	State	345	05-01-21
Wisconsin	State	998044300	08-31-21

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins TestAmerica, Knoxville
5815 Middlebrook Pike

Knoxville, TN 37921-5947
phone 865.291.3000 fax 865.584.4315

Canister Samples Chain of Custody Record

TestAmerica Laboratories, Inc. assumes no liability with respect to the collection and shipment of these samples.

eurofins | Environment Testing TestAmerica

TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica

Client Contact Information		Client Project Manager: Rick Murray	Samples Collected By: T. Pegan	COC No: 1 of 1 COCs
Company Name:	Geosyntec	Phone: 678-202-9574		TALS Project #:
Address:	1255 Roberts Blvd	Email: rmurray@geosyntec.com		For Lab Use Only:
City/State/Zip	Kennesaw, GA 30144	Site Contact: Taylor Pegan		Walk-in Client:
Phone:	678-202-9500	Tel/Fax 470-217-4166		Lab Sampling:
FAX:		Analysis Turnaround Time		
Project Name:	Ashland	Standard (Specific): ✓		Job / SDG No.:
Site/Location:	Brunswick, GA			(See below for Add'l Items)
P O #		Rush (Specifiy):		

Sample Identification	Sample Start Date	Time Start	Sample End Date	Time Stop	Canister Vacuum in Field, "Hg (Start)	Canister Vacuum in Field, "Hg (Stop)	Flow Controller ID	Canister ID	TO-14/15 (Standard / Low Level)	TO-15 SIM	EPA 3C	EPA 25C	ASTM D-1946	EPA 15/16	Other (Please specify in notes section)	Sample Type: Indoor Air/Ambient Air	Sub-Slab	Soil Gas	Soil Vapor Extraction (SVE)	Landfill Gas	Other (Please specify in notes section)	Sample Specific Notes:
SSG-02-03032021	3/3	1018	3/3	1101	29.5	4	10884	34001	X													
SSG-01-03032021	3/3	1139	3/3	1144	29	4	9036	11820	X													
SSG-08-03032021	3/3	1137	3/3	1142	29	4.5	9957	11135	X													
DUP-01	3/3	—	3/3	—	30	4	10899	11811	X													

CUSTODY SEALS INTACT
RECEIVED AMBIENT
BKD 3-8-21
Courier FEDEX# 9533 1213 7670 C
5 Cans/5 Flows IN/IT

	Temperature (Fahrenheit)			Pressure (inches of Hg)	
	Interior	Ambient		Interior	Ambient
Start	70	50	Start	/	30.1
Stop	70	50	Stop	/	30.1

Special Instructions/QC Requirements & Comments:

Samples Shipped by: [signature]	Date / Time: 3/3/21 1420	Samples Received by:
Samples Relinquished by:	Date / Time:	Received by: [signature] ETA KNX 3-8-21 1100
Relinquished by:	Date / Time:	Received by:
Lab Use Only: Shipper Name:	Opened by:	Condition:

140-22202 Chain of Custody

Form No. CA-C-WI-003, Rev. 2.23, dated 5/4/2020

11146

EUROFINS/TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST **Log In Number:**

Review Items	Yes	No	NA	If No, what was the problem?
1. Are the shipping containers intact?	✓		✓	☐ Containers, Broken
2. Were ambient air containers received intact?			✓	☑ Checked in lab
3. The coolers/containers custody seal if present, is it intact?	✓			☐ Yes ☐ NA
4. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C) Thermometer ID :_____ Correction factor: _____			✓	☐ **Cooler Out of Temp, Client Contacted, Proceed/Cancel** ☐ **Cooler Out of Temp, Same Day Receipt**
5. Were all of the sample containers received intact?	✓			☐ **Containers, Broken**
6. Were samples received in appropriate containers?	✓			☐ **Containers, Improper; Client Contacted; Proceed/Cancel**
7. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ **COC & Samples Do Not Match** ☐ **COC Incorrect/Incomplete** ☐ **COC Not Received**
8. Were all of the samples listed on the COC received?	✓			☐ **Sample Received, Not on COC** ☐ **Sample on COC, Not Received**
9. Is the date/time of sample collection noted?	✓			☐ **COC; No Date/Time; Client Contacted**
10. Was the sampler identified on the COC?	✓			☐ **Sampler Not Listed on COC**
11. Is the client and project name/# identified?	✓			☐ **COC Incorrect/Incomplete**
12. Are tests/parameters listed for each sample?	✓			☐ **COC No tests on COC**
13. Is the matrix of the samples noted?	✓			☐ **COC Incorrect/Incomplete**
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **COC Incorrect/Incomplete**
15. Were samples received within holding time?	✓			☐ **Holding Time - Receipt**
16. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ **pH Adjusted, pH Included (See box 16A)** ☐ **Incorrect Preservative**
17. Were VOA samples received without headspace?			✓	☐ **Headspace (VOA only)**
18. Did you check for residual chlorine, if necessary? (e.g. 1613B, 1668) Chlorine test strip lot number:_____			✓	☐ **Residual Chlorine**
19. For 1613B water samples is pH<9?			✓	☐ If no, notify lab to adjust
20. For rad samples was sample activity info. Provided?			✓	☐ Project missing info

Comments/Actions Taken

Labeling Verified by: **Date:**

pH test strip lot number:

	Box 16A: pH Preservation	Box 18A: Residual Chlorine
Preservative:		
Lot Number:		
Exp Date:		
Analyst:		
Date:		
Time:		

Project #: 480229943 PM Instructions: _____

Sample Receiving Associate: _____ Date: 3-8-21

QA026R32.doc, 062719

TestAmerica Knoxville - Air Canister Initial Pressure Check

Gauge ID: G5
Date: 3/8/2021

Analyst	Sample ID	Asset #	Cleaning Job	Cert	Size (L)	Pressure @ Receipt (-in Hg or +psig)	Time	Comments
afb	140-22202-A-1	34002455	21955	b	1	-2.7	1755	
afb	140-22202-A-2	11860	21955	b	1	-2.4	1756	
afb	140-22202-A-3	11135	21955	b	1	-3.2	1757	
afb	140-22202-A-4	11831	21955	b	1	-2.7	1758	

□ Receiving –Air Can –Calve Open (NCM #_____)
□ Air - Can P -24 to -25 " - Flow Contr. Works (NCM#_____)
□ Air - Can P -24 to -25 " - Flow Contr. Faulty (NCM#_____)
□ Air - Can P Out -26" - Flow Contr. Works (NCM#_____)
□ Air - Can P Out -26" - Flow Contr. Faulty (NCM#_____)
□ Air - Can P Low -24 to -25 " - Grab Sample (NCM#_____)
□ Air - Can P Low -26 "- Grab Sample (NCM#_____)

Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 140-22202-1

Login Number: 22202
List Number: 1
Creator: Dameron, Bryan K

List Source: Eurofins TestAmerica, Knoxville

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

APPENDIX C

Data Validation Reports

Geosyntec consultants

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Memorandum

Date: 20 October 2020

To: Greg Roush

From: Jennifer Pinion

CC: J. Caprio

Subject: Stage 2A Data Validation - Level II Data Deliverable – Eurofins Test America Laboratory Job ID: 140-20512-1

SITE: Ashland – Brunswick Tier 1 VI

INTRODUCTION

This report summarizes the findings of the Stage 2A data validation of ten air samples and two field duplicates, collected on September 23-24, 2020, as part of the Ashland Brunswick sampling event. Eurofins TestAmerica, Knoxville, Tennessee analyzed the samples. The samples were analyzed for the following test:

- United States (US) Environmental Protection Agency (EPA) Method TO-15 Low Level (LL) –Volatile Organic Compounds (VOCs) in Ambient Air by Gas Chromatography/Mass Spectrometry (GC/MS)

- American Society for Testing and Materials (ASTM) D1946 – Fixed Gases (Helium)

EXECUTIVE SUMMARY

Overall, based on this Stage 2A data validation covering the quality control (QC) parameters listed below and based on the information provided, the data as qualified are usable for supporting project objectives. The qualified data should be used within the limitations of the qualifications.

The data were reviewed based on professional and technical judgment and the following documents:

- US EPA National Functional Guidelines for Superfund Organic Methods Data Review, January 2017 (US EPA-540-R-2017-002); and,

- The pertinent methods and SOPs referenced by the data package and professional and technical judgement.

The following samples were analyzed and validated at a Stage 2A level in the data set:

Laboratory IDs	Client IDs
140-20512-1	SSSG-01
140-20512-2	SSSG-02
140-20512-3	SSSG-03
140-20512-4	SSSG-04
140-20512-5	SSSG-08
140-20512-6	SSSG-07

Laboratory IDs	Client IDs
140-20512-7	DUP-02
140-20512-8	SSSG-06
140-20512-9	SSSG-05
140-20512-10	CS-01
140-20512-11	DUP-01
140-20512-12	OA-01

US EPA methods TO-15 specify the use of humidified "zero air" as the blank reagent for canister cleaning, instrument calibration and sample analysis. Ultra-high purity humidified nitrogen from a cryogenic reservoir is used in place of "zero air" by TestAmerica Knoxville.

Incorrect error corrections were observed on the chain of custody (COC), instead of the proper procedure of a single strike through, correction, and initials and date of person making the corrections.

The sample relinquished by signature, date and time are missing from the COC. The samples were received in the laboratory on 9/29/20, 12:00.

1.0 VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for selected VOCs per US EPA Method TO-15 LL.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Time
✓ Method Blank
✓ Laboratory Control Sample
✓ Laboratory Duplicate
✓ Surrogates
⊗ Field Duplicate
✓ Sensitivity
⊗ Electronic Data Deliverable Review

1.1 Overall Assessment

The VOC data reported in this package are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

1.2 Holding Time

The holding time for the TO-15 analysis of an air sample collected in a canister is 30 days from collection to analysis. The holding times were met for the sample analyses.

1.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three method blanks were reported (batches 43142, 43178, 43208). VOCs were not detected in the method blanks above the method detection limit (MDLs).

1.4 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). Three LCSs were reported. The recovery results were within the laboratory specified acceptance criteria, with the following exception.

The recovery of vinyl chloride in the LCS in batch 43208 was high and outside the laboratory specified acceptance criteria. Since vinyl chloride was not detected in the associated samples, no qualifications were applied to the vinyl chloride data.

1.5 Laboratory Duplicate

Laboratory duplicates were not reported.

1.6 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

1.7 Field Duplicate

Two field duplicate samples were collected with the sample sets, DUP-01 and DUP-02. Acceptable precision [relative percent difference (RPD) ≤ 30%] was demonstrated between the field duplicates and the original samples CS-01 and SSSG-07, respectively, with the following exceptions.

1,1-Dichloroethane was detected at an estimated concentration greater than the MDL and less than the reporting limit (RL) in sample CS-01 and not detected in the field duplicate DUP-01; resulting in a non-calculable RPD. Therefore, based on professional and technical judgement, the estimated concentration of 1,1-dichloroethane was J qualified as estimated in sample CS-01 and the non-detect 1,1-dichloroethane result in the field duplicate DUP-01 was UJ qualified as estimated less than the MDL.

1,1-Dichloroethene was detected at a concentration greater than the RL in sample CS-01 and not detected in the field duplicate DUP-01; resulting in a non-calculable RPD. Therefore, based on professional and technical judgement, the concentration of 1,1-dichloroethene was J qualified as estimated in sample CS-01 and the non-detect 1,1-dichloroethene result in the field duplicate DUP-01 was UJ qualified as estimated less than the MDL.

Tetrachloroethene and trichloroethene were detected at concentrations greater than the RLs in sample CS-01 and detected at estimated concentrations greater than the MDLs and less than the RLs in the field duplicate DUP-01; resulting in non-calculable RPDs. Therefore, based on professional and technical judgement, the concentrations of tetrachloroethene and trichloroethene in the field duplicate pair CS-01/DUP-01 were J qualified as estimated.

Xylene was detected at an estimated concentration greater than the MDL and less than the RL in sample CS-01 and detected at a concentration greater than the RL in the field duplicate DUP-01; resulting in a non-calculable RPD. Therefore, based on professional and technical judgement, the concentrations of xylene in the field duplicate pair CS-01/DUP-01 were J qualified as estimated.

The RPDs for acetone, carbon disulfide and m,p-xylene were greater than 30% in the field duplicate pair. Therefore, based on professional and technical judgement, the concentrations of acetone, carbon disulfide and m,p-xylene were J qualified as estimated in the field duplicate pair CS-01/DUP-01.

Sample ID	Compound	Laboratory Result (µg/m3)	Laboratory Flag	RPD	Validation Result (µg/m3)	Validation Qualifier*	Reason Code**
CS-01	1,1-Dichloroethane	0.16	J	NC	0.16	J	7
DUP-01	1,1-Dichloroethane	0.038	U		0.038	UJ	7
CS-01	1,1-Dichloroethene	0.78	NA	NC	0.78	J	7

Sample ID	Compound	Laboratory Result (µg/m3)	Laboratory Flag	RPD	Validation Result (µg/m3)	Validation Qualifier*	Reason Code**
DUP-01	1,1-Dichloroethene	0.043	U		0.043	UJ	7
CS-01	Acetone	24	NA	43	24	J	7
DUP-01	Acetone	37	NA		37	J	7
CS-01	Carbon disulfide	6.6	NA	149	6.6	J	7
DUP-01	Carbon disulfide	45	NA		45	J	7
CS-01	m,p-Xylene	0.40	NA	64	0.40	J	7
DUP-01	m,p-Xylene	0.78	NA		0.78	J	7
CS-01	Tetrachloroethene	4.2	NA	NC	4.2	J	7
DUP-01	Tetrachloroethene	0.27	J		0.27	J	7
CS-01	Trichloroethene	0.79	NA	NC	0.79	J	7
DUP-01	Trichloroethene	0.054	J		0.054	J	7
CS-01	Xylene (total)	0.65	J	NC	0.65	J	7
DUP-01	Xylene (total)	1.2	NA		1.2	J	7

µg/m3-microgram per cubic meter
U-not detected at or above the MDL
J-the result is less than RL but greater than the MDL and the concentration is an approximate value
NA-not applicable
NC-non-calculable
* Validation qualifiers are defined in Attachment 1 at the end of this report
**Reason codes are defined in Attachment 2 at the end of this report

1.8 Sensitivity

The samples were reported to the MDLs. Elevated non-detect results were reported due to the dilutions analyzed.

1.9 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated level II report at a minimum of 20% as part of the data validation process. No discrepancies were identified between the level II report and the EDD.

2.0 FIXED GASES (HELIUM)

The samples were analyzed for selected fixed gases per ASTM D1946

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the course of the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Time
✓ Method Blank
✓ Laboratory Control Sample
✓ Laboratory Duplicate
✓ Surrogates
✓ Field duplicate
✓ Sensitivity
⊗ Electronic Data Deliverable Review

2.1 Overall Assessment

The fixed gas data reported in this package are considered usable for supporting project objectives. The results are considered valid; the analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for this data set is 100%.

2.2 Holding Time

The holding time for the fixed gas analysis of an air sample collected in a canister is 30 days from collection to analysis. The holding times were met for the sample analyses.

2.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch 43217). Fixed gases were not detected in the method blank above the RL.

2.4 Laboratory Control Sample

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria.

2.5 Laboratory Duplicate

Laboratory duplicates were not reported.

2.6 Surrogates

The surrogate recoveries were within the laboratory specified acceptance criteria.

2.7 Field duplicate

Two field duplicate samples were collected with the sample sets, DUP-01 and DUP-02. Acceptable precision (RPD $\leq$ 30%) was demonstrated between the field duplicates and the original samples CS-01 and SSSG-07, respectively.

2.8 Sensitivity

The samples were reported to the RLs. Elevated non-detect results were reported due to the dilutions analyzed.

2.9 Electronic Data Deliverable (EDD) Review

Results and sample IDs in the EDD were reviewed against the information provided by the associated level II report at a minimum of 20% as part of the data validation process. No discrepancies were identified between the level II report and the EDD.

* * * * *

ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS
AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for but was not detected above the reported sample quantitation limit. Upon application of the U qualifier to a reported result, the definition changes to "not detected at or above the reported result".

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other

RPD-relative percent difference

Geosyntec consultants

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Knoxville, TN 37922
PH 865.330.0037
www.geosyntec.com

Memorandum

Date: 24 March 2021

To: Greg Roush

From: Jennifer Pinion

CC: J. Caprio

Subject: Stage 2A Data Validation - Level II Data Deliverable – Eurofins TestAmerica Job Number 140-22202-1 Revision 1

SITE: Ashland - Brunswick Treatability Study

INTRODUCTION

This report summarizes the findings of the Stage 2A data validation of three air samples and one field duplicate collected on March 03, 2021, as part of the Ashland Brunswick Plant sampling event.

Eurofins TestAmerica Knoxville, Tennessee analyzed the samples for the following analytical test:

- United States (US) Environmental Protection Agency (EPA) Methods TO-15 LL - Volatile Organic Compounds (VOCs) in Ambient Air, Low Concentration

EXECUTIVE SUMMARY

Overall, based on this Stage 2A data validation covering the quality control (QC) parameters listed below and based on the information provided, the data are usable for supporting project objectives.

The data were reviewed based on professional and technical judgment and the following documents:

- USEPA National Functional Guidelines for Organic Superfund Methods Data Review, January 2017 (OLEM 9355.0-136, EPA 540-R-2017-002);
- The pertinent methods and standard operating procedure (SOP) referenced by the data package.

The following samples were analyzed in the data set:

Laboratory IDs	Client IDs
140-22202-1	SSSG-02-03032021
140-22202-2	SSSG-01-03032021

Laboratory IDs	Client IDs
140-22202-3	SSSG-08-03032021
140-22202-4	DUP-01

Incorrect error corrections were observed on the chain of custody (COC), instead of the proper procedure of a single strike through, correction, and initials and date of person making the corrections.

There was no time of collection listed for the field duplicate on the COC. The laboratory logged the sample as collected on 03/03/21; 00:00. In addition, the year of collection was not included on the COC. The samples were logged in as collected in 2021.

The laboratory report was revised on March 24, 2021 to report the surrogates. The revised report was identified as 140-22202-1 Revision 1.

1.0 VOLATILE ORGANIC COMPOUNDS

The samples were analyzed for select VOCs by US EPA methods TO-15 LL.

The areas of data review are listed below. A leading check mark (✓) indicates an area of review in which the data were acceptable. A preceding crossed circle (⊗) signifies areas where issues were raised during the validation review and should be considered to determine any impact on data quality and usability.

✓ Overall Assessment
✓ Holding Times
⊗ Method Blank
✓ Matrix Spike/Matrix Spike Duplicate
✓ Laboratory Control Sample
✓ Surrogates
✓ Field Duplicate
✓ Sensitivity
✓ Electronic Data Deliverable Review

1.1 Overall Assessment

The VOC data reported in these sample sets are considered usable for supporting project objectives. The analytical completeness, defined as the ratio of the number of valid analytical results (valid analytical results include values qualified as estimated) to the total number of analytical results requested on samples submitted for this analysis, for the sample set is 100%

1.2 Holding Times

The holding time for the TO-15 analysis of an air sample collected in a canister is 30 days from collection to analysis. The holding times were met for the sample analyses.

1.3 Method Blank

Method blanks were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One method blank was reported (batch 47515). VOCs were not detected in the method blank above the method detection limits (MDLs), with the following exception.

Chlorobenzene was detected at an estimated concentration greater than the MDL and less than the RL in the method blank. Therefore, the estimated concentrations of chlorobenzene in samples SSSG-02-03032021 and SSSG-08-03032021 were U qualified as not detected at the RLs.

Sample ID	Compound	Laboratory Result (µg/m3)	Laboratory Flag	Validation Result (µg/m3)	Validation Qualifier*	Reason Code**
SSSG-02-03032021	Chlorobenzene	0.91	J B	9.2	U	3
SSSG-08-03032021	Chlorobenzene	0.76	J B	9.2	U	3

µg/m3-microgram per cubic meter
J-the result is less than RL but greater than the MDL and the concentration is an approximate value
B-laboratory flag indicating the compound was found in both the blank and the sample
* Validation qualifiers are defined in Attachment 1 at the end of this report
**Reason codes are defined in Attachment 2 at the end of this report

1.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

MS/MSD pairs were not reported.

1.5 Laboratory Control Sample (LCS)

LCSs were analyzed at the proper frequency for the number and types of samples analyzed (one per batch of 20 samples). One LCS was reported. The recovery results were within the laboratory specified acceptance criteria, with the following exceptions.

The recoveries of naphthalene and vinyl chloride in the LCS were high and outside the laboratory specified acceptance criteria. Since naphthalene and vinyl chloride were not detected in the associated samples, no qualifications were applied to the data.

1.6 Surrogates

Acceptable surrogate recoveries were reported for the sample analyses.

1.7 Field Duplicate

One field duplicate was collected with the sample set, DUP-01. Acceptable precision [relative percent difference (RPD) ≤ 30%] was demonstrated between the field duplicate and the original sample SSSG-08-03032021, with the following exception.

Chlorobenzene was detected at an estimated concentration greater than the MDL and less than the RL in sample SSSG-08-03032021 and not detected in the field duplicate, resulting in a non-calculable RPD. Since the chlorobenzene concentration in sample SSSG-08-03032021 was U qualified due to method blank contamination, no additional qualifications were applied to the data, based on professional and technical judgment.

1.8 Sensitivity

The samples were reported to the MDLs. Elevated non-detect results were not reported.

1.9 Electronic Data Deliverable (EDD) Review

The results and sample IDs in the EDD were reviewed against the information provided by the associated level II report at a minimum of 20% as part of the data validation process. No discrepancies were identified between the level II report and the EDD.

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* * * * *

ATTACHMENT 1
DATA VALIDATION QUALIFIER DEFINITIONS AND INTERPRETATION KEY
Assigned by Geosyntec's Data Validation Team

DATA QUALIFIER DEFINITIONS

U The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified; however, the associated numerical value is likely to be higher than the concentration of the analyte in the sample due to positive bias of associated QC or calibration data or attributable to matrix interference.

J- The analyte was positively identified; however, the associated numerical value is likely to be lower than the concentration of the analyte in the sample due to negative bias of associated QC or calibration data or attributable to matrix interference.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

ATTACHMENT 2
DATA VALIDATION REASON CODES
Assigned by Geosyntec's Data Validation Team

Valid Value	Description
1	Preservation requirement not met
2	Analysis holding time exceeded
3	Blank contamination (i.e., method, trip, equipment, etc.)
4	Matrix spike/matrix spike duplicate recovery or RPD outside limits
5	LCS recovery outside limits
6	Surrogate recovery outside limits
7	Field Duplicate RPD exceeded
8	Serial dilution percent difference exceeded
9	Calibration criteria not met
10	Linear range exceeded
11	Internal standard criteria not met
12	Lab duplicates RPD exceeded
13	Other
14	Laboratory flag was removed or modified: no validation qualification required

RPD-relative percent difference