# FINAL REPORT

# Demonstration/Validation of More Cost-Effective Methods for Mitigating Radon and VOC Subsurface Vapor Intrusion to Indoor Air

## ESTCP Project ER-201322

JULY 2018

Todd McAlary
William Wertz
Darius Mali
**Geosyntec Consultants**

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New lines of evidence and mathematical modeling are developed to aid in the design and performance monitoring of subslab venting systems for mitigation of radon and volatile organic compound vapor intrusion to protect the health of building occupants from inhalation exposures. The results indicate that the system performance depends strongly on the relative permeability of the floor slab and the material below the floor slab, and that both parameters can be determined with reasonable confidence using tests and analysis that are rapid and affordable. Where coarse granular fill is present below a high quality floor slab (typical in DoD building stock), the radius of influence may extend to considerable distances, which reduces the number of suction points required and the associated capital cost. Where a system already exists, mass emission monitoring may help reduce the operation, maintenance and monitoring costs.

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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| $\Delta P$ | differential pressure |
| $\Delta T$ | differential temperature |
| AF | Attenuation Factor (the ratio of indoor air VOC concentration/subsurface concentration) |
| AFB | Air Force Base |
| ASD | Active Soil Depressurization, also known as subslab depressurization (SSD). |
| ATD | Automatic Thermal Desorption |
| BPC | Building Pressure Cycling |
| $Bq/m^3$ | Becquerels per cubic meter |
| BRAC | Base Realignment and Closure |
| CERCLA | Comprehensive Environmental Response, Compensation and Liability Act |
| $CH_4$ | methane |
| Cia or $C_{IA}$ | Concentration in indoor air |
| cDCE | cis-1,2-dichloroethene |
| $CO_2$ | carbon dioxide |
| COPCs | Compounds of Potential Concern |
| CSM | Conceptual Site Model |
| Cssv | Concentration in effluent of subslab venting system |
| 11DCE | 1,1-dichloroethene |
| DoD | Department of Defense |
| DQO | data quality objectives |
| ECD | Electron Capture Detector |
| EPA | Environmental Protection Agency |
| ER | Environmental Restoration |

| | |
|---|---|
| ESTCP | Environmental Security Technology Certification Program |
| FID | flame ionization detector |
| GC/MS | gas chromatography/mass spectroscopy |
| GIS | geographic information system |
| GWSL | Groundwater Screening Level |
| GWVC | Groundwater Vapor Concentration (groundwater concentration x Henry's Constant) |
| He | helium |
| HI | Hazard Index |
| HVAC | Heating, Ventilating and Air Conditioning |
| HVS | high volume sample |
| in-$H_2O$ | inches of water column |
| IA | indoor air |
| IASL | Indoor Air Screening Level |
| IRP | Installation Restoration Program |
| J&E | Johnson and Ettinger |
| L | Liters |
| L/day | Liters per day |
| LTM | Long-Term Monitoring |
| ML | mass loading |
| MRL | Minimal Risk Level |
| MTBE | Methyl-tert-butyl ether |
| $O_2$ | oxygen |
| OA | outdoor air |
| O&M | Operation and Maintenance |
| OSHA | Occupational Safety and Health Administration |

| | |
|---|---|
| OSWER | Office of Solid Waste and Emergency Response |
| OVM | Organic Vapor Monitor |
| Pa | pascals |
| PCE | Tetrachloroethene (a.k.a., Perchloroethene) |
| PEL | Permissible Exposure Level |
| PID | photoionization detector |
| QAPP | Quality Assurance Project Plan |
| $Q_{BPC}$ | flow rate of air during building pressure cycling |
| Qssv | flow rate of subslab venting system |
| $Q_{tracer}$ | Flow rate of tracer gas |
| RA | Risk Assessment |
| RAGS | Risk Assessment Guidance for Superfund |
| RAO | Response Action Outcome |
| RD | Remedial Design |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| ROI | Radius of Influence |
| RPM | Remedial Project Manager |
| RSL | Regional Screening Level |
| SC | Site Closure |
| $SF_6$ | sulfur hexafluoride |
| SL | Screening Level |
| SSD | Subslab Depressurization, also known as active soil depressurization (ASD) |
| SSV | Subslab Ventilation |
| SSSL | Subslab Screening Level |

| | |
|---|---|
| SSSG | subslab soil gas |
| TCE | trichloroethene |
| TMB | trimethylbenzenes |
| μg/L | micrograms per liter |
| $\mu g/m^3$ | microgram per cubic meter |
| VC | Vinyl chloride |
| VI | Vapor Intrusion |
| VOC | Volatile Organic Compound |
| VISL | Vapor Intrusion Screening Level |
| WMS | Waterloo Membrane Sampler |

## GLOSSARY OF TERMS

Advection – movement of a fluid and associated chemicals in response to a pressure gradient.

Aerated floors – a subslab design option which creates a very highly permeable space below the floor slab to facilitate mitigation with minimal long-term costs.

Air Exchange Rate – average rate at which the air inside a building is replaced with new air.

Attenuation Factor – the ratio of indoor air concentration to concentration at some depth below the building. Also known as alpha factor, AF or $\alpha$.

Atypical Preferential Pathways – conduits that facilitate vapor transport (i.e., highly permeable to facilitate advection) much more than typical entry points for subsurface vapors into a building (e.g., sewer pipes with ineffective traps, large floor drains). The conduit must connect the building to a source of VOCs and there must also be a pressure gradient to drive advection before an atypical preferential pathway will contribute significantly to indoor air VOC concentrations.

Background – sources of volatile organic compounds that are not in the subsurface, such as consumer products and building materials inside a building and outdoor air.

Blower-Door – fan within a frame that fits snugly with a door frame and is used to either pressurize or depressurize a building (usually for energy audits, but easily re-purposed for building pressure cycling tests or mitigation system stress tests).

Building Pressure Cycling – sampling indoor air after manipulating the pressure of the building to be higher and then lower than atmospheric to turn vapor intrusion "off" and then "on". The product of the exhaust rate and VOC or radon concentrations under low pressure provides a measure of the emissions available to enter the building from the subsurface and the difference in concentrations between samples collected with positive and negative pressure assists in documenting background sources.

Diffusion – migration of molecules in response to a concentration gradient.

Henry's Law Constant – the ratio of the concentration of a vapor in air and the concentration of the same compound as a solute in water where the air and water are in contact in a closed system at equilibrium (temperature dependent).

High Volume Sampling – sampling where the volume of gas extracted from the subsurface is purposefully large to enable interpretation of vapor concentrations between and beyond suction points, provide data for understanding the permeability of materials below the floor slab to interpret the radius of extracted gas and the rate of leakage across the floor slab to interpret dilution in the extracted gas concentrations.

Mass Flux – mass per unit area per unit time across a surface

Mass Emission, Mass Loading, or Mass Discharge – mass per unit time across a surface with a specified area. Equal to the flux multiplied by the area of the surface being crossed.

Mitigation – protection of indoor air quality through engineering controls such as subslab venting, subslab depressurization, indoor air pressurization, increased building ventilation, indoor air purification with filters, etc. This is distinct from remediation, where the goal is to reduce subsurface concentrations below levels of potential concern for a permanent remedy.

Multiple Lines of Evidence (MLE) – Use of multiple distinctly different approaches to VI assessment to reduce uncertainty in the determination of potential human health risks. Sampling and analysis of multiple media (outdoor air, indoor air, soil gas and groundwater) are all subject to similar uncertainties (spatial and temporal variability, background sources). Building pressure and air exchange rates (physics), soil texture and layering (geology), soil moisture, water table depth and recharge rates (hydrology), microbially-mediated degradation (biology) and building ventilation (mechanical engineering) can all provide additional lines of evidence to help interpret the chemistry data.

Passive Sampling – sample collection by diffusion or permeation, rather than advection.

Radius of Influence – radial distance from the point of suction to a condition of minimal influence. This has traditionally been defined by an applied vacuum level of a few pascals or less for subslab depressurization systems but could also be defined by a gas velocity of a few feet per day or less in a subslab venting system, by a certain travel time, or by a certain proportion of flow from below the floor.

Reasonable Maximum Exposure – Concentrations that are unlikely to be exceeded during a period of human occupancy but are still within a range that is reasonably expected.

Screening level – concentration considered to pose no unacceptable risk.

Tracers – parameters that migrate in a manner analogous to parameters of interest but can be monitored with less uncertainty or a lower cost. For example, sulfur hexafluoride ($SF_6$) is often used as a tracer to measure building air exchange rates, proportion of flow across the floor slab during subslab venting operations, etc. In this study, helium (He) was used as a tracer to measure subsurface gas travel times.

Vadose zone – region between the ground surface and the zone of saturation at the top of the capillary fringe above the water table.

Vapor Intrusion – migration of volatile organic compounds from the subsurface to indoor air.

VI assessment – evaluation of whether VI poses unacceptable health risks to occupants of current or potential future buildings.

VI Guidance – Documents issued by regulatory agencies describing preferred methods of VI screening and assessment including sampling and analysis recommendations, conceptual site model considerations, frequency and timing considerations, generic screening levels

for indoor air, soil vapor and groundwater concentrations, mitigation considerations, and communication.

VI Screening – selection of buildings for which VI assessment is warranted.

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# ABSTRACT


## Introduction and Objectives

Human health risks from vapor intrusion related inhalation exposures to VOCs and radon are typically mitigated with subslab depressurization systems, the design and performance monitoring of which is typically based only on static vacuum measurements across the floor slab. The objective of this research was to develop a more comprehensive approach to provide protective systems at a lower overall cost.

## Technology Description

The technology is parallel to the design and performance monitoring of a groundwater extraction system for containment of a contaminant plume. Components include monitoring ambient pressure gradients, pumping tests to measure vacuum vs time and vacuum vs distance, subslab tracer testing to measure gas travel rates, flow rate and concentration measurements in vent pipes, and mathematical modeling using a two-layer radial analytical solution developed by Hantush and Jacob (1955). This yields information on vacuum vs distance, velocity vs distance, travel time vs distance, proportion of flow originating below the slab vs distance and mass removal rates, all of which can be compared to performance targets to provide a basis for design and operation of an efficient and effective subslab depressurization or venting system. These data can also be used to calculate a building-specific attenuation factor for building-specific subslab screening levels.

## Performance and Cost Assessment

The field methods are relatively fast and simple, using methods that are similar to pilot testing of soil vapor extraction and groundwater pumping test analysis. The mathematical models are either commercially available or easily programmed into a spreadsheet. As a result, the incremental cost to collect and analyze the data is easily offset by the benefits of avoiding overdesigned systems: reduced capital costs (smaller fans and/or fewer suction points) and operational costs (minimizing power consumption and the energy penalty associated with discharge of conditioned indoor air that leaks through the floor). Based on the buildings testing in this research, savings increase with the size of the building. DoD specifications require granular fill below the floor slab and reinforced concrete floor slabs, which generally results in a high contrast in the gas-permeability between the two layers, which is the ideal application for this technology.

## Implementation Issues

Implementation issues will be minimal for most DoD buildings. For rare cases where the floor slab rests on very low permeability native soil, subslab venting systems may not achieve sufficient flow or mass removal to be protective of indoor air quality, in which case, other options such as aerated floors, building ventilation and/or barriers may be needed. For new construction, aerated floors may provide a less expensive mitigation option. Adoption of this technology into written standards may take some time.

## Publications and Presentations

Mali, D., Wertz, W. and T. McAlary, 2018. New Methods for Design and Monitoring of vapor Intrusion Mitigation Systems, Presentation at Air & Waste Management Associations Vapor Intrusion, Remediation and Site Closure Conference, Phoenix, AZ, December 5, 2018.

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McAlary, T., 2018. New Tools for Vapor Intrusion Mitigation Design, Two-hour invited presentation to the Michigan Association of Environmental Professionals, Howell, MI, November 7, 2018.

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McAlary, T., 2018. Building-Specific Attenuation Factors from Flow and Vacuum Measurements, platform presentation at the First Annual Western Groundwater Congress, Sacramento, CA, September 25, 2018.

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McAlary, T. Better Mousetraps for Vapor Intrusion, invited keynote address at the RemTec Summit, Denver, March 7, 2017.

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Wertz, W., McAlary, T. and D. Mali, 2016. Demonstration/Validation of More Cost-Effective Methods for Mitigating Radon and VOC Subsurface Vapor Intrusion to Indoor Air, ESTCP ER201322, an invited presentation to U.S. EPA, January 2016.

McAlary, T. Emerging Solutions for Vapor Intrusion, invited presentation at a half-day training session hosted by Maxxam Analytics, Mississauga, August 25, 2016.

McAlary, T., Wertz, B., Mali, D. and P. Nicholson. New Methods for Design, Monitoring, and Optimization of Subslab Depressurization Systems, platform presentation at the AARST-NRPP 30th Annual International Radon Symposium, San Diego, September 21, 2016.

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Mali, D., McAlary, T., Nicholson, P. and W. Wertz, 2016. New Methods for Design and Performance Monitoring of Subslab Depressurization Systems for VOCs and Radon, platform presentation at the Canadian Society for Civil Engineering (CSCE) Resilient Infrastructure Conference, London, ON, June 1-4, 2016.

McAlary, T. ESTCP Research on Optimization of Vapor Intrusion Mitigation Systems in Large Military Buildings, invited platform presentation at the EPA Workshop on Vapor Intrusion at the AEHS Soils and Sediments Conference, San Diego, March, 23, 2015.

McAlary, T. and H. Dawson, Advances in Vapor Intrusion Characterization and Mitigation, invited presentation at the Joint Alternative Restoration Technology Team and Optimization Workgroups Meeting of the U.S. DoD, Jacksonville, FL, April 23, 2015.

McAlary, T., Applied Research on Vapor Intrusion Assessment and Mitigation, invited presentation at the Midwestern States Environmental Consultants Association Quarterly Meeting, Indianapolis, IN, August 18, 2015.

McAlary, T. ESTCP Research for Improving the Effectiveness, Efficiency and Sustainability of Mitigation, invited presentation at the US EPA Workshop on Vapor Intrusion at the AEHS Conference, San Diego, CA, March 18, 2014.

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McAlary, T., 2013. Overview of ESTCP 13 EB-ER1-015 Demonstration/Validation of More Cost-Effective Methods for Mitigating Radon and VOC Subsurface Vapor Intrusion to Indoor Air, invited presentation at the SERDP and ESTCP Vapor Intrusion Seminar and Workshop, Tempe, AZ, December 19, 2013.

# EXECUTIVE SUMMARY

## Introduction

Subsurface vapor intrusion (VI) to indoor air of volatile organic compounds (VOCs) and radon pose potential health risks to building occupants through inhalation exposures. The most common method for mitigating risks is subslab depressurization (SSD), which is also known as active soil depressurization (ASD) or may be referred to as subslab ventilation (SSV) if the goal is to reduce concentrations below the floor slab instead of establishing a vacuum below the floor. SSD systems enhance subslab ventilation and SSV systems cause subslab depressurization, so the terms are interchangeable to some degree. Design and performance specifications were developed by radon researchers decades ago and were based mostly on achieving a measurable vacuum below the concrete floor slab. For example, EPA/625/5-88/024 (U.S. EPA 1988) recommended a minimum applied vacuum of 4 pascals and ASTM E2121 (ASTM 2013) recommended a minimum applied vacuum of 6 to 9 pascals. Revisions to guidance documents are in progress at the time of this report (ANSI/AARST RMS-LB, RMS-MF, RMS-SF for large buildings, multi-family residences and single-family residences, respectively). This poses an opportunity for advances to design and performance assessment, which was the motivation for this research.

## Goal and Objectives

The goal of this research was to demonstrate and validate a more rigorous and cost-effective process for design and optimization of systems for mitigating vapor intrusion for VOCs and radon to reduce the capital and long-term operating costs. This research was predicated on the conceptualization that an SSD/SSV or ASD system is essentially a "capture system" that could be designed and monitored using methods analogous to those used to contain the migration of a plume of contaminated groundwater. This demonstration shows how a test procedure analogous to a groundwater pumping test can be performed very quickly and efficiently for subslab gas flow characterization and can be used with tracer testing, mass flux monitoring and mathematical modeling to create several lines of evidence for performance assessment and monitoring to improve mitigation system design and operations.

Specific objectives included:

1. **Reduce Lifecycle Costs** associated with system design and installation, electricity to run fans, and energy loss due to conditioned (heated, cooled, humidified or dehumidified) indoor air being drawn into the subsurface and vented to outdoor air and quantify these costs and recognized savings for comparison to the costs of performing the optimization,

2. **Maintain protection of indoor air quality** by maintaining indoor air concentrations below risk-based screening levels

3. **Maintain a protective mass removal rate**, similar to or higher than the emissions of VOCs and radon through the building during building depressurization testing and/or

comparable to the mass removal rate of an existing mitigation system where the optimization is performed after the initial system commissioning,

4. **Demonstrate and validate the technology** with sufficient data to allow a detailed review by third parties, include different buildings with a range of size and construction typical of DoD building stock, including residential buildings, engage a team of world-leading experts, and employ multiple lines of evidence, analytical modeling and long-term monitoring,

5. **Transfer the technology** to DoD consultants and contractors so that it can be easily adopted and implemented at as many buildings as needed, and

6. **Achieve regulatory approval**.

## Technology Description

The scope included field testing at four buildings ranging from 1,200 to 64,000 $ft^2$ in footprint size. Testing methods included monitoring of:

- ambient cross-slab differential pressure (ΔP) to establish building-specific target subslab vacuum levels (Figure ES-1);
- subslab vacuum vs time in response to fan cycles (on/off) (Figure ES-2) and subslab vacuum vs radial distance (Figure ES-3) for matching to Equations 1 and 4 to characterize the transmissivity (T) and leakance (B);
- subslab tracer testing (Figure ES-4) to measure travel time from different radial distances to the point of suction to enable performance evaluation based on travel time and velocity;
- flow rate and VOC/radon concentrations in the vent-pipes under various operating conditions to assess the mass removal rate as a function of gas extraction rate for comparison to threshold values of mass loadings via building pressure cycling and the system performance during challenges imposed by a stress test (Table ES-1), and;
- mathematical modeling using the Hantush-Jacob (1955) Leaky Aquifer Model, after making adjustments to account for different density between gas and water.

Analysis of these data yields information regarding the temporal distribution of ambient cross-slab pressure differential, the transmissivity of the material below the floor, the leakage of the floor, the thickness and effective porosity of the dominant zone of air flow beneath the floor, the radial profiles of vacuum, travel time, gas velocity and proportion of flow originating below vs above the floor (Figure ES-5), which provide lines of evidence for system design and performance assessment. These data can also be used to calculate a building-specific attenuation factor (AF) to support customized subslab screening levels:

$$AF = \frac{T\,\Delta P}{B^2 h\,AER} \qquad \text{(EX-1)}$$

where T, ΔP and B are defined above, h is the building height and AER is the air exchange rate.

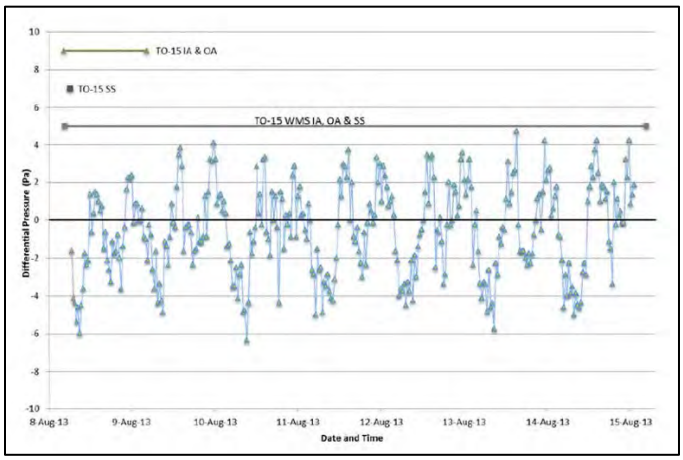



**Figure ES- 1: Example of ambient cross-slab differential pressure monitoring**

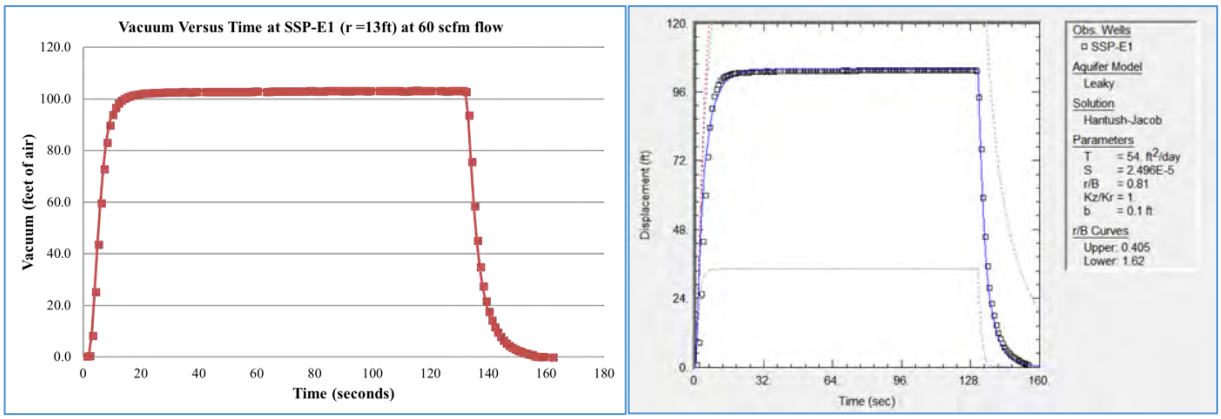



**Figure ES- 2: Example of subslab vacuum vs time: raw data (left), and fit to the Hantush-Jacob Model (right)**

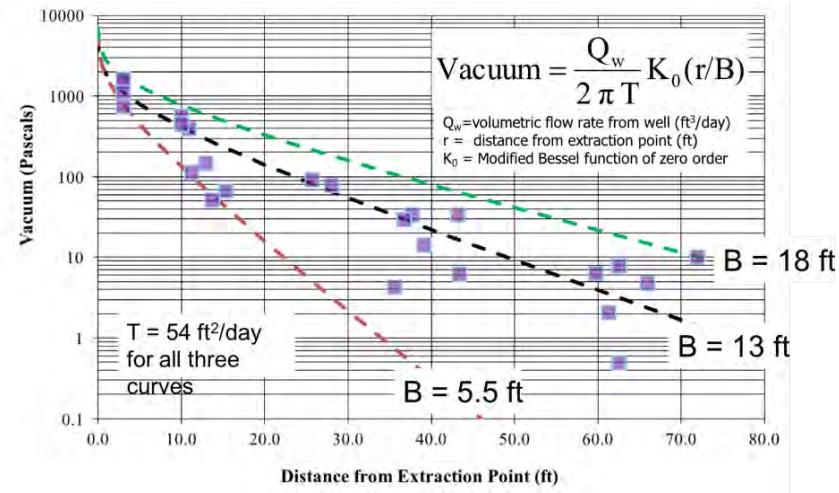



**Figure ES- 3: Comparison of vacuum vs distance measurements to profiles calculated using the Hantush-Jacob Model**

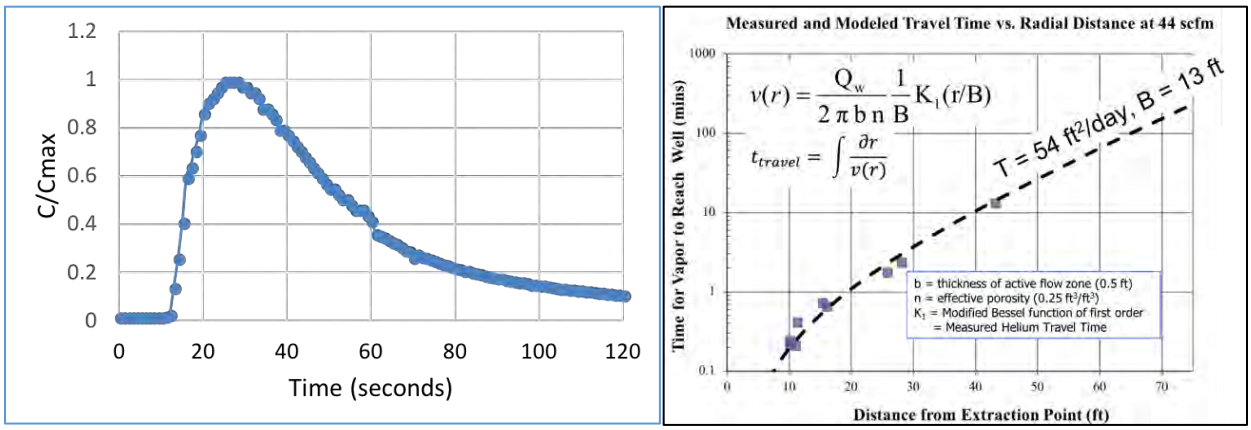



**Figure ES- 4: Measured (left) and modelled (right) travel time vs distance from suction point**

**Table ES- 1: Mass Loadings for a range of operating conditions**

| | | | PCE | | TCE | |
|---|---|---|---|---|---|---|
| SSV Flow Rate (CFM) | Blower Door Flow (CFM) | Duration (hr) | SSV Mass Loading (g/day) | Building Mass Loading (g/day) | SSV Mass Loading (g/day) | Building Mass Loading (g/day) |
| 50 | | 1 | 45 | | 1.0 | |
| | | 5 | 50 | | 0.79 | |
| 25 | | 1 | 24 | | 0.38 | |
| | | 16 | 22 | | 0.30 | |
| 25 | 5100 | 1 | 27 | 2.0 | 0.30 | 0.15 |
| 60 | 5100 | 1 | 67 | 1.9 | 0.74 | 0.18 |
| | | 17 | 50 | 1.3 | 0.52 | 0.10 |
| 65 | 5100 | 3 | 55 | 4.2 | 0.55 | 0.14 |
| 65 | 3800 | 1.5 | 52 | 5.7 | 0.55 | 0.13 |
| 60 | 3800 | 4.5 | 37 | 3.6 | 0.42 | 0.085 |
| 60 | | 22 days | 10 | | 0.26 | |

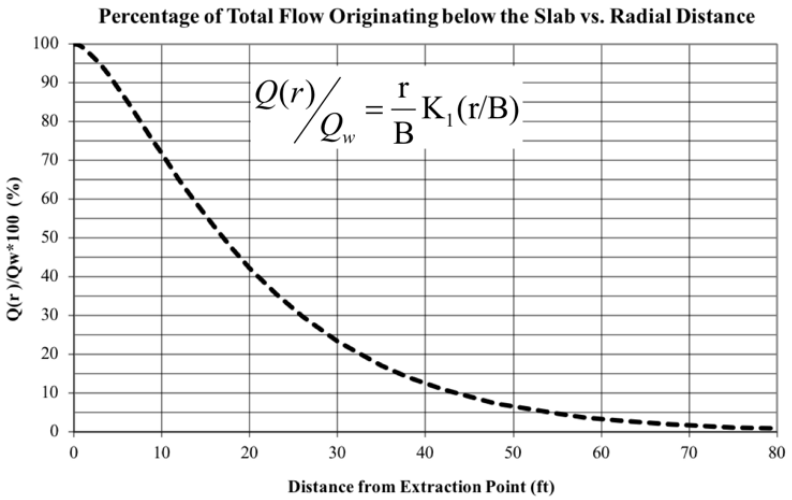



**Figure ES- 5: Proportion of flow originating below the floor vs radial distance**

## Performance Assessment

Where the material below the floor is granular fill (which is usually specified in building codes) and the floor is relatively competent (e.g., few utility penetrations, epoxy sealants, sealed expansion joints), the optimal spacing between suction points can be very large, which reduces the capital cost of installation for a large building compared to designs with closer spacing between suction points. Appendix B of this report provides a worked example of this scenario and shows that conventional design methods tend to underestimate the radius of influence in this scenario. The U.S. DoD has a Unified Facilities Criteria Program (http://www.wbdg.org/ffc/dod) to assure good and consistent construction practice and specifies 4 to 6 inches of reinforced concrete and 6 to 8 inches of ¾-inch granular fill that is gap graded to increase drainage rates (https://www.wbdg.org/guides-specifications/building-envelope-design-guide/below-grade-systems/floor-slabs). As a result, most new DOD buildings will fall into this category.

If the material below the floor is highly permeable, the flow velocity and induced ventilation below the slab can be sufficient to reduce subslab concentrations by subslab ventilation (SSV), even in areas where the induced vacuum is too small to reliably measure. If the ventilation rate below the slab is sufficient to reduce the VOC and radon concentrations to very low levels, then an occasional reversal of the cross-slab pressure gradient will not result in substantial VOC transport into the building, so the conventional minimum subslab vacuum design criteria of 6 to 9 Pa (ASTM E2121) may not be necessary to prevent unacceptable exposures due to vapor intrusion. In such cases, current standard practice generally results in unnecessary installation of larger fans and more suction points, which both increases capital and operation costs, but also results in wasted energy because conditioned indoor air is extracted and exhausted outdoors. The subslab tracer testing, mass flux monitoring and mathematical modeling developed during this research provide additional lines of evidence to support a protective design with smaller induced vacuums, a larger spacing between suction points and/or lower fan power which reduces capital and operating costs. The detailed example in Appendix B illustrates how conventional designs using a minimum specified static vacuum of 6-9 Pa result in a radius of influence estimate of 36 feet, whereas the methods developed in this research demonstrate the ROI is up to about 90 ft. For a building with these characteristics and a floor area of 100,000 $ft^2$, a conventionally designed system would require 25 suction points drawing 2500 standard cubic feet per minute (scfm) of soil gas whereas an optimized system would require only 4 suction points drawing 400 scfm. Use of the optimized system would be much less costly to install, operate and maintain yet still meet all of the performance objectives. The permeability of the material below the floor and the leakance of the floor vary from building-to-building, so results will vary, but the test procedure includes building-specific measurement of these critical parameters as part of the optimized system design.

The rate of mass removal by the system also provides a useful performance metric that can be compared to the mass loading through a building via building pressure cycling as a means of demonstrating the adequacy of the mitigation system design and performance. It can also be used to support an exit strategy if the system is clearly capturing all the available mass and the rate of mass removal of the mitigation system is insufficient to pose an indoor air quality concern considering the building size and air exchange rate.

Where the material below the floor has a low permeability and the subslab vapor concentrations are very high (i.e., >~1E6 $\mu g/m^3$), diffusive transport of VOCs through the floor slab can

potentially pose indoor air quality concerns even if there is an appreciable vacuum below the floor and supplemental measures such as increased building ventilation, floor coating or carbon filtration may be needed as interim measures until there is a reduction in subslab vapor concentrations.

For new construction, the use of "radon ready" construction with subslab collection pipes or aerated floors enables subslab ventilation with minimal effort and may be feasible with passive ventilation (driven by thermal gradients, wind-driven turbines or solar-powered fans). Vapor barriers alone may be adequate in some cases, but they may also allow vapor concentrations to gradually increase to levels similar to those of the underlying source, and lead to diffusive transport across the barrier that could pose a threat to indoor air quality. Barriers will also inhibit the downward flux of oxygen, which is beneficial for natural degradation of petroleum hydrocarbon vapors and methane.

## Cost Assessment

The field methods developed to support mitigation optimization are relatively fast and simple with readily-available equipment and can be mastered by practitioners skilled in the art and sciences of hydrogeology, vapor sampling and soil vapor extraction. The mathematical models are commercially available or readily programmed into a spreadsheet. As a result, the costs associated with implementing the lines-of-evidence developed in this research is modest compared to the potential savings in capital and operations, maintenance and monitoring, so a net savings is to be expected, particularly for larger buildings. The testing program demonstrated that conventional methods for determining a radius of influence may result in a much greater number of suction points being installed than are really needed, which is costly and disruptive. The testing also shows that total system flow rates may commonly also be overdesigned, which wastes electricity to run the fans and also incurs excess energy costs when conditioned indoor air is drawn through the floor and wasted by discharge to outdoor air.

## Implementation Issues

Implementation issues will be minimal for most DoD buildings. For rare cases where the floor slab rests on very low permeability native soil, subslab venting systems may not achieve sufficient flow or mass removal to be protective of indoor air and alternatives such as aerated floor, increased building ventilation and/or barriers may be needed. For new construction, it may be preferable to use aerated floors or other options, in which case the analysis developed here would not be needed. Adoption of this technology into written standards may take some time.

# 1.0 INTRODUCTION

This Final Report was prepared by Geosyntec Consultants, Inc. (Geosyntec) for the U.S. Department of Defense (DoD) Environmental Security Technology Certification Program (ESTCP) as part of ESTCP project ER-201322. The objective of this project is to demonstrate and validate a more cost-effective process for design, optimization and monitoring to reduce the capital and long-term costs of engineered systems for mitigating vapor intrusion for volatile organic compounds (VOCs) and radon. This document was prepared following the ESTCP Final Report Guidance (ESTCP, 2018).

This study included field work at four buildings, selected to span a range of size and construction at locations shown in Figure 1.1:

1) Building 205, Former Raritan Arsenal, Edison, NJ (slab-on-grade commercial, 64,000 $ft^2$)

2) Building 200, Former Edison Arsenal, Edison, NJ (slab on grade commercial, 2,200 $ft^2$)

3) Sun Devil Manor, Layton, UT (2-story residence, 1,000 $ft^2$)

4) Building 11193, Vandenberg AFB, Lompoc, CA (slab-on-grade commercial, 11,000 $ft^2$)




**Figure 1-1: Location of field test sites**

## 1.1 BACKGROUND

Subsurface vapor intrusion into indoor air has been a widely-recognized public health concern for radon for several decades and VOCs for about 30 years. The U.S. DoD is responsible for the health of occupants of thousands of structures built over or near areas of naturally occurring radon gas or

anthropogenic VOCs. For structures where mitigation is needed to reduce indoor air concentrations or achieve regulatory approvals for site closure, active subslab venting (SSV) or subslab depressurization (SSD) systems are the most common mitigation technology.

Conventional SSV/SSD mitigation systems for radon and VOCs are typically based on a decades-old technology and policy (e.g., U.S. EPA, 1993 and ASTM E-2121-13), which specify a minimum target vacuum of 4 pascals or 6 to 9 pascals respectively everywhere below the building floor slab as a performance specification. The reason this level of vacuum is specified is to enable a typical radon contractor to quickly and easily verify an induced vacuum relative to the natural fluctuations in the pressure differential across the floor slab of a building from wind gusts, occupants' activities, exhaust appliance operation, thermal convection (e.g., the "stack effect"), and heating, ventilating and air conditioning (HVAC) operations. Figure 1-2 shows examples of the cross-slab differential pressures measured in three buildings, which have significantly different baseline conditions, including consistently positive, cyclic and neutral. It may be overly-simplistic to assume that one single value for the target imposed vacuum by a mitigation system would be appropriate for all buildings.

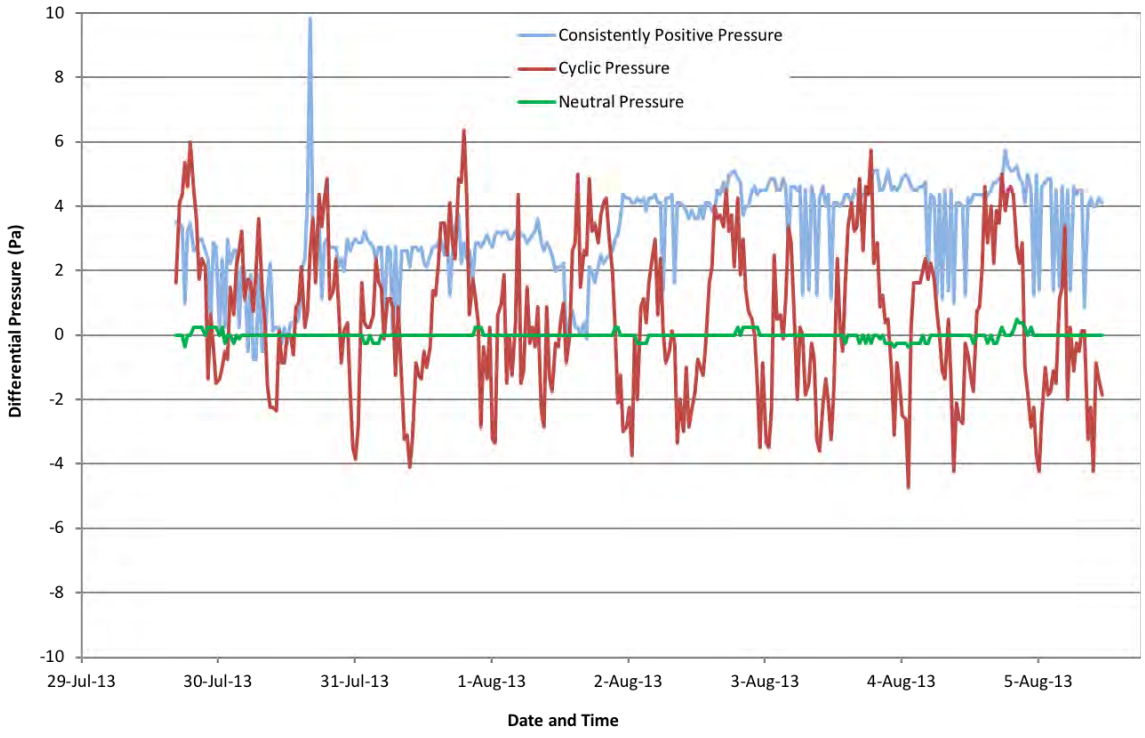



**Figure 1-2: Cross-slab pressure differentials for three buildings with no SSV systems**

Vacuum measurement is fast and simple, but it is not the ideal performance metric because of baseline fluctuations and instrument sensitivity limitations. Experience has shown that vacuum levels as low as 0.5 to 1 Pa can be protective (Lutes et al., 2011, Moorman, 2009), but the signal-to-noise ratio becomes problematic at low levels of vacuum because wind gusts alone can impart a few pascals of fluctuation in the cross-slab pressure differential. If the target subslab vacuum is set high enough to be easily resolved against baseline fluctuations and account for seasonal

variability, the result may be an over-designed system that is costly to install and operate and draws an excessive amount of conditioned indoor air across the floor slab for discharge above the roofline. Energy efficiency becomes increasingly important for large buildings.

The current practice for SSD design does not include design specifications related to the permeabilities of the floor or subfloor, the velocity distribution below the floor, or the distribution of mass below the slab. Current building codes generally call for granular fill to be placed below concrete floors as a capillary break for interior moisture control (e.g., California Building Code, Chapter 19 or California Residential Code, Chapter 5). In highly permeable subslab fill materials, a modest pressure gradient can cause a substantial velocity of gas flow (McAlary, et al., 2010), and as a result, subslab ventilation may be adequate to protect against vapor intrusion risks at vacuum levels lower than the level of noise in baseline pressure fluctuations.

In residential buildings, a vacuum of 6 to 9 Pa can often be achieved with a single fan drawing about $100/yr of electricity, so there is little cost incentive for SSD optimization. However, in larger buildings (typical of DoD facilities), the power draw for multiple fans or large blower operation alone can cost >$10,000/yr for a single building. Installation and balancing of a system designed to meet the current ASTM performance criteria also requires significant disruption to operations in an active building, and may not be feasible due to security concerns or the nature of the activities that take place in certain parts of a military building. Furthermore, operation of SSV/SSD systems typically draws large volumes of conditioned (heated or cooled, humidified or dehumidified, and filtered) building air through the floor slab, resulting in substantial additional energy losses (Moorman 2009, Turk and Hughes 2009). The ASTM vacuum criterion of 6 to 9 Pa is now recognized as excessive by many practitioners (see Moorman 2009 for example), but no alternative design process or performance specifications have been published to replace the current standards. Moorman (2009) showed that energy losses from extraction of heated or cooled indoor air (depending on the season) were the dominant cost factor for a typical radon mitigation system, yet these costs are not typically quantified or considered when designing a system. Mitigation system performance can alternatively be assessed using indoor air quality monitoring as a performance metric, but it is expensive (more so for VOCs than radon), and complicated by spatial and temporal variability in VOC concentrations and the presence of background sources.

Regulatory screening levels for subslab vapor concentrations are often very conservative, typically assuming 3% of indoor air originates from the subsurface, based on the 95$^{th}$ percentile of empirical data from mostly residential structures analyzed by U.S. EPA (U.S. EPA, 2012). Commercial/industrial buildings generally have different heating, ventilating and air conditioning (HVAC) systems and military buildings often have more substantial foundations and floor slabs than average buildings, so there may be no significant vapor intrusion risks even when subslab concentrations are 100 to 1000-times higher than screening levels. However, regulators are often uncomfortable with no further action decisions in these cases because of the risk of future building degradation or modification. In these circumstances, pre-emptive mitigation or long-term monitoring may be required, and at the present time, both options are very expensive. This research also resulted in a new method to characterize the building-specific attenuation factor, which can help support no further action decisions in cases where the building is more resistant to vapor entry than the generic default attenuation assumptions used for subslab screening levels.

For VOCs, there may be localized areas of high concentrations beneath large buildings (e.g., near former degreasers or storage tanks). The technology described in this report is easily adapted to include High Volume Sampling (McAlary et al., 2010 and AFCEC, 2018) which provides data for characterization of the distribution of vapors between and beyond the sampling locations and minimizes the disruption and cost of subslab vapor characterization for large buildings.

## 1.2 OBJECTIVE OF THE DEMONSTRATION

The general objective of this research is to demonstrate and validate a more technically advanced process for design, optimization and performance monitoring of subslab venting (SSV) systems to reduce the initial capital and long-term operating costs of mitigating vapor intrusion for VOCs and radon compared to the conventional process.

Army, Navy and Air Force personnel estimate that there are potentially hundreds of buildings that may need mitigation for VOC vapor intrusion with an average size of 10,000 $m^2$ (pers. comm. DoD, 2012). The capital cost of a conventional system is in the range of $10 to 50 per $m^2$ (ITRC, 2003), therefore, the capital cost for these hundreds of buildings may be $10 to $100M for VOC mitigation systems alone.

Additional savings are possible if the research is also applied to radon mitigation systems. The USEPA estimated that 7% of US single-family homes had annual radon concentrations above EPA's Reference Level of 4 pCi/L (U.S. EPA 2003). Based on statistics compiled by the General Accounting Office, the DoD owns or leases approximately 285,000 units of family housing (U.S. GAO, 2001). If 7% of that housing stock required mitigation to address unacceptable radon or VOC vapor-intrusion-related exposures, and if the total average lifecycle cost of energy saved/unit by improved mitigation techniques is about $2,500, the savings to the DoD could approach $50M (20,000 units x $2,500).

Operation, maintenance and monitoring (OM&M) costs are typically in the range of $3K/yr to $10K/yr per system for large buildings. In addition, most SSV system designs do not quantify or attempt to control energy losses from conditioned indoor air that is drawn into the SSV system through floor cracks, expansion joints, utility penetrations or other discontinuities. Heating and cooling the air inside occupied buildings is usually about 41% of the total energy cost of building operations (U.S. DOE, 2002), or approximately $30,000 per year for a 10,000 $m^2$ (100,000 $ft^2$) building. In a recent report to the USEPA (Turk and Hughes, 2009), a detailed characterization of the SSV at three mitigated homes demonstrated that basement air comprised from 46 to 72 % of the total air flowing out of the SSV exhaust. The total flow from an SSV system can be on the order of $1/10^{th}$ to $1/3^{rd}$ of the air exchange rate of the building, so the energy losses for all DoD buildings with existing or future SSV systems for VOC mitigation could add up to $5M to $10M per year. Over the lifecycle of operation (typically decades to indefinite), the OM&M and energy loss costs could add up to hundreds of millions of dollars. Collectively, this poses a substantial opportunity for savings via improved efficiency in system design and performance monitoring.

The specific objectives of this work are to:

1. Reduce the costs associated with system design and installation, electricity to run fans, and energy loss due to conditioned (heated, cooled, humidified or dehumidified) indoor air being drawn into the subsurface and vented to outdoor air,
2. Quantify these costs and recognized savings for comparison to the costs of performing the optimization,
3. Demonstrate the technology with sufficient data to allow a detailed review by third parties,
4. Include different buildings with a range of size and construction typical of DoD building stock, including residential buildings,
5. Validate the technology with a team of world-leading experts, multiple lines of evidence, analytical and numerical modeling and long-term modeling,
6. Transfer the technology to DoD consultants and contractors so that it can be easily adopted and implemented at as many buildings as needed, and
7. Achieve regulatory approval.

## 1.3 REGULATORY DRIVERS

Regulatory guidance for assessment and management of risks associated with vapor intrusion has been issued by over 25 States, the United States Environmental Protection Agency (U.S. EPA, 2015), and the Interstate Technology and Regulatory Consortium (ITRC, 2007). These documents are predominantly guidance, not statutory requirements; however, there are statutory requirements to protect human health (CERCLA), and regulatory programs have developed cleanup goals considered protective of human health at cancer risk levels ranging between 1E-06 and 1E-04 and hazard quotients ranging between 1.0 and 3.0. To account for temporal variability, mitigation systems may be selected as a pre-emptive risk management measure even in cases where available data show concentrations below actionable levels.

Radon mitigation is recommended when indoor air radon concentrations are above 4 picocuries per liter (pCi/L) (U.S. EPA, 2003). Regulatory drivers vary to some extent from State-to-State. There are ASTM Standards for radon mitigation (ASTM E-2121-13, ASTM E1465-08a) and U.S. EPA guidance (U.S. EPA, 1994), all of which have similar recommendations (implement subslab depressurization or a comparable remedy when indoor air radon concentrations exceed 4 pCi/L).

# 2.0 TECHNOLOGY

## 2.1 TECHNOLOGY DESCRIPTION

Active subslab venting (SSV) or subslab depressurization (SSD) are the most common alternatives for protecting against human health risks associated with vapor intrusion. The current standards of practice for design, installation, operation and maintenance are essentially the same for VOCs and radon (e.g., ASTM E2121-13). These practices are based on technology that is decades old and depend primarily on a single performance metric (subslab vacuum) that is not an ideal metric because of limitations imposed by measurement sensitivity and baseline fluctuations in the cross-slab pressure differential. This demonstration shows how a test procedure analogous to a groundwater pumping test can be performed very quickly and efficiently for subslab gas flow characterization and can be used with mathematical modeling and additional lines of evidence for performance monitoring to improve mitigation system design and operations.

Figure 2-1 provides a summary of the technology and how it can be integrated with conventional mitigation system design and performance monitoring practice. The left side of Figure 2-1 summarizes current standard practice. The additional lines of evidence developed in this research are outlined in the middle (recommended) and right (optional). For simple cases, the conventional approach may be sufficient. For example, in a single-family dwelling with a reasonably competent floor slab and moderate to highly permeable granular fill, the additional recommended and optional lines of evidence may not be needed to develop a cost-effective mitigation system. In fact, this is the case for Sun Devil Manor, the testing in this program simply provided additional lines of evidence to demonstrate the effectiveness. For cases where the conventional approach results in ambiguous results, additional lines of evidence are very helpful. For example, if the system has a high flow rate, but there is no measurable vacuum at the distal communication test points, subslab tracer testing can quickly demonstrate whether there is rapid flow (indicating that the absence of a measurable vacuum is simply attributable to a very high transmissivity) or not (indicating that the extracted gas may be short-circuiting through a preferential pathway).

The incremental costs of many of these lines of evidence are very low. For example, the inter-well tracer tests and transient vacuum monitoring typically takes only a few minutes with equipment that is commonly used by field technicians familiar with vapor intrusion assessment and mitigation. Additional assessment effort becomes increasingly cost effective as the total cost of the mitigation system increases, which is typically a function of the size of the building. So, in general, it will be appropriate to employ more of the recommended and optional activities in larger buildings, compared to single family residences.

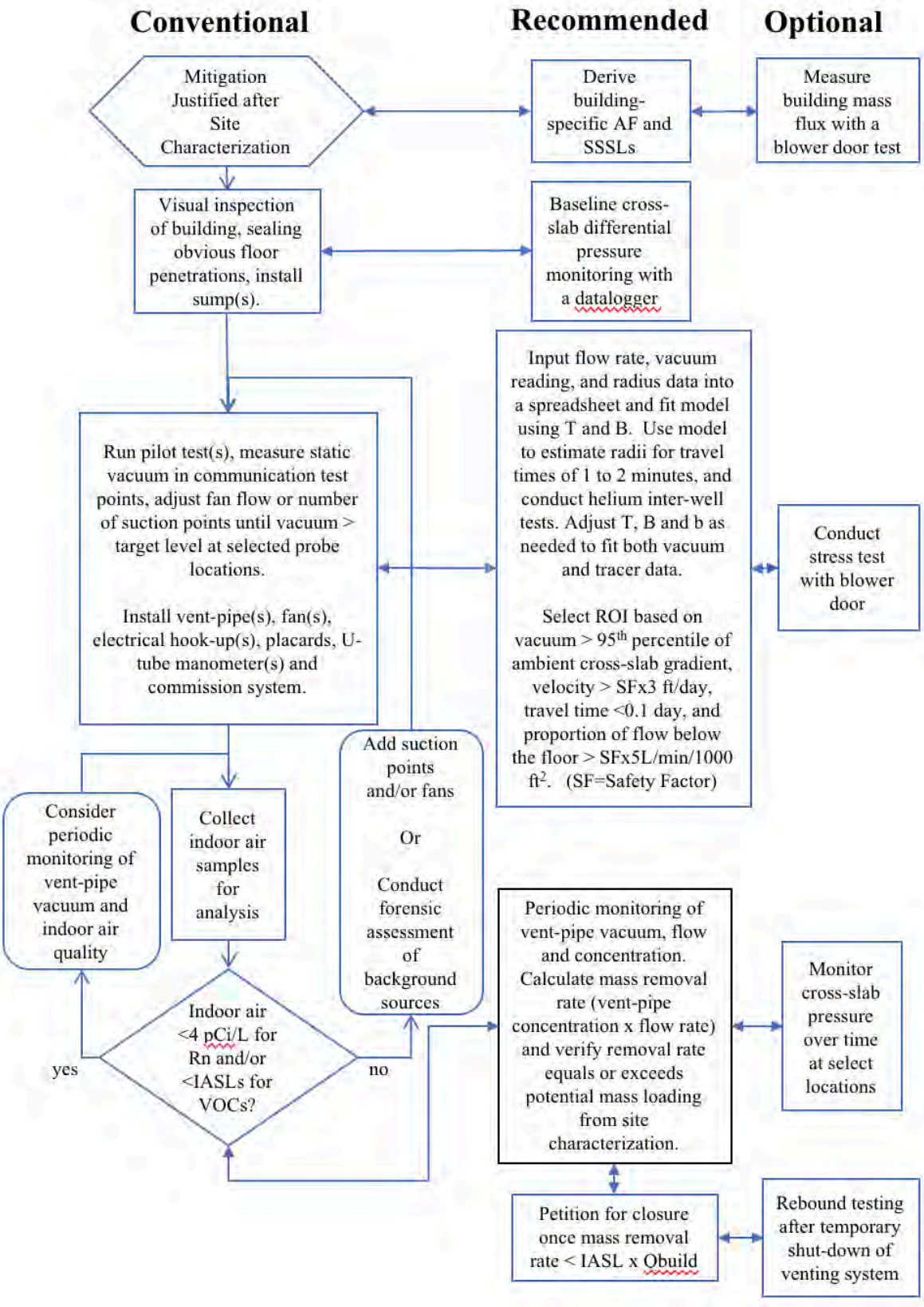



**Figure 2-1: Logic flow diagram for mitigation system design and performance monitoring**

## 2.2 SUBSLAB PNEUMATIC TESTING, TRACER TESTING AND MATHEMATICAL MODELING

Subslab pneumatic testing, tracer testing and mathematical analysis is used to calculate the transmissivity (T) of the materials below the floor, the leakance (B) across the floor slab, and the thickness of the zone through which flow predominantly occurs (b), which allows calculations of the radial profiles of vacuum, gas velocity, travel time, and relative proportions of flow from above and below the slab for a given extraction flow rate ($Q_{SSV}$). This information provides valuable insight for the selection of the number and spacing of suction points as well as the fan size needed to attain sufficient applied vacuum and associated flow. The leakance also provides information to assess the cost-benefit of floor sealing activities. The T and B values can also be used with cross-slab differential pressure, building height and air exchange rate information to calculate a building-specific attenuation factor, which can be used to help support no further action decisions at buildings with subslab vapor concentrations above conservative default screening levels where the building is less susceptible to vapor intrusion.

The mathematical framework for modeling the system is based on the "Leaky Aquifer Model" of Hantush and Jacob (1955), shown conceptually in Figure 2-2. The model was originally formulated for assessing groundwater flow in a two-layer system, with an aquifer (more permeable) overlain by an aquitard (less permeable). Water extracted from the aquifer creates a drawdown cone that reaches out to a certain radial distance, until the volume of water leaking down through the aquitard matches the volume of water extracted from the aquifer, at which time, the drawdown levels off.

The Hantush-Jacob Model is analogous to a system extracting gas from below a concrete floor slab if the material below the slab is more permeable than the concrete. The transient response of the vacuum in response to pumping follows a curve of the type shown in Figure 2-3, where the level of the head increases initially, and eventually stabilizes when the amount of soil gas leaking across the semi-confining layer equals the amount extracted. The drawdown versus time data is fit to the Hantush-Jacob (1955) Leaky Aquifer Model to calculate T and B (Massman, 1989).

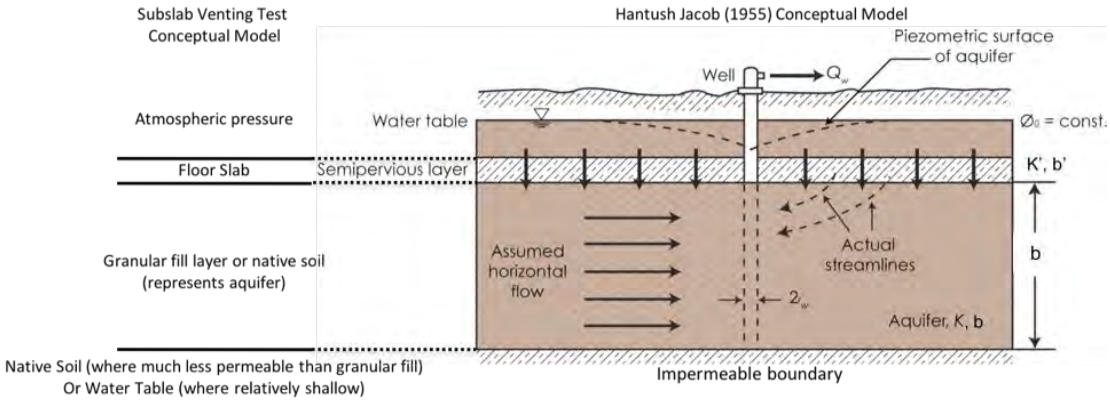



**Figure 2-2: Conceptualization of Hantush-Jacob (1955) model and correlation to floor slab and subslab (modified after McAlary et al., 2010)**

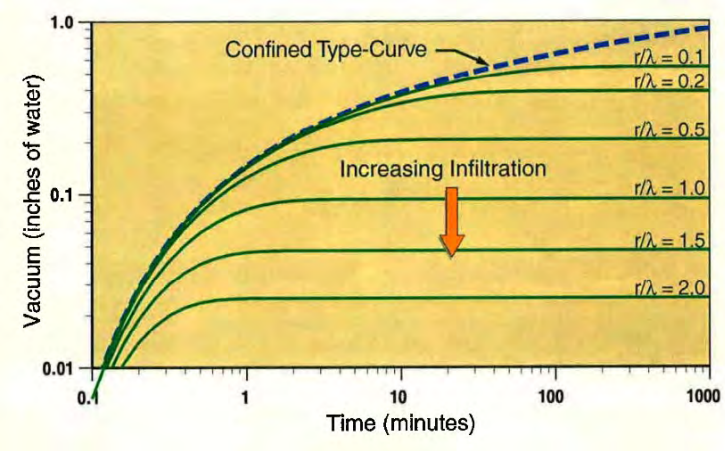



**Figure 2-3: Type-curves showing the effect of leakage on the vacuum versus time data (after Bear, 1979)**

The Hantush-Jacob Model assumes horizontal flow in a permeable layer with an impermeable layer below and vertical flow through an overlying "leaky" layer, with uniform, homogenous and isotropic properties for the permeable and leaky layers. Additional assumptions in the Hantush-Jacob Model and their application to subslab gas extraction are discussed in detail in the supporting information of McAlary et al., 2018. Good construction practice includes a layer of 10 to 15 cm of compacted granular fill below a concrete floor slab, which would be several orders of magnitude more permeable than the concrete slab and usually much more permeable than the native soil, so it can be the primary layer through which gas flows. Not all buildings have granular fill below the floor slab, but native soil is also likely to be more permeable than concrete. Granular fill is relatively uniform, homogenous and isotropic by design, which is consistent with the model assumptions. Concrete is permeable predominantly through discontinuities which are not uniform, homogenous or isotropic; however, like groundwater flow through fractured rock, the behavior approximates a porous medium if the region through which flow is occurring is large relative to the spacing between the discontinuities (Bear, 1979).

If granular fill is not present, or if the native soil is relatively permeable, the lower boundary to the permeable layer may be the water table or a low-permeability stratum at some depth in the vadose zone. Regardless of whether flow occurs primarily in the granular fill or native soil, the model yields the transmissivity, which is the product of the gas phase conductivity and the thickness of the active flow zone.

The pneumatic test procedure is analogous to a groundwater pumping test, although a soil gas pumping test can be performed in much less time (minutes instead of hours or days). The test procedure includes three types of measurements:

1) vacuum versus time using a pressure-transducer/data logger,
2) vacuum versus distance using a manometer or micromanometer,
3) travel time versus distance in the subslab region using a tracer such as helium

The vacuum versus time data are fit to the Hantush-Jacob (1955) Non-Steady Leaky Aquifer Model (Equation 1) to calculate T and B values. This can be performed using commercially

available modeling software (e.g., AQTESOLV, by HydroSOLVE, Inc. of Reston, VA). The AQTESOLV software requires the pressure data to be expressed in units of air head (one pascal is approximately 0.083 m (0.273 ft) of air head at 15 °C).

$$Vacuum\ (t) = \frac{Q_{SSV}}{4\pi T} \int_{y=U}^{\infty} exp\left(-y - \frac{r^2}{4B^2 y}\right) \frac{\partial y}{y} \quad (1)$$

Where y is a variable of integration and U and B are defined as:

$$U = \frac{r^2 S}{4Tt} \quad (2)$$

$$B = \sqrt{\frac{K\ b\ b'}{K'}} \quad (3)$$

and:

T = transmissivity of the region below the floor slab [$L^2$/T] (T=Kb)
U = well function [dimensionless]
B = leakance [L],
$Q_{SSV}$ = discharge from the extraction well [$L^3$/T]
r = radial distance from extraction well (L),
π = 3.14159
t = time since the start of gas extraction [T]
S = storativity [dimensionless]
K = pneumatic conductivity of the zone of extraction [L/T] which is equal to the transmissivity divided by the thickness,
b = thickness of the zone of extraction [L],
b' = thickness of the floor slab [L],
K' = bulk average vertical pneumatic conductivity of the floor slab [L/T].

The vacuum versus distance data are then fit using Equation 4:

$$Vacuum\ (r) = \frac{Q_{SSV}}{2\pi T} K_0\left(\frac{r}{B}\right) \quad (4)$$

where:

$K_o$ = Modified Bessel function of the second kind of order zero of (r/B) [unitless].

Some iteration may be required to obtain calibration of both Equation 1 to the vacuum versus time data and Equation 4 to the vacuum versus distance data using one unique pair of T and B values, however; there are two variables (T and B) and two lines of independent sets of data (vacuum versus time and vacuum versus distance), which is generally sufficient to yield a unique solution. The calibrated T and B values can then be used to calculate velocity versus radial distance using Equation 5:

$$Velocity\ (r) = \frac{Q_{SSV}}{2\pi bnB} K_1\left(\frac{r}{B}\right) \quad (5)$$

where:

*n* = air-filled porosity of the zone of extraction [volume of air/volume of soil]; and
$K_1$ = Modified Bessel Function of First Order of (r/B) [unitless]

Travel time from a given distance can be determined by integrating the velocities over discrete segments of the distance using:

$$t_{travel} = \int \frac{\partial r}{v(r)} \tag{6}$$

where:

*v(r)* = velocity at a given radial distance [L/T]
$t_{travel}$ = travel time from a given radial distance (r) [T]

The calculated travel times can be compared to subslab tracer test data to provide another independent method of calibrating the model inputs and evaluating how well the system behavior matches the behavior predicted by the model. Two types of tracer tests were developed in this research: the inter-well tracer test (a small volume of helium is injected into a subslab probe and the arrival is monitored in the suction pipe), and the helium flood (the system flow is reversed, helium is added at about 1%v/v and the arrival of helium is monitored at subslab probes at various distances). A push-pull test was attempted, but the rate of helium diffusion was too fast compared to the gas velocity to provide a clear signal.

The air-filled porosity (n) can usually be estimated with reasonable accuracy, so this parameter is not particularly sensitive. Porosity of soils is generally in the range of 0.25 to 0.4 (Freeze and Cherry, 1979), which is a relatively narrow range. The air-filled porosity of the material at shallow depths below the floor is expected to be similar to the total porosity because the building prevents infiltration of precipitation, so the subsurface drains to field capacity and generally dries further if there is an active SSV system removing humid air. The thickness of the permeable layer (b) can often be assessed by visual inspection of soil core, but otherwise, the helium tracer tests provide an independent line of evidence for verification of the b value.

The calibrated model can also be used to calculate the relative proportion of the total gas flow extracted that originates below the slab (Q(r)) as a proportion of the total extracted gas flow (Qssv) using Equation 7:

$$Q(r)/_{Q_{SSV}} = \frac{r}{B} K_1(r/B) \tag{7}$$

where $K_1$ is the first order Bessel Function. Equation 7 can be used to calculate the level of dilution of the subslab vapor concentrations caused by indoor air leakage across the floor slab for various distance from the point of suction (r). Equations 2 through 7 are easily solved using a spreadsheet. For systems with multiple extraction points, the sub-floor vacuum can be estimated by superposition of the results from nearby suction points or a numerical flow model can be used if the building geometry is complex.

## 2.3 MASS FLUX / MASS LOADING

The mass flux of VOCs available for potential vapor intrusion is commonly conceptualized by the steady-state upward diffusive flux (Johnson and Ettinger, 1991) from a source located at some depth below the building ($F_1$ in Figure 2-4). Transient changes in concentration may also contribute to increases or decreases in the vapor intrusion potential in the short-term. Strictly speaking, flux is measured per unit area, and when integrated over the area of a building, is referred to as a mass discharge or loading or emission. The mass flux of radon available for potential intrusion to the building is controlled by the emission rate from the geologic materials below the building.

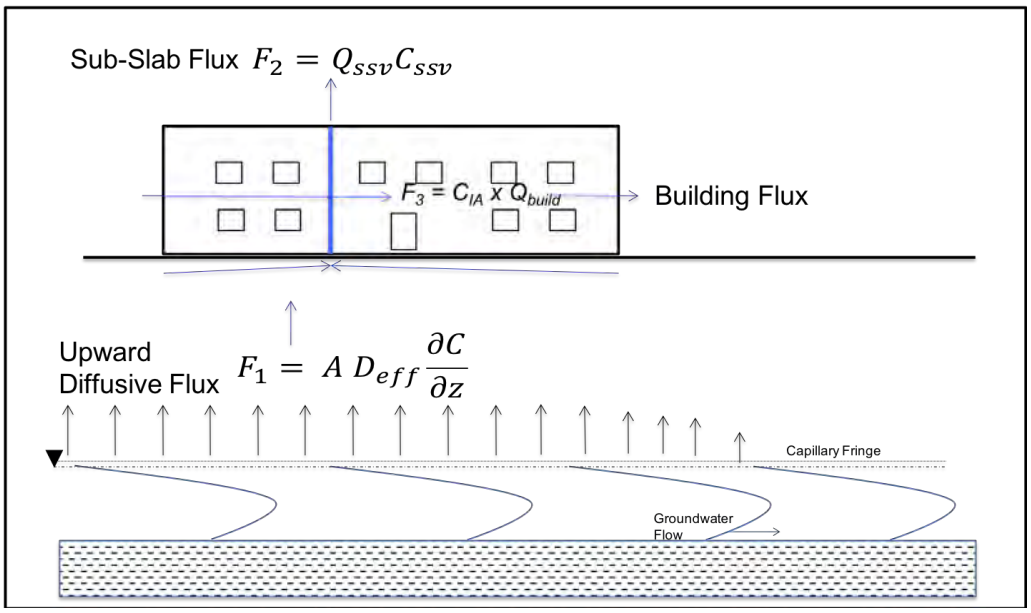



**Figure 2-4: Conceptualization of Mass Flux**

If the SSD system removes all or nearly all of the available mass flux into the building ($F_2$ in Figure 2-4), then the indoor air quality will be protected from vapor intrusion (this does not affect the presence of indoor air VOCs or radon from background sources inside the building or in outdoor air). Whatever fraction of the flux that is not captured may enter the building ($F_3$ in Figure 2-4 represents the mass flux through the building). In fact, one method to estimate $F_1$ is to depressurize the building in the absence of a mitigation system and measure $F_3$, which should be equal to or less than $F_1$, except for transient effects (see ESTCP ER201503). An overdesigned system can remove much larger volumes of gas, and as a result may capture some mass from beyond the footprint of the building, but if there is no increase in the VOC mass removal rate, the additional flow is not helpful, and is counter-productive because it contributes to energy losses (Figure 2-5).

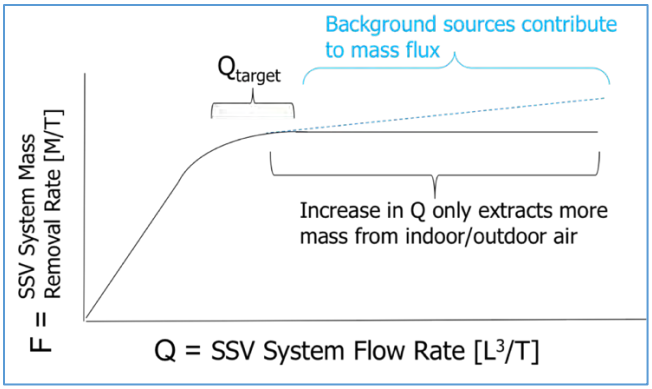



**Figure 2-5: Mass removal rate as a function of subslab venting system flow rate**

Mass flux monitoring can be useful for defining an exit strategy for a mitigation system, as shown in **Figure 2-6**. If the SSD/SSV system effectively contains all the available mass flux and the rate of mass removal is less than the minimum required to pose a potential risk (indoor air risk-based screening level multiplied by the building ventilation rate), these data support a no further action decision. To account for potential changes to mass in storage, this should be verified by means similar to cyclic operation of an SVE system prior to decommissioning.

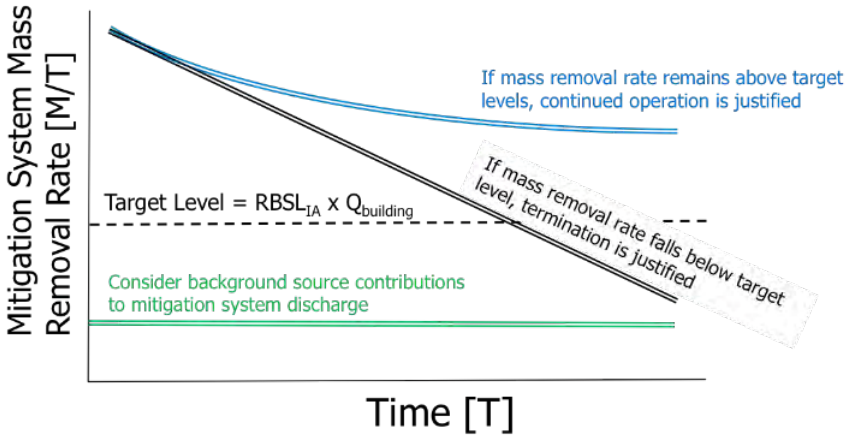



**Figure 2-6: Possible trends in mitigation system mass removal rate over time**

The mass flux can be conceptualized using a mass balance equation:

$$-D_{eff} (\delta C/\delta z) A = Q_{SSV} C_{SSV} + Q_{build} C_{IA} \quad (8)$$

where:

| | |
|---|---|
| $D_{eff}$ | effective diffusion coefficient for the compound of interest [$L^2$/t] |
| $\delta C/\delta z$ | vertical concentration gradient [M/$L^2$] |
| A | building footprint area [$L^2$] |
| $Q_{SSV}$ | subslab venting system flow rate [$L^3$/t] |
| $C_{SSV}$ | subslab venting system concentration [M/$L^3$] |
| $Q_{build}$ | building ventilation rate [$L^3$/t] |

$C_{IA}$ concentration in indoor air [$M/L^3$] from vapor intrusion (i.e. assumes no background indoor air contributions)

The goal of the SSV/SSD system is to keep $C_{IA}$ below a threshold level. If the SSD system effectively captures all the available mass flux, then $C_{IA}$ is reduced to zero and Equation 8 reduces to:

$$-D_{eff} (\delta C/\delta z) A = Q_{SSV} C_{SSV} \quad (9)$$

The upward diffusive flux of VOC vapors on the left side of Equation 9 is typically the rate-limiting step once mass in storage has been removed, so it can essentially be considered a threshold or target mass flux (MF) for the SSV system to contain, in which case Equation 9 reduces to:

$$MF = Q_{SSV} C_{SSV} \quad (10)$$

The goal of optimizing the SSV system is to select a $Q_{SSV}$ that will maintain a mass removal rate (the product of $Q_{SSV}$ x $C_{SSV}$) equal to MF as determined by: 1) $D_{eff} (\delta C/\delta z) A$, estimated from vertical profiles of sampling and analysis and soil property data, or; 2) $Q_{build} C_{IA}$, estimated from building pressure cycling. The mass removal rate from the system will initially include removal of mass from storage and subsequently stabilize at a level controlled by the upward diffusive flux. If the area of influence of the SSV system extends beyond the boundaries of the building, the mass removal rate may exceed the target mass flux by some margin. In the optimized system, the subslab vacuum may be lower than recommended by ASTM E2121, and occasional fluctuations in the building pressure could cause small amounts of soil vapor flow into the building. This is inconsequential if the upward flow is short-lived and the air entering the building was simply indoor air that moments earlier flowed in the opposite direction, or if the subslab ventilation rate is sufficient to reduce subslab concentrations to levels low enough to contribute negligible mass to the building over the duration of the pressure field reversal.

The mass flux also can be used to estimate a reasonable maximum indoor air exposure concentration ($C_{buildRME}$) that would be expected to be sustained if there was no operating SSV/SSD system:

$$C_{buildRME} = MF/Q_{build} \quad (11)$$

$Q_{build}$ can be measured directly (ASTM E741-11 or ASTM D-6245) or estimated from the literature. The U.S. EPA's Exposure Factors Handbook (U.S. EPA 2011) lists the mean air exchange rates as 1.5 AE/hr for commercial buildings and 0.45 AE/hr for domestic residences, which can be multiplied by the length, width and height of the building to estimate $Q_{build}$.

By similar logic, a mass flux screening level (MFSL) can be calculated with Equation 12, which represents a threshold MF below which vapor intrusion is unlikely to pose an unacceptable health risk. This can be useful for defining an exit strategy if the available mass flux is or becomes insufficient to sustain indoor air concentrations above a threshold risk.

$$MFSL = IASL \times Q_{build} \quad (12)$$

where:

IASL = indoor air screening level [$M/L^3$]

### 2.3.1 Indoor to SSV Tracer Testing

Indoor to SSV tracer testing can provide a direct measure of the percentage of indoor air that is extracted by an SSV/SSD system. This provides an independent line of evidence to verify the floor slab leakance calculated using Equation 7. The test consists of distributing a tracer in indoor air and measuring the concentration in both indoor air and the exhaust of the SSV system. The fraction of indoor air in the exhaust streams, F, can be assessed with the following equation:

$$F = \frac{C_{SSV} - C_{out}}{C_{in} - C_{out}} \quad (13)$$

where:

$C_{SSV}$ = the concentration of the tracer in the SSV exhaust stream,
$C_{out}$ = the outdoor air concentration and
$C_{in}$ = the indoor air concentration.

Sulfur hexafluoride ($SF_6$) was used as a tracer in this application at Building 200 and Sun Devil Manor because it can be detected at very low concentrations, it does not decay or sorb, and does not have significant background sources; however, $SF_6$ is a strong greenhouse gas, and is facing regulatory pressure to minimize its usage. Two other tracers were tested at Building 205, unfortunately, the carbon dioxide ($CO_2$) and formaldehyde (HCHO) data did not provide a clear signal, so tracer testing with those compounds was not pursued further.

### 2.3.2 Building-Specific Attenuation

The attenuation factor (AF), defined as the indoor air concentration (Cindoor) divided by the subsurface vapor concentration at a specified depth (Csource):

$$AF=(C_{indoor}/C_{source}) \quad (14)$$

For the special condition of a source directly beneath the foundation (i.e., the source-building separation distance $\rightarrow$ 0) and advection is the dominant mechanism of transport across the floor slab, AF$\rightarrow$Qsoil/Qbuilding, where Qsoil is the volumetric flow rate of soil gas into the building and Qbuilding is the total volumetric flow rate of air through the building or basement (i.e., the ventilation rate, which equals the interior volume multiplied by the air exchange rate). The building volume is easily measured or estimated. The air exchange rate can usually be estimated within a factor of about three for a typical residence: the mean air exchange rate for residences is 0.45 /hr and the $10^{th}$ percentile is 0.18 /hr, according to the U.S. EPA Exposure Factors Handbook (U.S.EPA, 2011). Chan et al., 2005 analyzed a database of 70,000 residential building leakage tests and showed comparable results. Qbuilding can be measured using blower door tests (ASTM E1821-11) and tracer tests ASTM E741-11, ASTM D6245-12). The air exchange rates for commercial buildings tend to be higher (mean = 1.5 /hr per EPA, 2011) and sometimes are

available from mechanical engineers responsible for the heating, ventilating and air conditioning (HVAC) systems.

In the field of hydrogeology, aquifer discharge (Qaq) is calculated using (Bear, 1979):

$$Qaq = K\ i\ A \tag{15}$$

where:

K = hydraulic conductivity [L/T]
i = hydraulic gradient [L/L], and
A = cross-sectional area perpendicular to flow [$L^2$]

Equation 15 can be applied to calculating Qsoil where A is the footprint of the building, i is the pressure gradient across the floor slab and K is the bulk average vertical gas conductivity of the floor slab.

Equation 3 can be re-arranged to solve for K':

$$K' = \frac{Kbb'}{B^2} \tag{16}$$

Combining Equations 1, 3 and 8 yields the following expression for the subslab-to-indoor air AF:

$$AF = \frac{Q_{soil}}{Q_{building}} = \frac{K' i\ A}{l\ w\ h\ AER} = \frac{\frac{Kbb'\Delta P}{B^2\ b'}A}{A\ h\ AER} = \frac{T\ \Delta P}{B^2\ h\ AER} \tag{17}$$

where Qsoil, Qbuilding, K', K, b', b, B, and T are defined above and:

A = area of the building (length (l) x width (w)) [$L^2$]
h = height of the interior space [L]
i = the pressure gradient across the floor slab (pressure difference (ΔP) in units of air head divided by the slab thickness (b')) [L/L]
AER = air exchange rate (number of building volumes exchanged per unit time) [$T^{-1}$]

In this formulation, the T and B values are derived from fitting vacuum vs distance data to Equation 4 and vacuum vs time data to Equation 1 (this typically requires some iteration to achieve the T and B values that match both most closely), the building height is either measured or reasonably estimated, the air exchange rate can be measured (ASTM E1827, E741 and D6245) or estimated from published data (U.S. EPA, 2011), and ΔP can be measured using a micromanometer with a datalogger.

## 2.4 TECHNOLOGY DEVELOPMENT

The mathematical approach employed in this research was developed by Geosyntec personnel for use in design of soil vapor extraction systems (Thrupp et al., 1996, 1998) and Geosyntec has been applying this for subslab venting system design since about 2008. A case study of the high-volume sampling (HVS) method and Hantush-Jacob analysis was published in a peer-reviewed journal

(McAlary et al., 2010) and additional mathematical modeling was presented in a platform presentation (McAlary et al, 2011). The HVS test has been performed at over 16 buildings with a total of 70 suction points and a total of 121 transient pneumatic response tests (McAlary et al., 2018). The vacuum versus time and vacuum versus distance profiles are consistent with the mathematical model in the majority of cases (exceptions include floors with complex pits, sumps, drains or bearing walls near the point of suction). AFCEE contracted Geosyntec for a Demonstration/Validation of High Volume Sampling versus Multi-Increment™ sampling (AFCEC, 2018), which included pneumatic testing and analysis at Vandenberg AFB Building 11193.

## 2.5 ADVANTAGES AND LIMITATIONS OF THE TECHNOLOGY

Advantages of the technology include:

1. Cost savings as a result of operating a reduced number of fans or fans of a smaller size using less electricity;
2. Cost savings as a result of reducing the loss of conditioned indoor air through leakage across the slab and discharge to the outdoor air via the SSV/SSD system;
3. Performance metrics based on measurements with a better signal/noise ratio compared to sub-floor vacuum and indoor air sampling; and
4. Development of a technical basis for an exit strategy for buildings when the mass flux of radon or VOC vapors is insufficient to pose a potential risk to building occupants.

Potential limitations of the technology include:

1. Site-specific conditions may pose currently unknown challenges (complex building foundations, interior footing for bearing walls, sub-floor utility conduits or other preferential pathways, floor slabs bearing on clay-rich soil, etc.);
2. Background sources of VOC vapors may complicate the interpretation of concentration data and calculations using the concentration data (forensic tools are available for analysis);
3. Temporal variability of subslab/stack and indoor air concentrations is to be expected, and is likely to require a margin of safety in the SSV/SSD system design.

# 3.0 PERFORMANCE OBJECTIVES

The performance objectives are provided in **Table 3.1**.

**Table 3-1: Performance Objectives, Data Requirements and Success Criteria**

| Performance Objective | Data Requirements | Success Criteria |
|---|---|---|
| Reduce Lifecycle Cost | Cost of baseline testing, analysis, optimization and verification. Savings via reduced energy costs. | Minimum 4X reduction in total Net Present Value/(Cost) |
| Maintain protectiveness of indoor air quality | Indoor air concentrations of VOCs and Radon | Rn<4pCi/L<br>VOCs within acceptable risk range (Hazard Index<1.0, Lifetime Incremental Cancer Risk $<10^{-5}$) or background range |
| Maintain protective mass removal rate | Flow rates and concentrations in vent-pipes | Optimized system removes at least 95% of the mass removed by a conventionally designed system. Correction may need to be applied for chemicals known or suspected to have sources inside the building or in ambient outdoor air. |
| Validate the technology with sufficient technical detail for independent third-party review | Physical data (flow and both transient and steady-state vacuum), chemical data (concentration, mass flux), financial data (energy costs and savings), mathematical modeling (analytical and numerical), monitoring of spatial and temporal variability in the pneumatic parameters and VOC distributions. | Consensus among the diverse and knowledgeable study team, plus one or more peer-reviewed journal articles. |
| Transfer the technology to DoD consultants and contractors so that it can be easily adopted and implemented at as many buildings as needed | None other than those above | Detailed standard operating procedures, technical papers, training video, presentations and ESTCP reports |
| Achieve regulatory approval | Invitation to select members of the regulatory community to attend field activities. | Roll-out via CLU-IN of the final report, presentations at several conferences, and webinars. |

## 3.1 DETAILED DESCRIPTIONS OF EACH PERFORMANCE OBJECTIVE

### 3.1.1 Reduce Lifecycle Costs

Lifecycle costs include capital costs of installation (typically driven by the number of suction points and number/power of fans), operation costs (electricity, fan replacement), monitoring costs (verifying continuous operation, sampling and analysis), regulatory reporting, the energy cost of conditioned indoor air extracted by the system, and administrative fees.

### 3.1.2 Maintain Protectiveness of Indoor Air Quality

Indoor air concentrations less than 4 pCi/L for radon and posing a hazard index less than 1 and a lifetime incremental cancer risk (LICR) less than 1E-5 for VOCs were considered protective. This was evaluated with indoor sampling and analysis and other lines of evidence.

### 3.1.3 Maintain Protective Mass Removal Rate

The mass removal rate was measured as the product of the SSV system flow rate and the concentrations in the extracted gas. Where available (Buildings 205 and 200), this was compared to the rate of mass removal from the system prior to optimization. For SDM and Building 11193, prior SSV system mass removal rates were not available, so the mass removal rate from the SSV system was compared to mass emission rates from the building during building depressurization testing.

### 3.1.4 Third Party Review

The contents of this report provide data and analysis/interpretation for four buildings, including one single-family dwelling (Sun Devil Manor), a small commercial building (Building 200), and two larger commercial buildings (11193 at 11,000 $ft^2$ and 205 at 64,000 $ft^2$). Data from these tests has been extensively shared with the technical community through the presentations listed in the Abstract of this report. A draft of this report was circulated for review to the members of the study team listed in Appendix A. A summary presentation was also made to the American Association of Radon Scientists and Technologists (AARST) Committee on Mitigation Standards, which includes over a dozen very experienced radon mitigation professionals (June 22, 2018).

### 3.1.5 Technology Transfer

The objective of technology transfer is intended to provide DOD personnel and their contractors with information they can use to understand the technology, its capabilities and limitations, benefits and costs to the degree needed to be able to employ the technology to the benefit of all.

### 3.1.6 Regulatory Approval

The objective of regulatory approval is intended to facilitate future applications of the technology by providing a clear basis that the approach is equally protective as the conventional approach and a track record of regulatory approval during the conduct of the research.

# 4.0 TEST DESIGN

This section describes the test design elements that were common to all four buildings. Elements that were unique to each building are described in Chapters 5 through 8, respectively.

## 4.1 CONCEPTUAL EXPERIMENTAL DESIGN

The basic concept for this research is that a subslab venting system for vapor intrusion mitigation can benefit from design principles commonly applied for groundwater extraction systems used to hydraulically contain plumes of contaminated groundwater. Water levels are not the sole design and performance monitoring parameter of groundwater mitigation systems, it is useful to characterize the aquifer permeability and use mathematical models to better understand the flow-field (ESTCP, 2003). The same logic can be applied to SSD/SSV systems.

Equations 4, 5, 6 and 7 provide a means to calculate radial profiles of vacuum, velocity, travel time and leakage across the floor slab. This raises the question of what values for each parameter would likely be protective. This is addressed in the following subsections. A worked example of how the mathematical modeling can be used to compare and contrast conditions with high and low transmissivity and leakance is provided in Appendix B.

### 4.1.1 Target Vacuum

Ambient cross slab differential pressure measurements provide valuable insight into the building-specific gradient, which is influenced by many factors, and therefore tends to be very different between buildings. When monitored over time, there are normally fluctuations, and commonly there are gradient reversals (from positive to negative building pressure). If readings are made every second, the magnitude of the fluctuations will be larger than if the differential pressure is averaged over time. The appropriate duration for averaging has yet to be studied in detail, but fluctuations of 1 second are unlikely to carry sufficient mass into a building to have a substantial effect on indoor air quality. An interval up to a minute is still very short relative to building air exchange rates.

If the compound of concern beneath a particular building has acute health effects, then it may be prudent to select an upper percentile value from the ambient differential pressure data for use as a target vacuum level. If chronic risks are the only concern, an average value may be more appropriate. In any event, it is prudent to err on the side of caution, so a margin of safety could be applied before selecting a building-specific target vacuum.

### 4.1.2 Target Velocity

There is currently no existing performance goal for the induced velocity below a floor slab, but as a frame of reference, one could calculate an upward velocity that corresponds with an upper-range estimate of the volumetric flow of soil gas into a building. EPA compiled data on subslab (Css) and indoor air (Cia) VOC concentrations (U.S. EPA, 2012) and the 95$^{th}$ percentile value of the empirical attenuation factor (AF=indoor air/subslab concentrations) was 0.03, which is considered protective. Using mass balance principles (Johnson, 2005) the AF is equivalent to the ratio of

Qsoil/Qbuild (volumetric flow of soil gas into building / volumetric flow of air through the building). Qsoil can be defined as:

$$Q_{soil} = V_{soil}\, An \tag{18}$$

where:

Vsoil = the net average upward velocity of soil gas [L/t]
A = building area [$L^2$], and
*n* = effective air-filled porosity [v/v]

Qbuild is defined as:

$$Q_{build} = A\, h\, AER \tag{19}$$

where:

h = building height [L]
AER = the air exchange rate [$t^{-1}$].

The Vsoil value corresponding to the upper 95$^{th}$ percentile attenuation factor (0.03) would be:

$$V_{soil} = (h\, AER\, AF_{95\%-ile})/n \tag{20}$$

A reasonable estimate of the air-filled porosity of soil beneath a building is about 30%. A typical building height for a residential building is 8 ft. The 95th percentile attenuation factor would likely correspond with a building having a relatively low air exchange rate, and the 10th percentile for residential air exchange rates is 0.18/hr (USEPA, 2011); therefore Vsoil is about 0.144 ft/hr (or about 3 ft/day). If the mitigation system induces a velocity toward the suction point that is greater than this value, subsurface vapors are likely to be captured or contained by the system. Coincidentally, 3 ft/day is the induced velocity considered to be sufficient for a soil vapor extraction system by AFCEE and U.S. ACoE (AFCEE, 2001 and USACoE, 2002). Note that this logic is based on a conservative (upper 95$^{th}$ percentile) default value for AF. A similar logic could be developed using a building-specific AF value, which can be calculated from the flow and vacuum testing (McAlary et al., 2018). For a median attenuation factor of 0.003 (USEPA 2012) and a median air exchange rate of 0.45/hr (USEPA, 2011), the Vsoil would be about 0.9 ft/day, which indicates Vsoil is likely to be considerably less than 3 ft/day in most cases.

### 4.1.3 Target Travel Time

If the upper-range subslab velocity into the building is 3 ft/day (as calculated above from the 95$^{th}$ percentile AF of 0.03) and the average thickness of the active flow zone beneath the building is 4 to 6 inches (commonly specified for granular fill in building codes), then the 95$^{th}$ percentile vertical travel time across the granular fill is about 3 to 4 hours. If the travel time from a particular radius to the suction point is less than this range, the vapors would likely be contained. Again, this is for a 95$^{th}$ percentile attenuation factor, and a building-specific attenuation factor could be used to calculate a building-specific target travel time. For a median attenuation factor (0.003), the target travel time across the granular fill would be approximately 9 to 13 hours (about half a day).

### 4.1.4 Target Vertical Flow Per Unit Area

Equation 7 can be differentiated to calculate the vertical component of flow across the floor per unit area at progressive distances from the point of suction, which can be compared to generic estimates of Qsoil. For example, the U.S. EPA recommended a default value of 5 L/min for Qsoil for their spreadsheet implementation of the Johnson and Ettinger (1991) model (EQM, 2004), which was for a default building area of 100 $m^2$, or roughly 1000 $ft^2$. Within a certain radius from the suction point, the vertical leakage of air down across the slab will equal or exceed this reference point of 5 L/min per 1000 $ft^2$.

## 4.2 DESIGN AND LAYOUT OF TECHNOLOGY COMPONENTS

For buildings with an existing SSV system (205, 200 and SDM), the components are described in Sections 5, 6 and 7. At Building 11193, a temporary SSV system was constructed, the components of which are described in Section 8. In future testing at buildings with no existing system, both transient and static vacuum response testing can be conducted using the apparatus shown in **Figure 4-1**. A suction point of at least 2-inch diameter is needed to minimize frictional losses. A concrete coring machine or a hammer drill can create a hole of 2 to 4 inches in diameter with minimal effort. It is advantageous to remove some granular fill from the region below the floor, typically 1 to 10 kg, depending on the diameter of the cored hole. A PVC pipe is then sealed to the floor using backer rod between the pipe and the concrete and fast-setting anchor cement in the annulus above the backer rod. A sample port and vacuum gauge are connected to the wellhead. A four (4) foot section of two (2) inch diameter PVC pipe extends from this connection to provide a near-linear flow regime for measurement of gas velocity with a thermal anemometer or similar quality flowmeter. A bleed valve is located ahead of the fan (a Shop-Vac® is equally useful as a fan) and can be opened if the flow rate is very low to reduce the risk that the fan will overheat. A lung-box (or vacuum chamber) is used to collect gas samples into a Tedlar bag for field screening via a photoionization meter (PID) and Landfill Gas Meter (LGM). Summa canister samples are collected by direct connection to a sample port in the PVC piping. The extracted soil gas can be treated with a portable carbon filtration unit comprised of one 55 gallon drum of activated carbon. A second 55 gallon drum of permanganate treated zeolites is recommended if vinyl chloride is present in soil vapor at elevated concentrations, because VC is not effectively retained by activated carbon filtration. The exhaust may also be discharged through layflat Mylar tubing through an exterior door or window to a location downwind of the building (polyethylene tubing is not recommended because VOC vapors diffuse through polyethylene at a rate that may result in indoor air concentrations of potential concern).



**Figure 4-1: Apparatus for pneumatic testing showing Shop Vac, linear pipe segment for velocity measurement, sampling port with lung-box attached for Tedlar bag sample collection, Summa canister sample connected to sample port at wellhead**

## 4.3 TESTING PROGRAM

### 4.3.1 Specific Capacity Testing

Specific capacity is the ratio of flow to applied vacuum, which is proportional to the permeability of the material below the floor slab. The flow velocity in a vent-pipe is easily measured using a Dwyer 471 thermal anemometer or similar, and the velocity is multiplied by the internal cross-sectional area of the pipe to determine the flow rate. The applied vacuum is easily measured using a U-tube manometer or Magnehelic vacuum gauge. The ratio of the flow divided by the applied vacuum is the specific capacity, expressed typically in units of scfm per in. $H_2O$.

### 4.3.2 Transient Vacuum Response Testing

Transient vacuum data can be collected by cycling a suction fan on and off while measuring applied vacuum at nearby subslab probes. Data logging micromanometers (e.g., DG-700 from The Energy Conservatory) can be used to record vacuum measurements at 1-second intervals. With the fan off, the meters are be zeroed prior to starting the test and the data logger started. Then the fan is turned on and time recorded. When vacuum measurements stabilize (usually within a minute or two, but sometimes as short as 10 seconds or as long as 30 minutes), the fan is turned off, and the

vacuum is recorded until it returns to baseline (usually a comparable amount of time as was required to reach a static vacuum). At least two on/off cycles are recommended where practical so the reproducibility of the data can be verified.

In cases where the transient pneumatic response is very rapid, the test data benefits from having a ball-valve between the fan and the suction point. It may take a few seconds for the fan to reach peak speed and a few seconds to stop after the power is cut, but the ball-valve can be opened or closed much more rapidly, which creates a more instantaneous change in the flow. The mathematical model for the analysis of the transient data assumed the pumping starts and stops instantaneously, so it is good to make best efforts to match this during the field data collection.

### 4.3.3 Static Vacuum Versus Distance Measurements

Static vacuum data should be recorded after the vacuum levels stabilize at all subslab probes in the proximity of the suction point being tested at any particular time. Static vacuum can be measured using the same micromanometer as the transient vacuum measurements.

There is a distinct advantage to having at least one monitoring point located at a small radial distance from the suction point because the vacuum at small distances from the suction point depends primarily on the T value. The rate at which the vacuum decreases with distance from the suction point depends largely on the B value. Therefore, the confidence in the T and B values improves if the subslab monitoring points include both short and large radial distances from the suction point. Note that the suction measured in the vent-pipe itself can be misleading because there is often turbulent flow in very close proximity to the suction point and inside the pipe, which would tend to cause a positive bias in the vacuum measured in the vent pipe.

If there is no measurable vacuum, it is instructive to use a smoke-pen or chemical smoke tubes to assess whether there is downward flow into the subslab probe (which can occur at very modest vacuum levels, too low to easily measure when the material below the floor is highly permable). Smoke tubes can also be used to inspect the flow of air from the building through obvious joints and cracks in the floor. If the vacuum is very small or if baseline fluctuations are relatively large, there is a benefit to logging the pressure over time and cycling the fan on and off several times. The magnitude of the change imposed by the fan will typically become apparent as a saw-toothed pattern of drawdown and recovery, which can be discerned even against baseline drift and fluctuation.

### 4.3.4 Helium Inter-Well Test

The inter-well tracer test consists of injecting a small slug (~10L over a few seconds) of 100% helium into a subslab probe near an operating suction point. Helium concentrations in the extracted gas are monitored by drawing gas from a small port in the vent pipe and monitoring continuously with a helium meter to determine the time lag between the midpoint of the helium injection and the moment of maximum helium concentration at the vent-pipe, which represents the average travel time, as shown in Figure 4-2.

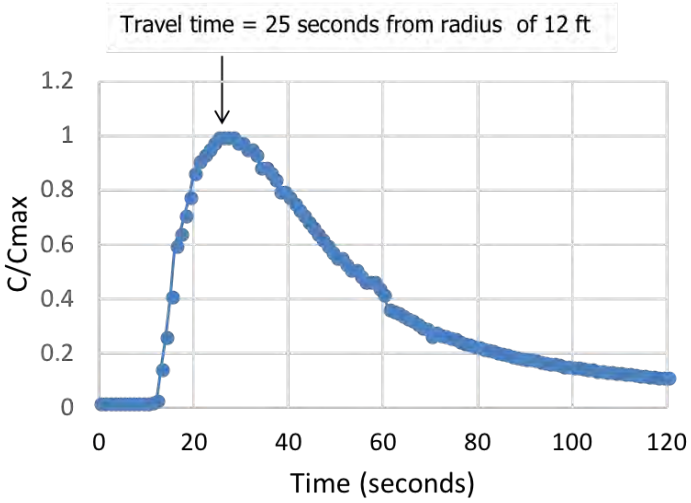



**Figure 4-2: Example breakthrough curve for an inter-well subslab helium tracer test**

The inter-well test provides the most useful results when the test is between about 30 seconds and 3 minutes in length. If the helium is injected so close to the suction point that it arrives in less than 30 seconds, then the time lag in the instrument reading can cause a positive bias that becomes significant. If the test is longer than a few minutes, the peak spreads by dispersion (helium has a very high diffusion coefficient), and the peak is very low and broad and the peak is harder to discern. The range of radial distances that would fall in the range of about 0.5 to 3 minutes travel time depend on the rate of gas extraction. A simple calculation can be used to approximate this, assuming that flow to the extraction point is dominated by a permeable granular fill layer of 0.1 m thickness (4 inches) and 25% air-filled porosity, with minimal leakage. The recommended minimum and maximum radial distance for the injection point(s) are provided in Table 4-1. If transient and steady-state pneumatic testing has already been conducted and the T and B values have been calculated, the radial distances corresponding to 0.5 to 3 minute travel times can be calculated using Equation 5 and 6 instead.

**Table 4-1: Recommended minimum and maximum radial distances for the injection point of a helium inter-well tracer test as a function of the rate of gas extraction at the suction point**

| Q (scfm) | Minimum radius (m) | Maximum radius (m) |
|---|---|---|
| 5 | 0.9 | 2.3 |
| 10 | 1.3 | 3.3 |
| 15 | 1.6 | 4.0 |
| 20 | 1.9 | 4.6 |
| 25 | 2.1 | 5.2 |
| 30 | 2.3 | 5.7 |
| 35 | 2.5 | 6.1 |
| 40 | 2.7 | 6.6 |
| 45 | 2.8 | 7.0 |
| 50 | 3.0 | 7.3 |
| 55 | 3.1 | 7.7 |
| 60 | 3.3 | 8.0 |
| 65 | 3.4 | 8.4 |
| 70 | 3.5 | 8.7 |
| 75 | 3.7 | 9.0 |
| 80 | 3.8 | 9.3 |
| 85 | 3.9 | 9.6 |
| 90 | 4.0 | 9.8 |
| 95 | 4.1 | 10.1 |
| 100 | 4.2 | 10.4 |

### 4.3.5 Helium Flood Test

The helium flood test is preferred for measuring travel time to larger radial distances than the inter-well test. If both inter-well and flood tests are planned, the inter-well tests should be performed first to avoid a background helium interference, and provide information for planning the frequency of monitoring and distances for the flood test. The flood test consists of injecting air into the subsurface through the vent pipe, either by reversing the fan or using a ShopVac® to blow approximately the same flow rate into the subsurface as is usually removed during extraction. A continuous stream of helium is added to the injected air at a flow rate sufficient to achieve about 1% v/v helium in the injected gas. The helium will migrate below the floor in all directions away from the vent-pipes. The He concentration is measured at regular intervals at subslab probes until the helium concentrations reach 50% of the injected helium concentration, which represent the average travel time to the given probe (see Figure 4-3). After the midpoint of the breakthrough curve has been reached, data collection can proceed to locations progressively farther from the

point of injection. Periodic measurements should be made after the midpoint has been recoded to verify that the final concentration at the probes matches the injected concentration.

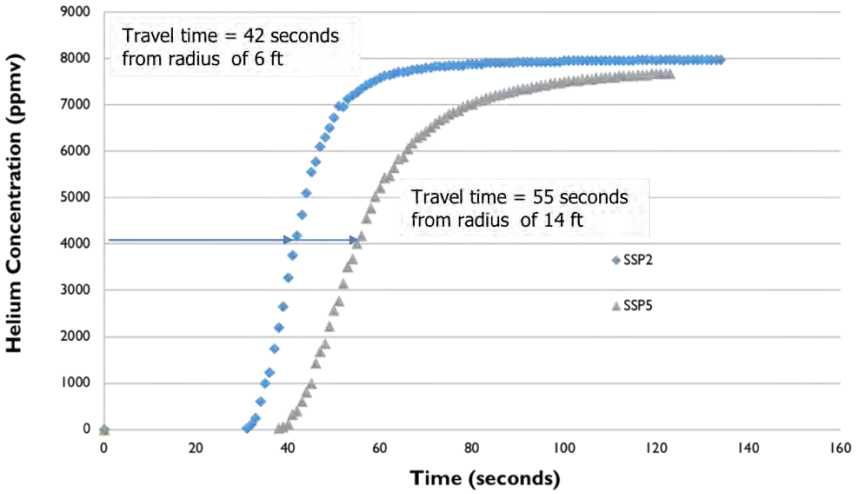



**Figure 4-3: Example breakthrough curves for subslab helium flood tracer test**

### 4.3.6 Cross-Slab Tracer Test

Equation 7 can be used to calculate the proportion of flow originating from below the floor slab, and the indoor air leakage test is designed to provide an independent line of evidence to test this calculation. The test consists of adding a tracer gas to indoor air and monitoring the concentration of the tracer in the emission from the vent pipe(s). If all of the gas extracted by the system is attributable to leakage across the floor slab, then the concentration of the tracer in the vent-pipe effluent will be equal to the concentration in the indoor air after at least a few pore volumes of gas have been swept through the active flow zone beneath the floor slab, or real-time monitoring has shown the tracer concentration in the effluent of the system has stabilized. If the steady concentration of tracer in the vent-pipe effluent is lower than the indoor air concentration, then the system is likely drawing gas from either outdoor air that enters the subsurface outside the building footprint, or from subsurface preferential pathways, or both.

### 4.3.7 Mass Flux Monitoring

Mass discharge from the venting systems was measured by calculating the product of the flow rate and concentrations of VOCs and radon from the vent pipes.

Mass discharge from the building was measured by depressurizing the building and measuring the air flow rate being extracted from the building and the average concentrations of VOCs and radon in the extracted air. For Building 205, this was accomplished by placing tarps partially over the air intakes without reducing the flow from the exhaust fans. For Buildings 200 and 11193, the building mass discharge was measured as part of ESTCP ER2015-03. For Sun Devil Manor, the building mass discharge was measured as part of SERDP ER1686.

### 4.3.8 Stress Test

A stress test was developed which consists of using a blower door to impose a vacuum on the building interior while the optimized mitigation system is operating. The imposed vacuum should be selected based on reasonable conditions for the building, and ambient cross-slab monitoring over time should be able to provide appropriate differential pressure data. The mass loading of target compounds to the building can be measured by collecting a sample at the face of the blower door after operating for long enough to reach a steady state condition, which can be verified by real-time monitoring or estimated by flushing a minimum of a few multiples of the building volume prior to sample collection (i.e., less than the mass flux screening level). The mass loading to the building under these conditions should ideally be too low to pose a potential health concern. If the stress test indicates an unacceptable loading to the building, additional forensic effort may be required to assess whether the root cause is an inadequate mitigation system design or background sources inside the building, or diffusive transport through the floor slab.

### 4.3.9 Building-Specific Attenuation Factor

For each building tested, the building-specific attenuation factor was calculated using Equation 17 and with available subslab and indoor air concentration data to compare and contrast the results.

## 4.4 SAMPLING METHODS

VOC vapor concentrations were primarily characterized by U.S. EPA Method TO-15 using passivated stainless steel canisters. Samples from vent-pipes were typically collected as "grab" samples (i.e., instantaneous, with no flow controller), indoor air samples were typically 24-hour samples in 6 L individually certified canisters and analyzed by the selected ion monitoring (SIM) method to achieve lower reporting limits. Some vent-pipe samples were collected using time-weighted average passive samplers (the Waterloo Membrane Sampler, Seethapathy and Gorecki, 2010, 2011). WMS samplers have been accepted by the State of New Jersey as a stand-alone technology for measurement of VOCs in discharge samples (NJDEP, 2009).

Radon concentrations were characterized either using a direct reading portable instrument (Duridge Rad7 or Accustar RadStar), by collection of whole gas samples in Tedlar bags, which were shipped to the University of Southern California for analysis by Professor Douglas Hammond using the Lucas cell method, or using E-Perm Electret samples over a period of typically 30 days.

Velocity measurements in vent-pipes were made using a Dwyer Model 471 thermal anemometer, which was inserted to the middle of the pipe and the average reading over about 10 seconds was recorded. Measurements were made in straight sections of pipe with a length at least 9 times the diameter to approximate laminar flow conditions.

Vacuum measurements were made using U-tube manometers, Dwyer Magnehelic gauges or one of a few digital micromanometer (Greywolf, Zephyr II, Dwyer or TEC DG700). Instruments were either auto-zeroing, or were zeroed before readings were made. Prior to analysis in AQTESOLV, the transient vacuum measurements were converted to units of feet of air head (1 Pa = 0.273 ft of air head at 15 $^{o}$C).

Field screening for VOC vapor concentrations were made using a PID (preferably the Tiger by Ionscience, which manages interferences by water vapor better than other PIDs), or using a ppbRAE or miniRAE if the Ionscience instruments were unavailable.

Field screening for $O_2$, $CO_2$ and methane ($CH_4$) concentrations were made using a GEM 2000 or GEM 5000 LGMs.

Radial distances between suction points and subslab probes were measured in a direct line with a measuring tape where possible. If a wall was present between the suction point and the subslab probe, the distance was calculated using Pythagorean theorem from orthogonal distance measures on the other two sides of a right triangle.

### 4.4.1 Calibration of Field Equipment

All instruments and equipment used during field sampling and analysis were operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations. Operation, field calibration, and maintenance were performed by trained personnel on a daily basis. Field calibration was performed at the beginning of each day and checked at the end of each sampling day.

The PIDs were field-calibrated to zero gas and 100 ppm isopropylene span gas. The GEM 2000 or GEM 5000 LGMs were calibrated with a mixture of span gases and the Dielectric Helium Meters were calibrated by the rental agencies. The Duridge Rad-7 and Accustar RadStar meters were verified to have been calibrated within the past twelve months and that background measurements had been performed. Micromanometers were zeroed in the field prior to use or were auto-zeroing.

One calibration issue occurred during the study: Arizona State University provided a helium meter for use at Sun Devil Manor that provided readings lower than the other two instruments rented by Geosyntec. This is not problematic because both the helium flood and the inter-well tracer test depend on relative concentration (C/Cmax), not absolute values. The only consequence is that one of the flood tests was adjusted part-way through the test, so the breakthrough curve was non-ideal. This was manageable, because the test had already progressed to the stage where the initial (pre-adjustment) data was sufficient to extrapolate the remainder of the breakthrough curve.

### 4.4.2 Quality Assurance Sampling

Quality assurance (QA) sampling was conducted to document the accuracy, precision, reliability and representativeness of the data. Field meters were calibrated and calibration checks were performed as documented in Field Calibration Forms which are included in Appendix C (which is subdivided for the four buildings tested).

Samples for laboratory analysis of VOCs were collected using Summa canisters or passive samplers. When Summa canisters were used, a duplicate frequency of one in ten (10%) was conducted, except when collecting small numbers of samples (1-3) during confirmation testing of optimized systems. When passive samplers were used, duplicate samples were also collected on a 10% basis and trip blanks samples were also analysed with a frequency of one per batch of samples.

Samples for laboratory analysis of Radon were collected using Tedlar bags or Electrets. When Electrets were used, duplicate samples were also collected at a 10% frequency. When Tedlar bag samples were used, the laboratory technician split each sample into two and analysis were performed twice on each sample.

### 4.4.3 Sample Documentation

Samples that were shipped to a contract laboratory for analysis were shipped by courier using chain of custody forms and custody seals. Samples were labelled with unique sample ID numbers, which generally included the location, media and samplers initials. Samples were labelled using indelible ink (not marker, which may emit VOCs). Daily field forms were used to document field activities and field measurements were recorded on forms specific for each monitoring method. Field forms are compiled and presented in Appendix C.

## 4.5 ACTIVITIES UNIQUE TO EACH TEST BUILDING

Activities unique to each of the four buildings tested are described in Chapter 5 (Raritan Arsenal Building 205), Chapter 6 (Raritan Arsenal Building 200), Chapter 7 (Sun Devil Manor) and Chapter 8 (Vandenberg Building 11193).

# 5.0 SITE 1: FORMER RARITAN ARSENAL BUILDING 205

Building 205 (Figure 5-1) is located at the former Raritan Arsenal in Edison New Jersey: a 3234-acre site that was used by the United States Army from 1917 to 1964 and is the subject of an ongoing Defense Environmental Restoration Program – Formerly Used Defense Sites (DERP-FUDS) remediation program being administered by the United States Army Corps of Engineers (U.S. ACoE). An existing mitigation system consisting of 27 suction points connected to 9 high suction fans was installed in October, 2005 (Alpha Concepts, 2006). This chapter describes the site conditions, site-specific testing, data analysis and interpretation. The data indicate that a system may not be needed, but in an abundance of caution, two fans remain operating, and are more than sufficient to be protective of VOC and radon vapor intrusion.

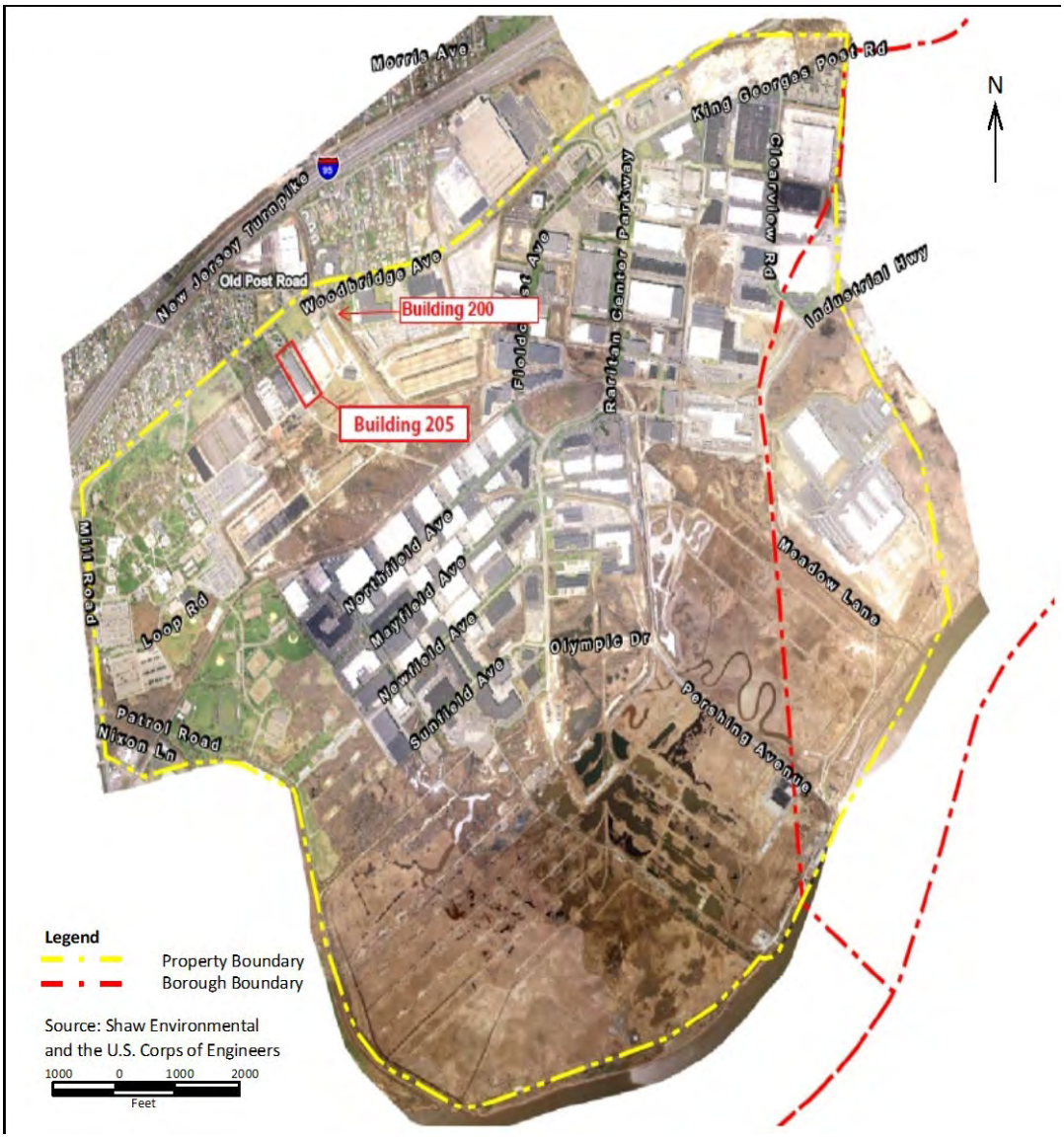



**Figure 5-1: Location of Building 205 at the Raritan Arsenal**

## 5.1 SITE DESCRIPTION AND HISTORY

Building 205 is a 64,000 $ft^2$, single-story brick building with a concrete slab floor on grade. The building is surrounded by a parking lot with a small landscaped lawn area. The building was constructed in 1918 and operations activities included pits, degreasers, stills, dip tanks and underground utility lines (U.S. ACoE, 2005). Currently, the building use is predominantly office space. Limited information is available on building footer construction, however the building appears to be constructed with a perimeter footing and interior columns supported on separate individual footers spaced at approximately 20 foot centers. A continuous footer may exist at the mid-point of the building running East-West across the building between extraction points HSF-05 and SSF-06 where the hallways are partitioned internally by doors that separate the different HVAC areas (indicated by shading in Figure 5-2). One HVAC unit serves the entire North-end of the building (about 29,000 square feet), a second HVAC unit serves the perimeter offices of the South-end of the building (about 24,000 square feet), and a third HVAC unit serves the internal offices in the South-end of the building (about 11,000 square feet).

Each of 9 Radonaway HS 2000 fans are mounted on the rooftop and discharge at a height about 4 ft above the roofline. Each fan is connected to three suction points through a 3-inch diameter PVC header than runs below the roof line (indicated by dashed lines in Figure 5-2). Photos of the exterior and interior are provided in Figure 5-3.

### 5.1.1 Site Geology/Hydrogeology

The Raritan Arsenal site is underlain by glacial lake sediments that have been described as inter-bedded sand and clay with some gravel. The data collected through historical site investigation activities indicates the shallow geology in the vicinity of Building 205 consists of generally homogenous unconsolidated sediments, primarily sand and silts with fill materials of variable thickness near the ground surface. The depth to the water table is approximately 30 ft bgs based on historical water level measurements.

### 5.1.2 Contaminant Distribution

Initial building-specific assessment activities were conducted by the U.S.EPA. In December 2004, they installed and sampled two temporary groundwater monitoring wells and 19 subslab points, shown in Figure 5-4. Sample results had a maximum TCE groundwater concentration of 7 μg/L and subslab concentration of 27,409 $\mu g/m^3$.

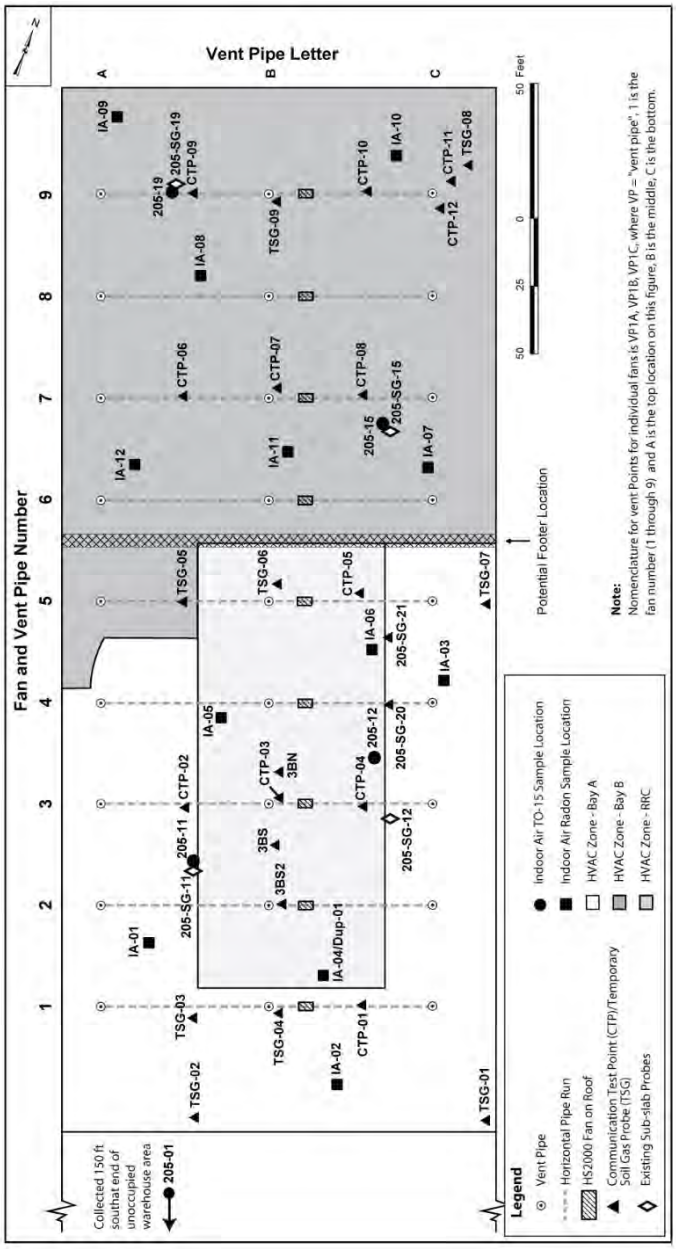



**Figure 5-2: Building 205 air zones, locations of vent-pipes and sampling locations**




**Figure 5-3: Photos of exterior and interior of Building 205**

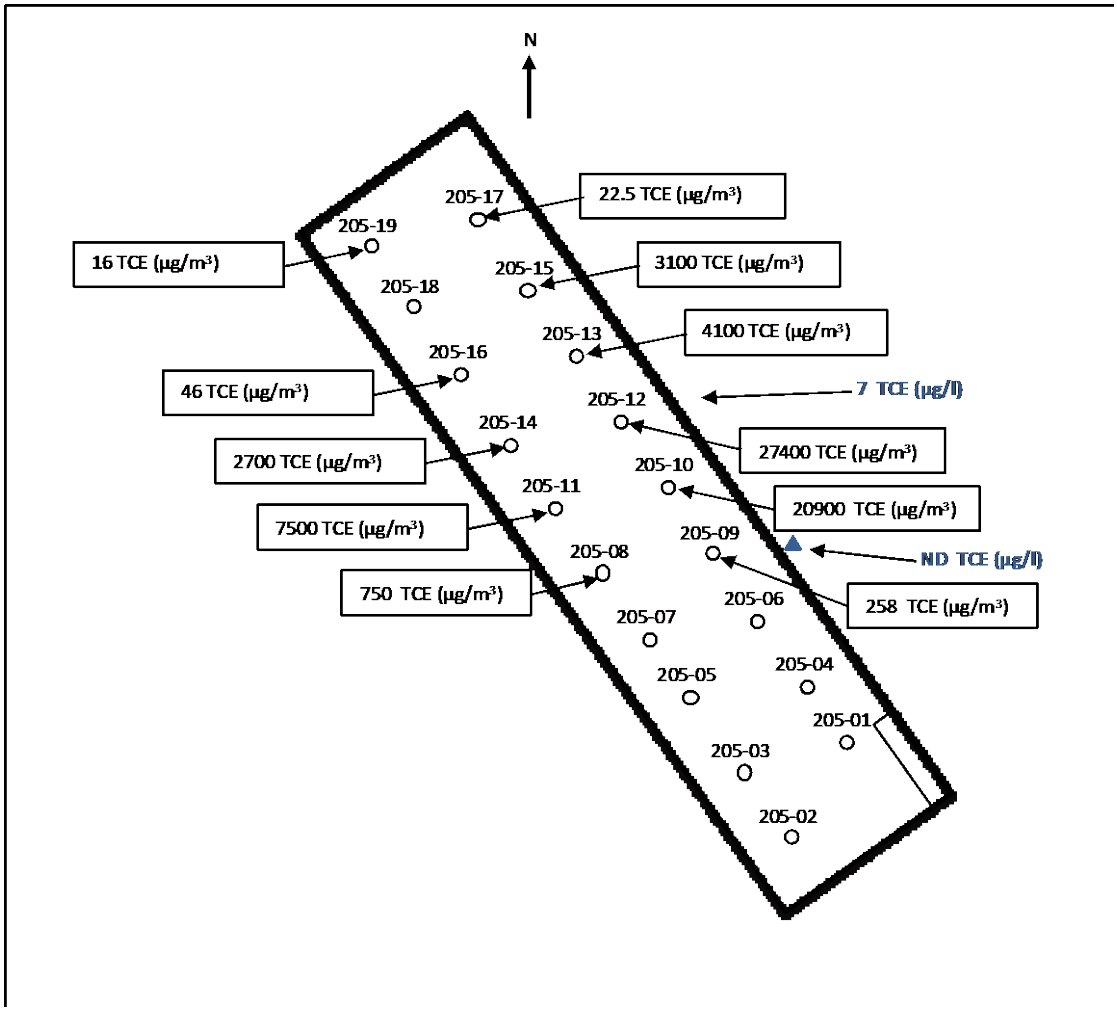



**Figure 5-4: Measured concentrations of TCE in shallow groundwater and subslab samples collected from wells in the vicinity of Building 205**

Based on those results, EPA sampled indoor air with a Trace Atmosphere Gas Analyzer (TAGA) unit in January 2005; measuring a maximum indoor air concentration of 57 ppb (310 µg/m$^3$), as shown in Figure 5-5 (note that the elevated concentrations of TCE in indoor air were very localized and did not correspond with the location of highest susbslab vapor concentrations, which raises the question of whether there may have been a background source inside the building). These concentrations exceeded their respective New Jersey Department of Environmental Protection subslab and indoor air screening levels by more than 10 times, so an SSD mitigation system was installed by the U.S.EPA.

Several rounds of indoor air and subslab soil gas sampling have been conducted by the U.S. ACoE since the SSD system was installed. Sample locations are shown on Figure 5-2. The indoor air concentrations (Table 4-1) are predominantly below reporting limits for TCE and PCE, with occasional detections and, rarely, with measured concentrations above 1 µg/m$^3$. The subslab data (Table 4-2) show that TCE concentrations are generally higher than PCE concentrations. Indoor air samples collected at five locations in the building on February 19, 2014 by Shaw Environmental

for the U.S. ACoE using Summa canisters and analyzed by USEPA Method TO-15 showed no detectable TCE at reporting levels that ranged from 0.07 to 0.107 μg/m$^3$ (Shaw, 2014). The measured subslab TCE concentrations in recent years are generally less than the NJDEP SSSL of 150 μg/m$^3$.

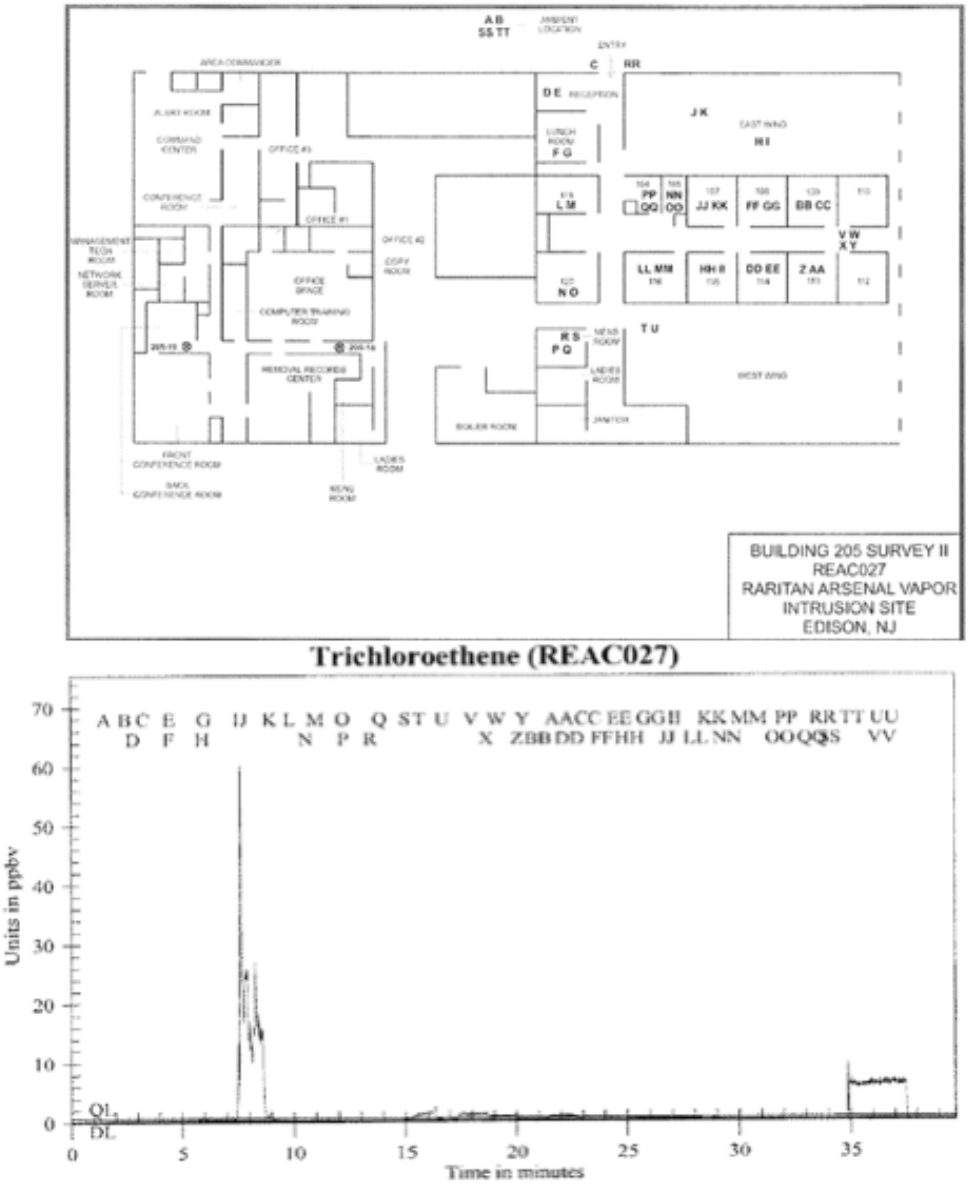



**Figure 5-5: Building 205 indoor air TCE concentrations measured by the TAGA unit**

## Table 5-1: Historical Indoor Air Sampling and Analysis Data from Building 205

**Indoor Air Samples**

205-19 Small Conference room

| Date | PCE | TCE |
|---|---|---|
| 1/30/2006 | 1.4U | 1.1U |
| 6/13/2006 | 1.4U | 1.1U |
| 9/13/2006 | 1.4U | 1.1U |
| 1/11/2007 | 1.4U | 1.1U |
| 4/9/2007 | 1.4U | 1.1U |
| 8/27/2007 | 1.4U | 1.1U |
| 11/14/2007 | 1.4U | 1.1U |
| 6/3/2008 | 0.33 | 0.27 |
| 9/30/2008 | 0.34 | 1.02 |
| 3/12/2009 | 0.2J | 0.21U |
| 9/17/2009 | 0.2U | 0.21U |
| 3/3/2010 | 7.46 | 0.21U |
| 9/24/2010 | 0.35 | 0.21U |
| 9/20/2011 | 0.27U | 0.21U |
| 2/22/2012 | 0.27U | 0.21U |
| 10/23/2012 | 0.42 | 0.21U |
| 2/26/2013 | 0.27U | 0.21U |
| 9/23/2013 | 1.36U | 0.05J |
| 2/19/2014 | 1.36U | 0.04J |

205-15 Bay A top of filling cabinet

| Date | PCE | TCE |
|---|---|---|
| 1/30/2006 | 1.5 | 1.1U |
| 6/13/2006 | 1.4U | 1.1U |
| 9/13/2006 | 1.4U | 1.1U |
| 1/11/2007 | 1.4U | 1.1U |
| 4/9/2007 | 1.4U | 1.1U |
| 8/27/2007 | 2.7 | 1.1U |
| 11/14/2007 | 1.4U | 1.1U |
| 6/3/2008 | 0.33 | 0.32 |
| 9/30/2008 | 0.47 | 0.22 |
| 3/12/2009 | 0.34 | 0.21U |
| 9/17/2009 | 0.2U | 0.21U |
| 3/3/2010 | 0.2U | 0.21U |
| 9/20/2011 | 0.27U | 0.21U |
| 2/22/2012 | 0.37 | 0.21U |
| 10/23/2012 | 0.24J | 0.21U |
| 2/26/2013 | 0.27U | 0.21U |
| 9/23/2013 | 1.36U | 0.05J |
| 2/19/2014 | 1.36U | 0.04J |

205-11 Bay B between 4th and 5th beam

| Date | PCE | TCE |
|---|---|---|
| 1/30/2006 | 1.4U | 1.1U |
| 6/13/2006 | 1.4U | 1.1U |
| 9/13/2006 | 1.4U | 1.1U |
| 1/11/2006 | 1.4U | 1.1U |
| 4/9/2007 | 1.4U | 1.1U |
| 8/27/2007 | 1.4U | 1.1U |
| 11/14/2007 | 1.4U | 1.1U |
| 6/3/2008 | 0.33U | 0.22U |
| 9/30/2008 | 1.08 | 3.87 |
| 3/12/2009 | 0.41 | .21J |
| 9/17/2009 | 0.2U | 0.21U |
| 3/3/2010 | 8.82 | 0.21U |
| 9/24/2010 | 0.6 | 0.35 |
| 9/20/2011 | 0.24J | 0.21U |
| 2/22/2012 | 1.1 | 0.21U |
| 10/23/2012 | 0.46 | 0.21U |
| 2/26/2013 | 0.27U | 0.21U |
| 9/23/2013 | 1.36U | 0.08J |
| 2/19/2014 | 1.36U | 0.07J |

205-12 Bay B 3rd Beam

| Date | PCE | TCE |
|---|---|---|
| 1/30/2006 | 1.4U | 1.1U |
| 6/13/2006 | 1.4U | 1.1U |
| 9/13/2006 | 1.4U | 1.1U |
| 1/11/2006 | 1.4U | 1.1U |
| 4/9/2007 | 1.4U | 1.1U |
| 8/27/2007 | 1.4U | 1.1U |
| 11/14/2007 | 1.4U | 1.1U |
| 6/3/2008 | 0.33U | 0.43 |
| 9/30/2008 | 0.41 | 1.18 |
| 3/11/2009 | 1.63 | 0.21U |
| 9/17/2009 | 0.34J | 0.21U |
| 3/3/2010 | 18.99 | 0.21U |
| 9/24/2010 | 0.55 | 0.26 |
| 9/20/2011 | 0.35 | 0.21U |
| 2/22/2012 | 0.27U | 0.21U |
| 10/23/2012 | 0.43 | 0.21U |
| 2/26/2013 | 0.27U | 0.21U |
| 9/23/2013 | 1.36U | 0.12 |
| 2/19/2014 | 1.36U | 0.10J |

**ALL UNITS ARE IN ug/m3**

**Table 5-2: Historic Soil gas sampling and analysis data from Building 205**

**Soil Gas Samples**

205-SG-19

| Date | PCE | TCE |
|---|---|---|
| 1/31/2006 | 14U | 510 |
| 6/13/2006 | 14U | 26 |
| 9/13/2006 | 14U | 34 |
| 1/12/2007 | 88 | 32 |
| 4/10/2007 | 14U | 11U |
| 8/29/2007 | 14U | 11U |
| 11/14/2007 | 14U | 11U |
| 6/3/2008 | 4.14 | 2.26 |
| 9/30/2008 | 0.33 | 0.38 |
| 3/12/2009 | 0.2J | 0.21U |
| 9/18/2009 | 0.41J | 0.59J |
| 3/16/2010 | 0.2U | 0.21U |
| 9/24/2010 | 1.1U | 0.86U |
| 9/20/2011 | 1J | 2 |
| 2/22/2012 | 1.1U | 1.2 |
| 10/23/2012 | 1.1U | 0.86U |
| 2/26/2013 | 1.1U | 3.3 |
| 9/24/2013 | 1.36U | 1.39 |
| 2/19/2014 | 1.36U | 1.16 |

205-SG-15

| Date | PCE | TCE |
|---|---|---|
| 1/31/2006 | 14U | 150 |
| 6/27/2006 | 14U | 120 |
| 9/13/2006 | 14U | 130 |
| 1/12/2007 | 88 | 120 |
| 4/12/2007 | 160 | 46 |
| 8/29/2007 | 14U | 33 |
| 11/14/2007 | 14U | 28 |
| 6/3/2008 | 24.82 | 20.42 |
| 9/30/2008 | 0.68 | 0.7 |
| 3/12/2009 | 0.34 | 0.38 |
| 9/18/2009 | 0.41J | 11.82 |
| 3/16/2010 | 0.2U | 12.36 |
| 9/24/2010 | 2 | 65.6 |
| 9/20/2011 | 0.95J | 24 |
| 2/22/2012 | 1.4J | 5.4 |
| 10/23/2012 | 2 | 32 |
| 2/26/2013 | 2.2 | 47 |
| 9/24/2013 | 1.76 | 31.16 |
| 2/19/2014 | 2.18 | 41.1 |

205-SG-11

| Date | PCE | TCE |
|---|---|---|
| 1/31/2005 | 1.8 | 86 |
| 1/31/2006 | 26 | 20 |
| 6/13/2006 | 14U | 49 |
| 9/13/2006 | 14U | 2000D |
| 1/12/2007 | 52 | 41 |
| 4/10/2007 | 14U | 75 |
| 8/29/2007 | 14U | 11U |
| 11/14/2007 | 14U | 29 |
| 6/3/2008 | 0.75 | 1.4 |
| 9/30/2008 | 0.41 | 0.27 |
| 9/24/2010 | 4.8 | 213 |
| 9/20/2011 | 3 | 313 |
| 2/22/2012 | 1.6 | 152 |
| 10/23/2012 | 3.2 | 51 |
| 2/26/2013 | 11J | 752 |
| 9/24/2013 | 7.66 | 902.4 |
| 2/19/2014 | 8.68 | 930 |

205-SG-12

| Date | PCE | TCE |
|---|---|---|
| 1/31/2005 | 1.4U | 2800D |
| 1/31/2006 | 14U | 1500 |
| 6/13/2006 | 14U | 330 |
| 9/13/2006 | 14U | 340 |
| 1/12/2007 | 65 | 130 |
| 4/10/2007 | 14U | 11 |
| 8/29/2007 | 14U | 160 |
| 11/14/2007 | 14U | 31 |
| 6/3/2008 | 32.89 | 3.44 |
| 9/30/2008 | 7.32 | 4.51 |
| 9/24/2010 | 1.1U | 1.7 |
| 9/20/2011 | 1J | 51 |
| 2/22/2012 | 1.1U | 12 |
| 10/23/2012 | 1.2 | 7.5J |
| 2/26/2013 | 1.1U | 26 |
| 9/24/2013 | 0.91J | 82.19 |
| 2/19/2014 | 1.36U | 41.6 |

**ALL UNITS ARE IN ug/m3**

## 5.2 BUILDING-SPECIFIC TESTING

### 5.2.1 Site Reconnaissance

A site reconnaissance visit was conducted by Geosyntec on February 20, 2014, including:

- A walk-through tour inside the building to assess the uses of the building, interior layout and access to planned sample areas;
- Observations and photographs of the current SSD system configuration;
- Evaluation of fan power controls (locations of on/off switches) and whether each suction point can be controlled by a balancing valve;
- Evaluation of existing communication test point availability and condition;
- Measurement of the flow rate from each of the 9 vent fans; and
- Deployment of Waterloo Membrane Samplers (WMS), passive samplers in the exhaust of each fan for about one month followed by analysis by Eurofins/Air Toxics of Folsom, California.

Trichloroethene (TCE) was the dominant VOC detected in the WMS samples from the vent pipes (see Table 5-3). Samplers placed in vent-pipes at HSF-1 and HSF-6 were unfortunately dislodged from the vent pipe and were not analyzed (NA). The TCE concentrations in the effluent from fans HSF-2, HSF-3, and HSF-4 were all similar (49 to 66 $\mu g/m^3$) and concentrations for fans HSF-5 through HSF-9 were about an order of magnitude lower (average about 4 $\mu g/m^3$, which is only slightly above the IASL of 3 $\mu g/m^3$).

**Table 5-3: Concentrations of TCE in vent pipe effluents**

| **Fan** | HSF-1 | HSF-2 | HSF-3 | HSF-4 | HSF-5 | HSF-6 | HSF-7 | HSF-8 | HSF-9 |
|---|---|---|---|---|---|---|---|---|---|
| **$C_{SSV}$ TCE ($\mu g/m^3$)** | ***NA*** | 58 | 66 | 49 | 9.3 | ***NA*** | 2 | 3.4 | 1.4 |

### 5.2.2 Pneumatic Testing and Mathematical Modeling

Pneumatic testing was conducted to measure the transient (vacuum versus time) and steady-state (vacuum versus radial distance from the suction points) pneumatic response and the Hantush-Jacob model was fitted to both sets of data by adjusting the transmissivity (T) of the material below the floor slab and the leakance (B) of the floor slab (two variables and two independent data sets provides a unique solution for T and B values via iteration). Equations 1 through 7 were used to calculate the radial profiles of subslab vacuum, gas velocity, travel time, and relative proportions of flow from above and below the slab for a given flow rate.

Transient pneumatic test data were collected for 5 of the 9 fans (HS Fans 1, 3, 5, 7 and 9). There were no ball-valves on the 27 vent-pipes, so all three vent-pipes were active for each fan. The Hantush-Jacob leaky aquifer model was incorporated in the commercially-available software package AQTESOLV by HydroSOLVE, Inc. of Reston VA, and the software allows multiple extraction points at different radial distances to be included in the analysis, so all three individual

vent-pipes were incorporated in each transient test analysis. Communication test points (CTPs) were installed 3 ft from the center extraction point (denoted with the letter B) and at the midpoints between both the A and B and the B and C extraction points. Air velocity in each vent-pipe was measured using a handheld Series 471 digital thermal anemometer from Dwyer Instruments International of Michigan City, IN. The flow rate (Qssv) for each vent-pipe was calculated by multiplying the measured velocity by the cross sectional area of the inside diameter of the pipe. Vacuum in each vent-pipe was measured using U-tube manometers installed on each vent-pipe in 2005.

Steady-state vacuum versus distance was measured with only a single fan running (HS Fan 3) while all other fans were turned off and capped to minimize the influence of overlapping vacuum fields from multiple fans. The steady-state vacuum distribution was measured after allowing about 12 hours (overnight) for conditions from the single fan operation to stabilize.

### 5.2.3 Mass Flux of HS Fans

The mass flux removed from below the building by the HS Fans was measured as the product of the flow rate ($Q_{SS}$) and concentration ($C_{SS}$) of VOCs or radon in the fan discharge. The flux was measured four times: 1) in February 2014 during site reconnaissance, 2) in August 2014 with all 9 HS Fans running, 3) over a period from August to October 2015 with HS Fan 3 running alone, and 4) in December 2015 with HS Fans 3 & 8 operating. In February 2014, VOC concentrations in the fan discharge were measured using WMS, which were deployed in the discharge stream of each vent pipe for 30-days. WMS samplers were analysed by Eurofins Air Toxics of Folsom, California using solvent extraction followed by GC/MS. WMS samplers have been approved in New Jersey since 2009 for the collection of VOC samples from SSD systems (NJDEP 2009). WMS samplers were used in subsequent events for VOC data collection in August 2014, September 2014 and December 2015. Summa cannisters were also collected in December 2015 in conjunction with the deployment of the WMS samplers to provide inter-method duplicates as a QA/QC step. Summa cannisters were analysed by Alpha Analytical of Mansfield, Massachusetts using the EPA TO-15 method.

In August 2015, the mass removal rates were also documented for radon. Radon concentrations in the discharge of each HS Fan were measured over a 30-minute interval using a Durridge RAD7 from Durridge Radon Instrumentation of Billerica, MA. The SSD system was then reconfigured by turning off and capping all HS Fans except HS Fan 3. The mass flux of HS Fan 3 was measured as a function of time after the start of the system to characterize the rate of change (if any) in the rate of mass removal. Summa canister samples were collected from the discharge of HS Fan 3 after 10, 100, 1,000 and 20,000 minutes following the start of the optimized system. Radon samples were collected as a grab sample into Tedlar bags and analysed at the University of Southern California by scintillation cell counting.

### 5.2.4 Subslab Tracer Testing

Subslab tracer testing was conducted to measure the velocity of air flow below the floor as an independent verification of the velocity and travel time calculated with Equations 5 and 6. Inter-well tests were conducted at subslab probes CTP-12, 3BN and 3BS.

The helium flood consisted of turning off all 9 HS Fans, then blowing air into HS Fan 3 using a Model WD6425 Wet/Dry Vac from Rigid Tool Company of Elyria, Ohio. A bleed valve was used to control the applied pressure and adjusted until the pressure at each of the three vent-pipes was equal in magnitude to the vacuum under normal operating conditions, which caused flow rates into each vent-pipe within about 10% of the normal operating extraction rates, except with the opposite flow direction. Helium was then metered into the injected air to create an injection concentration of two percent by volume (2% v/v). The concentration of helium was monitored in two subslab probes (SG-20-205 and SG-21-205) shown on Figure 5-2, located distances of 43 and 67 ft, respectively, away from the nearest vent-pipes into which helium was injected. Samples were collected using a 1L Tedlar bag and vacuum chamber and screened with a MGD-2002 Helium meter.

### 5.2.5 Cross-Slab Tracer Testing

Both $CO_2$ and HCHO cross-slab tracer tests were attempted, unfortunately, neither provided data that could be analyzed to yield the proportion of indoor air in the vent-pipe exhaust because the ambient subsurface concentrations of $CO_2$ were too high and the ambient indoor air concentrations of HCHO were too low.

### 5.2.6 Building Depressurization Testing

Building depressurization testing was conducted to measure the indoor air concentrations of VOCs and radon under negative pressure and calculate the mass flux of TCE and radon through the building. All 9 SSD HS Fans were turned off and capped prior to conducting the building depressurization test. The building was depressurized overnight by running the HVAC exhaust fans at their maximum flow rate and covering about 90% of the openings of the supply air manifolds with fibreglass-reinforced plastic tarps to restrict inflows to the building. The HVAC exhaust flow rate from the building was about 1.2 $Mm^3$/day (30,000 standard cubic feet per minute [scfm]) and the building pressure was generally in the range of 10 to 30 Pa lower than the subslab pressure measured at four subslab probes (at least one was located in each of the three air-zones shown in Figure 5-2). After 16 hours, seven (7) indoor air grab samples were collected at locations shown on Figure 5-2 via Summa canister for VOC analysis by EPA Method TO-15 and radon was measured in three locations by Tedlar bag samples analyzed by Doug Hammond at the University of Southern California, Los Angeles.

### 5.2.7 Confirmatory Indoor Air Monitoring

Indoor air quality monitoring was conducted in October 2014, 59 days after the change to HS Fan 3 operating alone to validate the effectiveness of the optimized system. Five indoor air samples were collected over 24-hours with 6 L Summa canisters for analysis of VOCs by EPA Method TO-15 and nine EPERM Electrets from Rad Elec Inc. of Frederick Maryland were collected over a 30-day period at locations shown on Figure 5-2 for radon analysis.

## 5.3 RESULTS AND DISCUSSION

### 5.3.1 Specific Capacity

Table 5-4 provides the vacuum and flow rate data measured in each of the vent-pipes in August 2014. The flow rates from the 27 individual suction points ranged from 2 to 45 standard cubic feet per minute (scfm) and the applied vacuum ranged from 4.9 to 12.5 inches of water column (in. $H_2O$). The specific capacity (flow rate divided by applied vacuum) ranged from 0.35 to 9.15 scfm/in $H_2O$. Specific capacity is directly proportional to the permeability of the material providing flow to the well (Bear, 1979), so the material below the floor near HS Fans 1 through 4 has a lower permeability than areas near HS Fans 5 through 9. The specific capacity values were interpolated and contoured as shown in Figure 5-6.

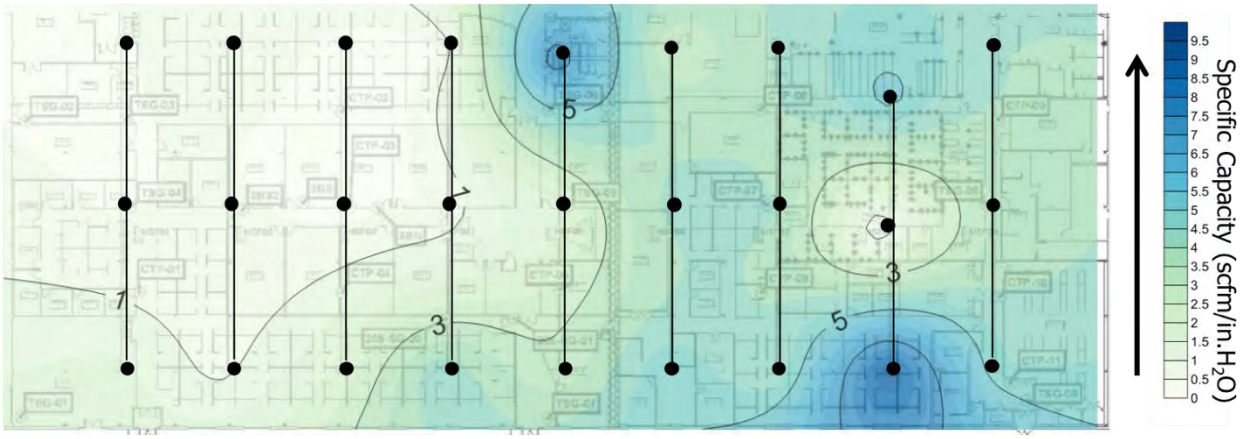



**Figure 5-6: Contour plot of specific capacity for each of the 27 vent pipes**

### 5.3.2 Mass Flux

Table 5-4 shows the total flow rates for each fan, TCE and radon concentrations measured in the fan discharge and mass flux in the discharge of each of the 9 HS Fans. The mass flux of TCE ranged from 0.004 to 0.12 grams per day (g/d), the total system TCE flux was 0.46 g/d and eighty-eight percent of the total system mass flux was measured in discharge of HS Fan 1 through Fan 4. This indicated that an optimized system may consist of fewer fans, and possibly Fan 3 alone could be sufficient, which was tested as described below.

The flux of radon was $2x10^9$ picocuries [pCi] per day and only 38% was from HS Fans 1 through 4. Therefore, a second scheme for optimization was tested using both Fan3 and Fan 8.

**Table 5-4: Flow Rate, Vacuum, Specific Capacity, TCE and Radon Data from 9 HS Fans**

| HS Fan | Suction Point | Vacuum (in. $H_2O$) | Flow (scfm) | Specific Capacity (scfm/in. $H_2O$) | Fan Total Flow (scfm) | TCE Conc'n ($\mu g/m^3$) | TCE Flux (g/day) | Radon Conc'n (pCi/L) | Radon Flux (pCi/day x $10^6$) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1-A | 11.8 | 4.2 | 0.35 | 30 | 100 | 0.12 | 140 | 177 |
| | 1-B | 11 | 5.2 | 0.47 | | | | | |
| | 1-C | 12.5 | 21 | 1.69 | | | | | |
| 2 | 2-A | 11 | 11 | 1.02 | 27 | 58 | 0.063 | 220 | 237 |
| | 2-B | 10 | 6.2 | 0.62 | | | | | |
| | 2-C | 10.8 | 9.2 | 0.85 | | | | | |
| 3 | 3-A | 10.5 | 4.1 | 0.39 | 31 | 100 | 0.12 | 130 | 167 |
| | 3-B | 10.5 | 4.0 | 0.38 | | | | | |
| | 3-C | 10.8 | 23 | 2.09 | | | | | |
| 4 | 4-A | 8.5 | 3.8 | 0.45 | 47 | 49 | 0.093 | 110 | 206 |
| | 4-B | 8.5 | 4.8 | 0.56 | | | | | |
| | 4-C | 8.5 | 38 | 4.45 | | | | | |
| 5 | 5-A | 5 | 39 | 7.70 | 64 | 9.3 | 0.024 | 26 | 68 |
| | 5-B | 5 | 8.7 | 1.74 | | | | | |
| | 5-C | 5.3 | 16 | 3.10 | | | | | |
| 6 | 6-A | 6 | 18 | 3.03 | 72 | 3.4 | 0.010 | 80 | 237 |
| | 6-B | 6 | 25 | 4.10 | | | | | |
| | 6-C | 6 | 30 | 4.94 | | | | | |
| 7 | 7-A | 6 | 24 | 4.02 | 72 | 2 | 0.006 | 120 | 359 |
| | 7-B | 6 | 25 | 4.10 | | | | | |
| | 7-C | 6 | 24 | 3.94 | | | | | |
| 8 | 8-A | 5 | 26 | 5.23 | 73 | 3.4 | 0.010 | 100 | 298 |
| | 8-B | 5.3 | 2.0 | 0.39 | | | | | |
| | 8-C | 4.9 | 45 | 9.15 | | | | | |
| 9 | 9-A | 6 | 24 | 4.02 | 73 | 1.4 | 0.004 | 110 | 314 |
| | 9-B | 6 | 22 | 3.61 | | | | | |
| | 9-C | 6 | 28 | 4.60 | | | | | |
| Total TCE flux | | | | | | | **0.46** | Radon | **2100** |
| TCE flux from HS Fan 3 alone after 10 minutes of operation | | | | | | | **0.47** | | |
| TCE flux from HS Fan 3 alone after 100 minutes of operation | | | | | | | **0.46** | | |
| TCE flux from HS Fan 3 alone after 1,000 minutes of operation | | | | | | | **0.45** | | |
| TCE flux from HS Fan 3 alone after 20,000 min. of operation | | | | | | | **0.43** | | |
| TCE flux from HS Fan 3 after 119 day plus Fan 8 after 10 min. | | | | | | | **0.56** | | |

The threshold mass flux from the sub-surface that would be needed to pose a concern to indoor air quality was calculated using Equation 12 as the product of a health-protective indoor air target concentration ($C_{IA}$) and the building ventilation rate ($Q_{bldg}$). $Q_{bldg}$ is about 30,000 scfm, measured as the sum of the exhaust flows for all the exhaust fans during the building depressurization test. This equates to about 1.9 air changes per hour, for an area of 64,000 $ft^2$ and a height of 15 feet. The TCE screening level of 3 $\mu g/m^3$ could be sustained by a TCE mass flux of 2.7 g/d. The radon

mitigation level of 4 pCi/L could be sustained by a Radon mass flux of $6x10^9$ pCi/day. The mass flux measurements were lower than the thresholds of concern for both TCE and radon, however, a modest mitigation effort may still be appropriate in the abundance of caution to account for spatial and temporal variability and other sources of uncertainty.

### 5.3.3 Steady Vacuum Distribution with HS Fan 3 Operating Alone

Figure 5-7 shows a contour plot of the steady-state distribution of vacuum below the floor slab after about 12 hours with HS Fan 3 as the only operating fan. This data indicates that HS Fan 3 exerts a significant vacuum throughout the region of potential TCE vapor intrusion into Building 205, although possibly not so for radon, which was more uniformly distributed across the building.

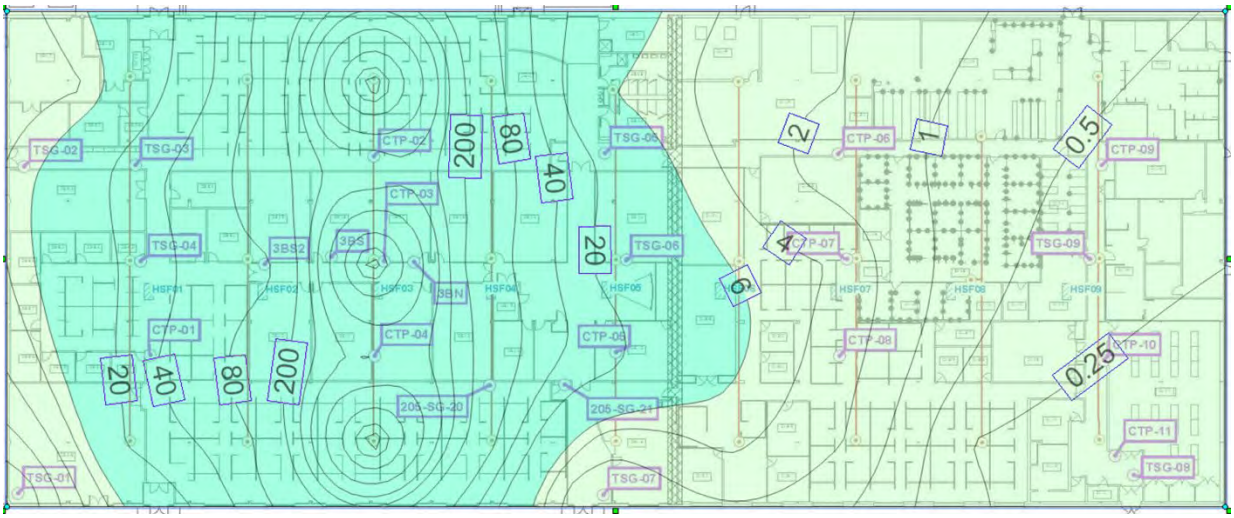



**Figure 5-7: Static vacuum with only HS Fan 3 operating (darker green shading >6 pascals)**

### 5.3.4 Transient Pneumatic Testing and Analysis

Table 5-5 summarizes the transmissivity and leakance values derived from analysis of the transient vacuum response (drawdown and recovery) data collected from subslab probes near HS Fans 1, 3, 5, 7 and 9 using the Hantush-Jacob Leaky Aquifer Model. An example set of transient response data is shown in Figure 5-8 (linear-linear scales) and the corresponding AQTESOLV output (log-log scales) is shown in Figure 5-9. The transmissivities for locations near HS Fans 1 and 3 are generally approximately an order of magnitude lower than the values measured for HS Fans 5, 7, and 9.

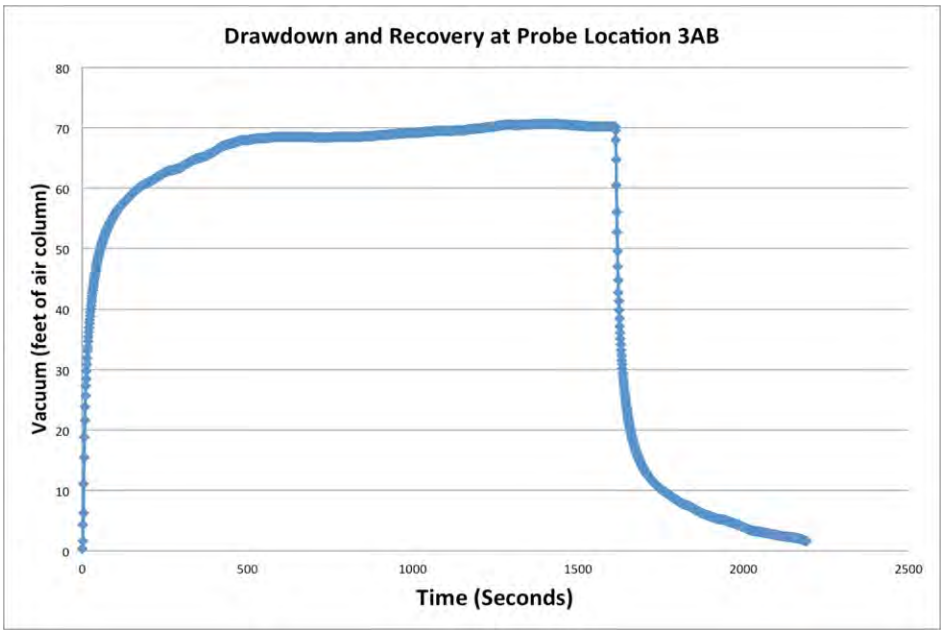



**Figure 5-8: Transient pneumatic response recorded at observation point 3AB (located midway between suction points 3A and 3B) in response to cycling HS Fan 3**

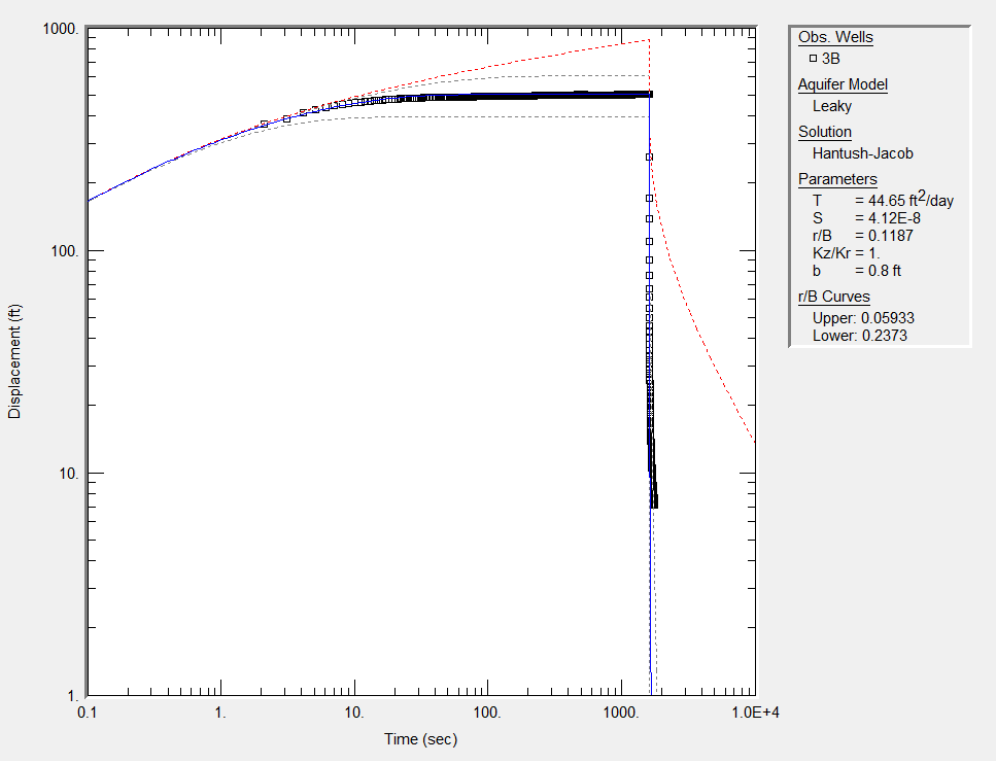



**Figure 5-9: Hantush-Jacob Model curve fitting to transient data from observation CTP-03 (located 3 feet from suction point 3B) in response to cyclic operation of Fan 3 (from AQTESOLV software)**

**Table 5-5: Results of Hantush-Jacob Model Analysis of Transient Vacuum Response Data**

| Fan | Subslab Probe | Transmissivity (T) | r/B | Radius (r) | Leakance (B) | K´ |
|---|---|---|---|---|---|---|
| | | ($ft^2$/day) | (dim) | (ft) | (ft) | (ft/day) |
| 1 | 3 ft from 1B | 14 | 0.21 | 3 | 15 | 0.031 |
| 1 | Between 1A & 1B | 130 | 0.41 | 30 | 73 | 0.012 |
| 3 | 3 ft from 3B | 45 | 0.12 | 3 | 25 | 0.036 |
| 3 | Between 3A & 3B | 22 | 1.0 | 30 | 30 | 0.012 |
| 3 | Between 3B & 3C | 22 | 1.0 | 30 | 30 | 0.012 |
| 5 | Between 5A & 5B | 700 | 0.78 | 30 | 38 | 0.24 |
| 5 | Between 5B & 5C | 710 | 1.2 | 30 | 25 | 0.57 |
| 7 | Between 7A & 7B | 440 | 0.73 | 30 | 41 | 0.13 |
| 7 | Between 7B & 7C | 660 | 1.5 | 30 | 20 | 0.83 |
| 9 | Between 9A & 9B | 860 | 2.2 | 30 | 14 | 2.2 |
| 9 | Between 9B & 9C | 1000 | 4.3 | 30 | 6.5 | 12 |

### 5.3.5 Model Calibration to Vacuum versus Distance

Figure 5-10 shows steady state vacuum versus distance measurements recorded with only HS Fan 3 running. Figure 5-10 also shows the calculated vacuum profiles from Equation 4 using the T and B values calculated from transient vacuum data recorded at communication test points near Fan 3 (Table 5-5). There is a good match between the measured and calculated profiles of vacuum versus distance and a very large radius of influence (150-200 feet) is indicated. This is sufficient to provide depressurization within the area of elevated TCE flux (Table 5-3) with Fan 3 operating alone, but this may not be adequate to not cover all areas of potential radon entry.

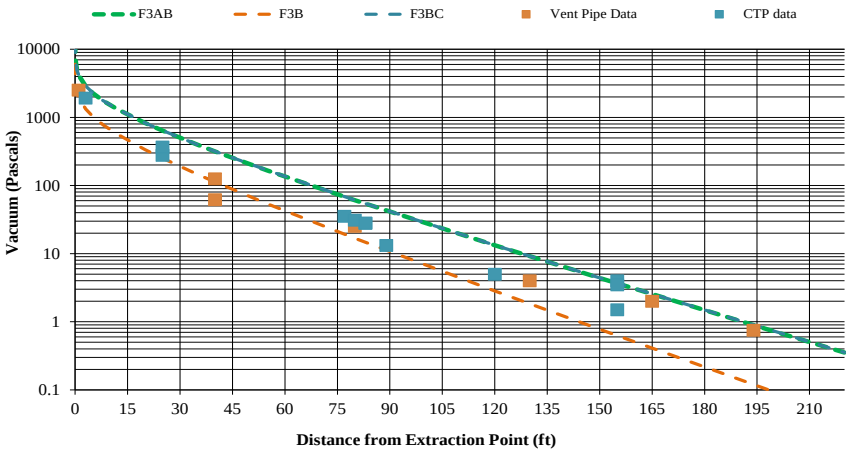



**Figure 5-10: Vacuum versus distance from HS Fan 3 suction points (measured and modeled using T and B values for probes near HS Fan 3)**

### 5.3.6 Subslab Helium Tracer Testing

Figure 5-11 shows the results of two of the inter-well helium tracer tests at probes located 14 feet on opposite sides of vent-pipe 3B. The two tests showed arrival times of 44 and 50 seconds, which are very similar. A third inter-well tracer test was conducted at a probe installed 6 feet from vent-pipe 9C (CTP-12) and had a time for the peak helium concentration of 130 seconds, indicating a much slower velocity (Figure 5-12). Vent-pipe 9C had a flow rate of 28 scfm, compared to 4 scfm at vent-pipe 3B, so the velocity near vent-pipe 9C should have been much faster than the velocity near vent-pipe 3B. Specifically, the travel time from a distance of 14 feet at an extraction flow rate of 4 scfm was about 3 times faster than the travel time from a distance of 6 feet at a flow rate of 28 scfm. This clearly indicates a much more rapid flow in one area compared to the other, and that demonstrates the potential utility of subslab tracer testing for assessing preferential flow pathways below the floor slab, which may be helpful for mitigation system design.

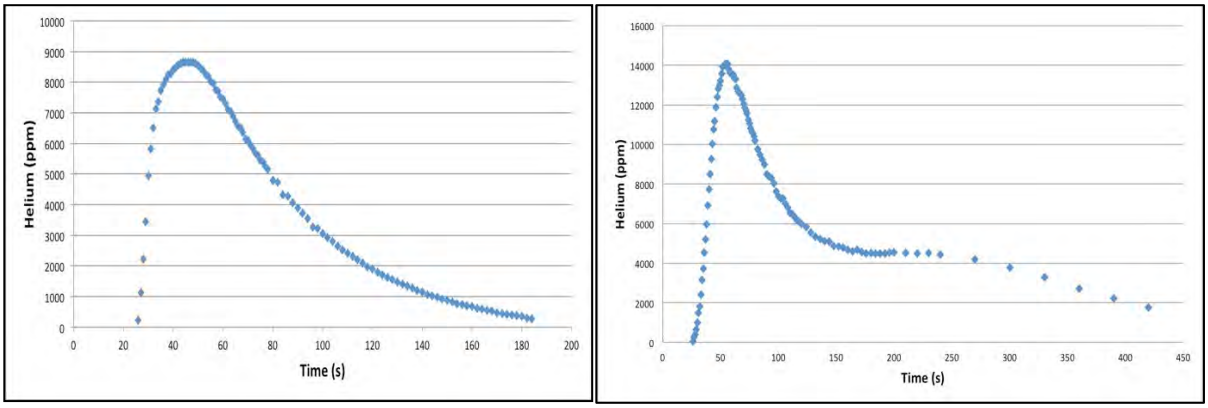



**Figure 5-11: Helium inter-well tracer test data for two probes 14 feet from suction point 3B in the north (left) and south (right) directions with travel times of 44s and 50 s, respectively**

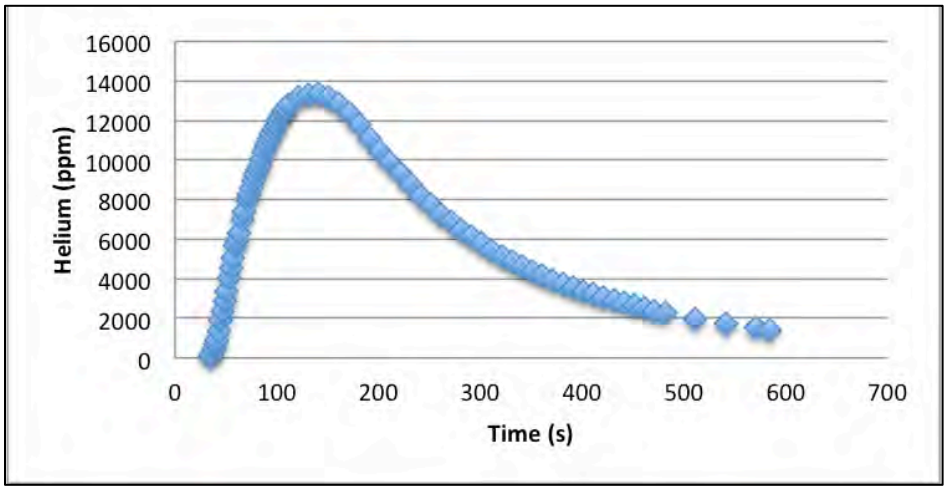



**Figure 5-12: Helium inter-well tracer test from a probe at a radius of 6 feet from suction point 9C, with travel time of 130 s**

Figure 5-13 shows data from the helium flood test. The average travel time from the injection points to the monitoring points is the time required for the subslab concentration to reach 50% of the injected concentration (50% of 2%, or 1% v/v, which is 10,000 parts per million). The average travel time to probe 205-SG-20 from Vent-Pipes 3A and 3B (located about 43 feet away) was approximately 100 minutes. Time restrictions forced an end to the test before the helium concentration at location 205-SG-21 reached 10,000 ppm, so the average travel time was extrapolated to follow a similar profile as 205-SG-20, resulting in an estimated time of 340 minutes to reach 10,000 ppm. These points are both plotted on Figure 5-13, which also shows the travel time profile calculated using Equation 6 and the travel times measured using the inter-well helium tracer tests. The travel times from the two inter-well tests 14 feet on either side of vent-pipe 3B (3BS and 3BN) are notably faster than the calculated He flood travel times, but the other tracer test data on Figure 5-13 all line up well with the profiles calculated with Equations 5 and 6. This indicates a preferential pathway in the vicinity of suction point 3B, where the two fast inter-well tests were located, which may be an underground utility, or more permeable fill along a footing (these probes are adjacent to an interior wall). The helium subslab inter-well and flood tests provide independent lines of evidence to validate the velocities calculated from the Hantush-Jacob model analysis.

The calibrated model provides information previously unavailable for mitigation system performance assessment. For example, Figure 5-14 shows that the travel time from radial distances ranging between 150 and 175 feet (i.e., the region of induced vacuum for HS Fan 3 shown on Figure 5-9), the travel time would be about 20,000 minutes (approximately 14 days). If the radius of influence was based on a travel time of 3 to 4 hours, the ROI would be about 60 ft. In other words, the area of influence ($\pi$ ROI$^2$) would be 11,000 ft$^2$, so the 64,000 ft$^2$ building footprint could be covered with 6 suction points.

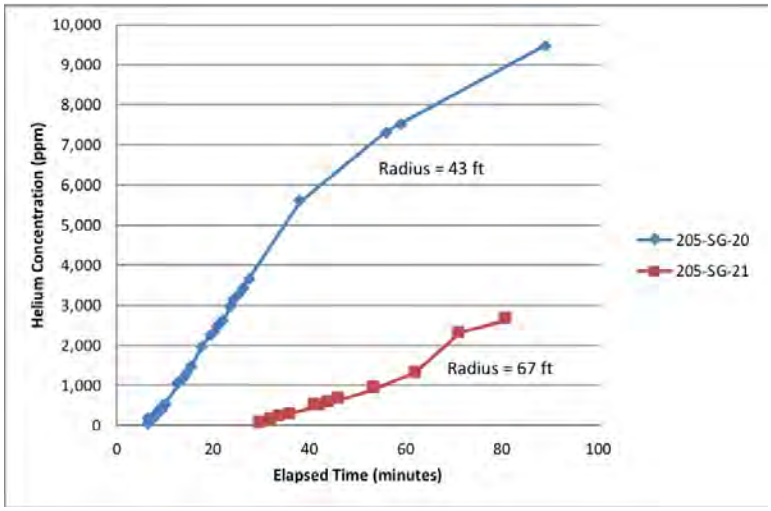



**Figure 5-13: Helium Flood test data for probes 43 and 67 ft from the nearest injection point (3A, 3B or 3C)**

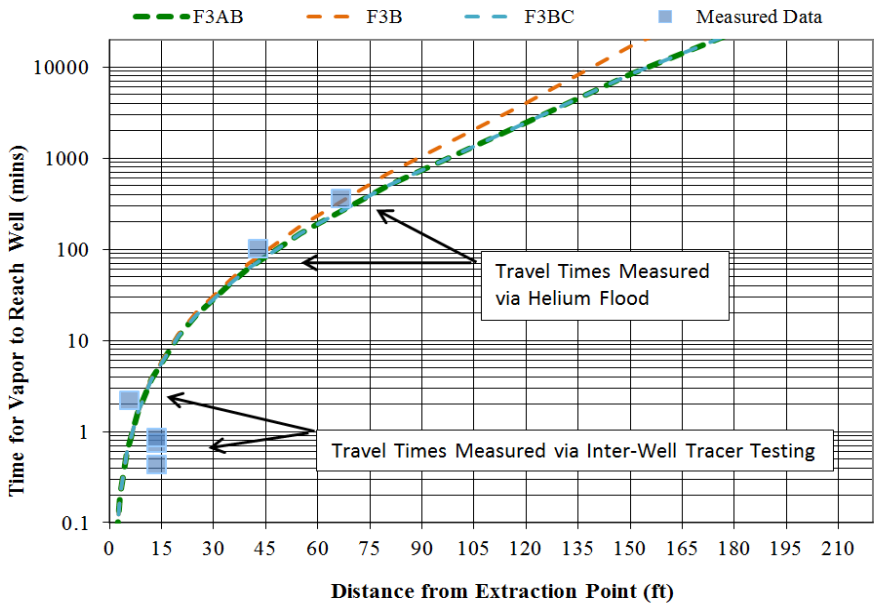



**Figure 5-14: Subslab travel time versus radial distance using T and B values for probes near HS Fan 3, showing inter-well tracer test and helium flood results for comparison**

Figure 5-15 shows the profiles of velocity calculated using Equation 5. If the ROI was defined by a velocity of 3 ft/day, it would be in the range of 145 to 165 ft, corresponding to areas of influence larger than the building.

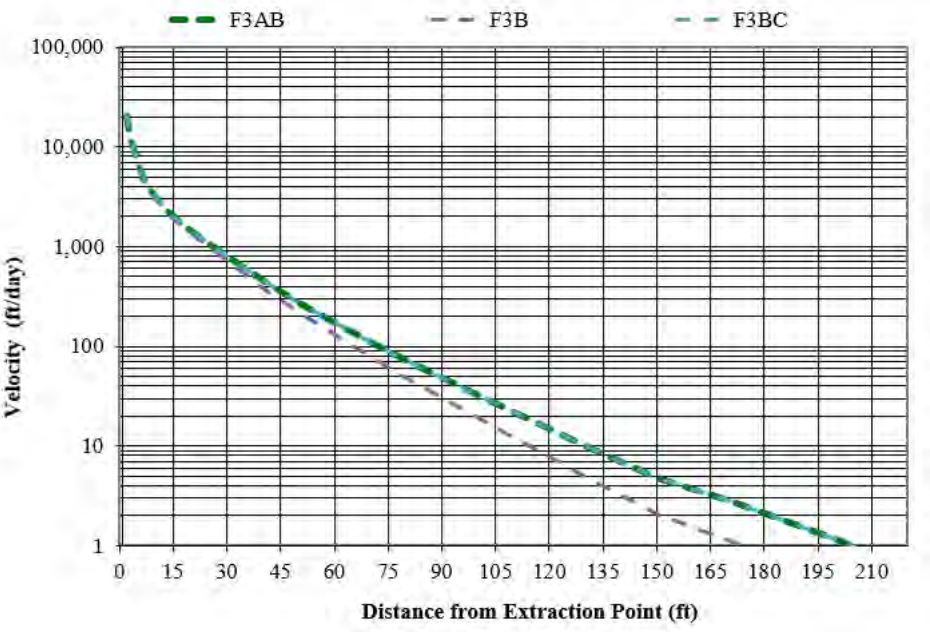



**Figure 5-15: Calculated profiles of velocity vs distance from Fan 3 suction points**

Figure 5-16 shows the proportion of flow originating below the floor calculated using Equation 7. At a radius of 90 ft, the proportion of flow originating from below the floor is about 10% of the

total flow (10% of 31 scfm = 3.1 scfm). The corresponding area ($\pi r^2$) would be 25,000 $ft^2$. So within this region, the flow per unit area would be greater than 3.5 L/min/1000$ft^2$, which is comparable to the U.S. EPA default of 5L/min for Qsoil in a 1,000 $ft^2$ residence (U.S. EPA, 2017).

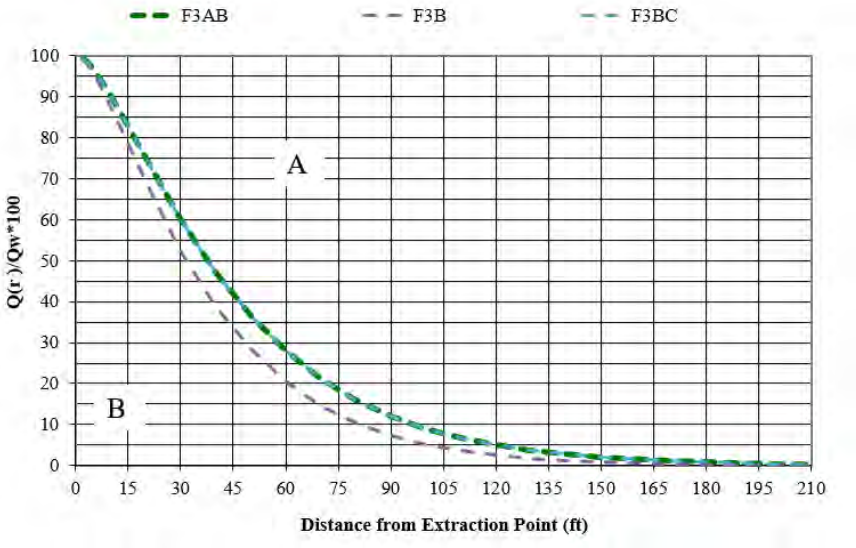



**Figure 5-16: Proportion of flow originating below the floor slab as a function of radial distance from HS Fan 3 suction points**

### 5.3.7 Building Depressurization Test

The differential pressure across the floor slab in the four locations monitored during building depressurization (with the SSDS off and capped) is shown in Figure 5-17. The air supply and exhaust flow rates measured during the test are listed in Table 5-6. Indoor air Summa canister samples collected after 16 hours of building depressurization showed no detectable TCE (<0.107 $\mu g/m^3$) in 6 of the 7 samples and one sample with a trace detection of 0.14 $\mu g/m^3$ (Location 205-15, see Figure 5-2), all of which were >20 times lower than the commercial indoor air screening level (3 $\mu g/m^3$). Three indoor air radon grab samples had concentrations in the range of 0.87 to 2.3 pCi/L, all of which are below the radon mitigation level of 4 pCi/L. The TCE mass flux through the building cannot be quantified exactly because TCE was not detected in most of the indoor air samples, but the mass flux through the building was less than 0.098 g/day (TCE concentration of 0.14 $\mu g/m^3$ multiplied by $Q_{build}$ of 1.2$Mm^3$/day). The radon mass flux through the building assuming an average indoor air concentration of 1.5 pCi/L multiplied by $Q_{build}$ of 1.2$Mm^3$/day is $1.8x10^9$ pCi/day, which matches the total extracted from the 9 fans on Table 5-4 almost exactly. The building depressurization test demonstrated that TCE and radon concentrations in indoor air do not exceed target levels even without the SSD operating and with the building depressurized to a level that would represent a reasonable maximum exposure for potential vapor intrusion. The TCE mass flux through the building is 27x less than the flux required to pose a potential health risk and the radon flux is at least 2x less than the flux required to cause indoor air concentrations above 4 pCi/L.

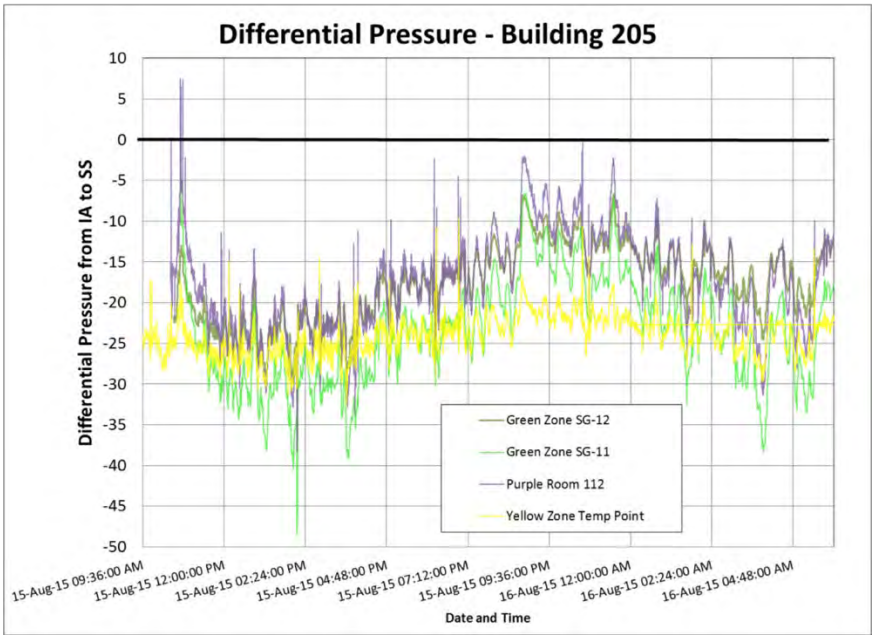



**Figure 5-17: Cross slab differential pressure induced by building depressurization**

**Table 5-6: Air supply and exhaust measured during build depressurization test**

| | South | | Middle | | North | |
|---|---|---|---|---|---|---|
| | **Supply** | **Exhaust** | **Supply** | **Exhaust** | **Supply** | **Exhaust** |
| Facing | West | East | West | East | East | West |
| Velocity (ft/min) | 85 | 430 | 52 | 75 | 45 | 450 |
| Length (in) | 116 | 116 | 36 | 72 | 116 | 116 |
| Width (in) | 38 | 38 | 36 | 24 | 45 | 45 |
| Area ($ft^2$) | 31 | 31 | 9.0 | 12 | 36 | 36 |
| Flow (scfm) | 2602 | 13162 | 468 | 900 | 1631 | 16311 |
| Sum supply (scfm) | 4701 | | | | | |
| Sum exhaust (scfm) | 30373 | | | | | |

### 5.3.8 Indoor air Concentrations Before and After Optimization

Table 5-7 summarizes TCE and Radon concentrations measured in indoor air before and after optimization of the mitigation system. TCE concentrations were <0.21 µg/m³ in both optimized scenarios. With only Fan 3 running, radon concentrations approached 4 pCi/L in Air Zone B, but were notably lower when Fan 8 was also running.

**Table 5-7: Results of Indoor Air Sampling Before and After Optimization**

| Mitigation System | | Baseline (All 9 HS Fans) | HS Fan 3 Only | HS Fans 3 & 8 |
|---|---|---|---|---|
| Sampling Date | | Aug-14 | Aug-15 | Dec-15 |
| Location | Air Zone[1] | Radon Concentration from 30-day EPERM Electrets (pCi/L) | | |
| IA-205-01 | A | 1.7 | 0.9 | 1.9 |
| IA-205-02 | A | 1.9 | 1.6 | 2.2 |
| IA-205-03 | A | 2.0 | 2.4 | 2.2 |
| IA-205-04 | RRC | 1.2 | 1.5 | 1.1 |
| IA-205-01 | A | 1.7 | 0.9 | 1.9 |
| Dup-01 | RRC | 1.2 | 1.4 | 1.5 |
| IA-205-05 | RRC | 1.1 | 1.4 | 1.4 |
| IA-205-06 | RRC | 1.2 | 1.3 | 1.4 |
| IA-205-07 | B | 2.0 | 3 | 2.2 |
| IA-205-08 | B | 2.2 | 3.4 | 2.6 |
| IA-205-09 | B | 1.8 | 3.3 | 1.4 |
| IA-205-10 | B | NA | NA | 2.2 |
| IA-205-11 | B | NA | NA | 2.1 |
| IA-205-12 | B | NA | NA | 1.5 |
| | **Average** | **1.6** | **2.0** | **1.8** |
| | | TCE Concentration from Summa Canister TO-15 SIM (µg/m³) | | |
| Location | Air Zone[1] | Sep-14 | Oct-15 | Mar-16 |
| 205-01 | warehouse | 0.21 U | 0.21 U | 0.21 U |
| 205-11 | A | 0.21 U | 0.21 U | 0.21 U |
| 205-12 | RRC | 0.21 U | 0.21 U | 0.21 U |
| 205-15 | B | 0.21 U | 0.21 U | 0.21 U |
| 205-19 | B | 0.21 U | 0.21 U | 0.21 U |
| Duplicate | B | 0.21 U | 0.21 U | 0.21 U |
| Duplicate | B | 0.21 U | 0.21 U | 0.21 U |

[1] - air zone refers to the three areas identified in the Figure 5-2 for each location
U - non-detect, value is the reporting limit
NA – not available (locations were sampled only in the last event for supplemental data)

### 5.3.9 Mass Flux from HS Fan 3 Alone

The mass flux of TCE removed from HS Fan 3 operating alone after the building depressurization test was 0.47, 0.46, 0.45 and 0.43 g/day for samples collected 10, 100, 1,000 and 20,000 minutes after start-up (Figure 5-18), indicating minimal change over time and a mass removal rate similar

to the total system mass removal rate when all 9 HS Fans were operating (Table 5-4). From inspection of Figure 5-14, the sample collected after 20,000 minutes would be an integration of gas drawn from below the floor to a distance of about 150-175 ft from the suction points, which includes all the areas of elevated TCE mass flux. The WMS samples collected 40 to 70 days later showed a slightly lower mass flux (as low as 0.25 g/day), which is within a factor of 2 and may be partially attributable to temporal variability from August to October or inter-method variations in sampling and analysis (30-day WMS sample versus grab Summa sample).

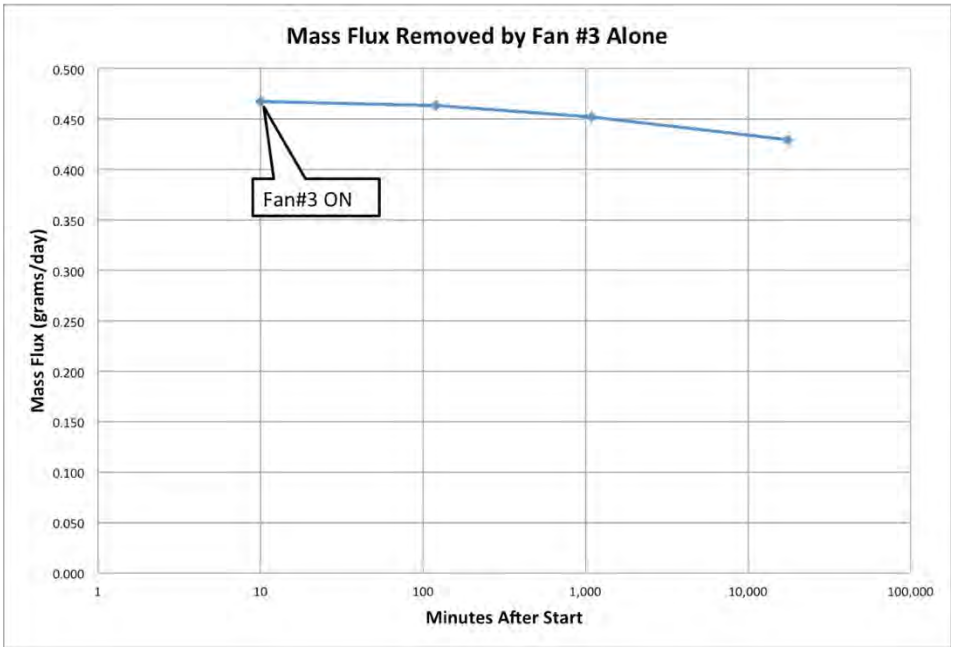



**Figure 5-18: Mass removal rate from Fan 3 operating alone**

### 5.3.10 TCE Mass Flux from HS Fans 3 & 8

Summa canister samples of the discharge were collected after 10 minutes of operation of HS Fan 8 and 119 days of operation of HS Fan 3. The HS Fan 3 TCE mass flux was 0.452 g/day and HS Fan 8 was 0.107 g/day for system combined TCE mass flux of 0.559 g/day, which is comparable to the performance of all 9 fans together as shown on Tables 5-3 and 5-4. The TCE mass flux from HS Fan 8 was about three times higher than the baseline mass flux from HS Fans 6 to 9, which likely indicates there was a rebound in subsurface vapor concentrations in the vicinity of HS Fan 8 over the few months that only HS Fan 3 was operating. Nevertheless, the TCE mass flux from HS Fans 3 and 8 combined was a factor of 5 times lower than the threshold flux of 2.7 g/day required to sustain indoor air concentrations of 3 $\mu g/m^3$.

### 5.3.11 Long-Term Monitoring

Routine periodic indoor air quality monitoring at Building 205 performed by Avatar Environmental, LLC as part of a site-wide monitoring program was conducted at 5 locations on March 23, 2016 and Feb 22, 2017. The results for all of these samples were <0.21 $\mu g/m^3$ for TCE. Radon monitoring is not included in the indoor air quality monitoring program by Avatar, but is documented in Section 5.3.12, below.

### 5.3.12 Radon Measurements

Figure 5-19 shows the radon distribution in the vent-pipes with all 9 fans running in August 2014. Each location was monitored for 30 minutes, which allows multiple measurements, so the data are shown as box and whisker charts, where the whiskers represent the 5$^{th}$ and 95$^{th}$ percentiles, the box represents the 25 to 75$^{th}$ percentiles, the horizontal line within the box is the median and the dot within the box is the mean. The overall mean for all measurements combined was about 4200 becquerels per cubic meter (Bq/m$^3$), which equates to 114 pCi/L. The highest reading was almost 9000 Bq/m$^3$ (240 pCi/L) and the lowest reading was 425 BQ/m$^3$ (12 pCi/L). The exhausted gas includes indoor air that leaks across the floor slab, so this data may provide an indication of less leakage where the effluent radon concentrations are high and vice versa. With the exception of Fans 2 and 5, the radon readings were within a relatively narrow range (3,000 to 6,000 Bq/m$^3$ or 80 to 16 pCi/L).

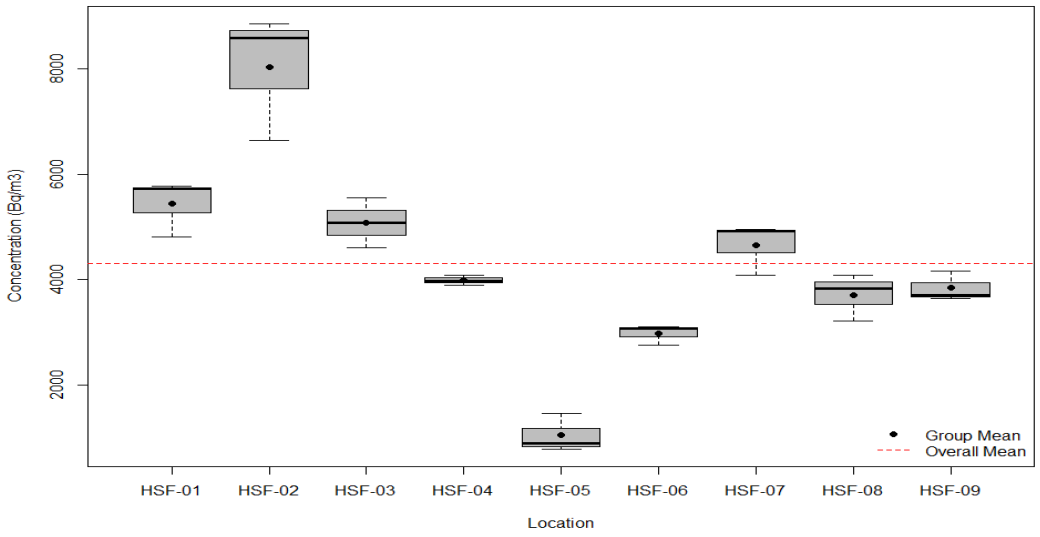



**Figure 5-19: Radon concentration in the exhaust of vent pipes pre-optimization**

Indoor air concentrations measured over a 24-hour period with only Fan 3 running are shown on Figure 5-20. These data are from a single location in the "Green" HVAC capture zone near suction point HSF-02A and are broken up into 6-hour increments to help visualize temporal trends within the 24 hour period. The mean values ranged from 37 to 55 Bq/m$^3$ (1 to 1.5 pCi/L). 30-day verification samples with EPERM Electrets showed indoor air Rn in the range of 41 to 81 Bq/m$^3$ (1.1 to 2.2 pCi/L) and outdoor air in the range of 11.1 to 14.8 Bq/m$^3$ (0.3 to 0.4 pCi/L). Samples collected over 30 days with both fans 3 and 8 running are shown on Table 5-7.

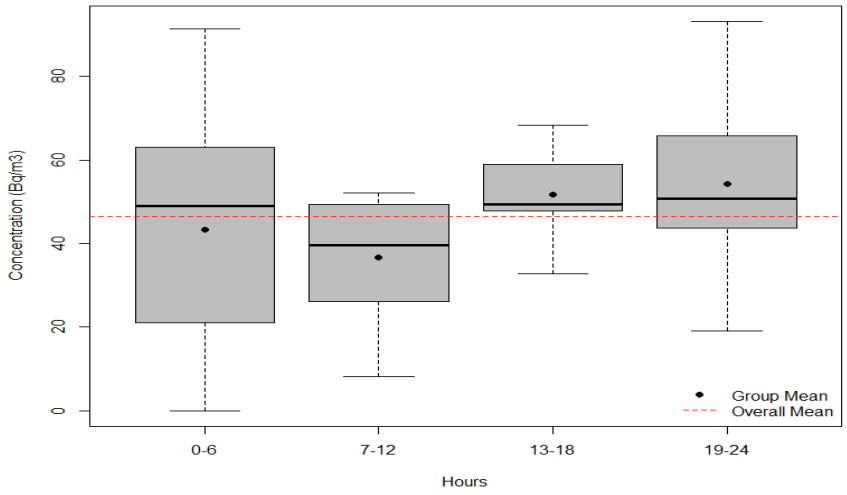



**Figure 5-20: Rad7 measurements of radon in indoor air over 24 hours with Fan 3 alone**

### 5.3.13 Building-Specific Attenuation Factor

Building-specific attenuation factors were calculated using Equation 17 and are provided in Table 5-8. The mean AF was 0.0008, which is 38 times lower than the generic subslab attenuation factor of 0.03 recommended in U.S. EPA guidance (U.S. EPA, 2012).

**Table 5-8: Building-Specific Attenuation Factors for Building 205**

| Fan | Subslab Probe | T ($ft^2$/day) | B (ft) | h (ft) | deltaP (ft) | AER (/day) | AF (-) |
|---|---|---|---|---|---|---|---|
| 1 | 3 ft from 1B | 14 | 15 | 15 | 0.18 | 44 | 2E-05 |
| 1 | Between 1A & 1B | 130 | 73 | 15 | 0.18 | 44 | 7E-06 |
| 3 | 3 ft from 3B | 45 | 25 | 15 | 0.18 | 44 | 2E-05 |
| 3 | Between 3A & 3B | 22 | 30 | 15 | 0.18 | 44 | 7E-06 |
| 3 | Between 3B & 3C | 22 | 30 | 15 | 0.18 | 44 | 7E-06 |
| 5 | Between 5A & 5B | 700 | 38 | 15 | 0.18 | 44 | 1E-04 |
| 5 | Between 5B & 5C | 710 | 25 | 15 | 0.18 | 44 | 3E-04 |
| 7 | Between 7A & 7B | 440 | 41 | 15 | 0.18 | 44 | 7E-05 |
| 7 | Between 7B & 7C | 660 | 20 | 15 | 0.18 | 44 | 5E-04 |
| 9 | Between 9A & 9B | 860 | 14 | 15 | 0.18 | 44 | 1E-03 |
| 9 | Between 9B & 9C | 1000 | 6.5 | 15 | 0.18 | 44 | 6E-03 |
| | | | | | | min | 7E-06 |
| | | | | | | max | 6E-03 |
| | | | | | | mean | 8E-04 |

Empirical attenuation factors could not be reliably calculated for Building 205 because the only place TCE was detected in indoor air at any level of significance (Figure 5-5) was in an area where no subslab sample was analyzed (Figure 5-4) and the surrounding subslab samples had lower TCE concentrations than the indoor air peak.

## 5.4 COST CONSIDERATIONS

This section discusses the costs of the conventional system, the optimized system and the costs of optimization testing and analysis to demonstrate the potential net savings. Similar sections are presented at the end of Sections 6, 7 and 8 for the other three buildings tests. Detailed cost tables are provided in Appendix E.

Table 5-9 provides a summary of the cost comparison for the conventional vs optimized mitigation system for Building 205. The incremental cost of the optimization testing and analysis service (assuming a production level of detail and not a research level of detail) would be about $21,000, but would result in a net savings of $250,000 over a 30 year lifecycle, which is a return on investment of 11.6 times. The cost differential between the conventional and optimized system is shown as a factor of 2.5, but the second fan was included in the optimized system even though the indoor air radon concentrations were not above the 4 pCi/L target level, so this is still arguably overdesigned.

**Table 5-9: Building 205 Cost Consideration Summary**

| Cost Components | Conventional | Optimized |
|---|---|---|
| Initiation | $ 14,125 | $ 14,125 |
| Reconnaissance | $ 16,200 | $ 16,900 |
| Pilot Test | $ 14,150 | $ 27,160 |
| Installation | $ 186,975 | $ 17,150 |
| Operation | $ 130,457 | $ 69,356 |
| Maintenance | $ 2,700 | $ 600 |
| Fan Replacement | $ 36,000 | $ 8,000 |
| Training | $ 5,000 | $ 6,000 |
| TOTALS | $ 405,607 | $ 159,291 |
| Total incremental cost of optimization activities | | $ 21,210 |
| Net Savings | | $ 246,316 |
| Return on Investment | | 11.6 |
| Ratio of Conventional Costs vs Optimized Costs | | 2.5 |

# 6.0 SITE 2: FORMER RARITAN ARSENAL BUILDING 200

## 6.1 SITE LOCATION AND HISTORY

Building 200 is, like Building 205, located at the former Raritan Arsenal in Edison New Jersey (see Figure 5-1). Building 200 is a single-story building with vinyl siding and a concrete slab on grade floor. The current usage consists of office space and a nurse's station. The locations of the existing subslab vapor extraction points, subslab vapor monitoring points and nearby groundwater monitoring wells are depicted in plan view on Figure 6-1. Photos of the exterior and interior of the building are provided in Figure 6-2. Building 200 was also studied as part of another ESTCP Project (ER-201503 – Mass Flux Characterization for Vapor Intrusion Assessment).

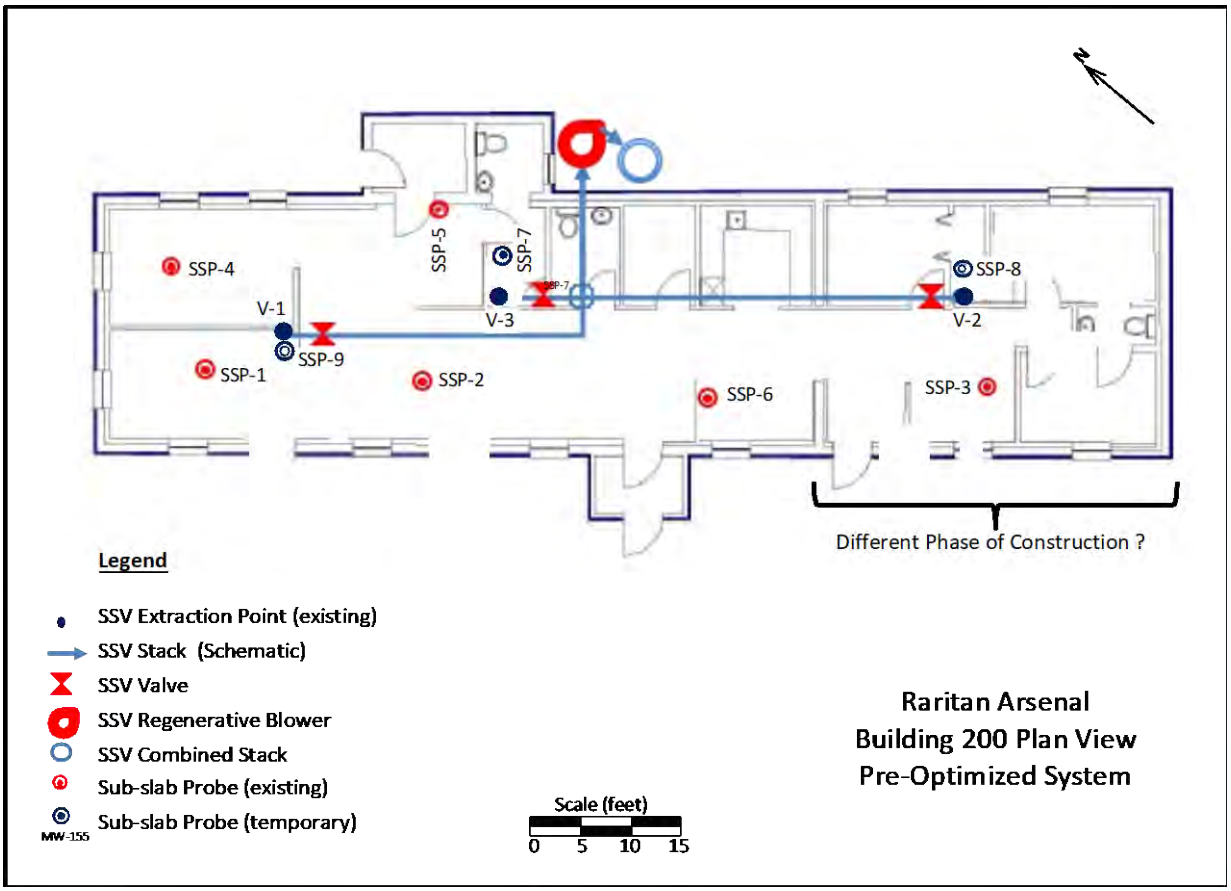



**Figure 6-1: Building 200 photo and floorplan with instrumentation**



**Figure 6-2: Photos of exterior and interior of Building 200**

### 6.1.1 Site Geology/Hydrogeology

The data collected through historical site investigation activities indicates the shallow geology in the vicinity of Building 200 consists of generally homogenous unconsolidated sediments, primarily sand and silts with fill materials of variable thickness near the ground surface. A detailed assessment of the geology is included in ESTCP Project ER-201503.

### 6.1.2 Contaminant Distribution

TCE is the primary constituent of concern in the groundwater at Building 200. Three groundwater monitoring wells (Figure 6-3) in the vicinity of Building 200 have been sampled as part of the DERP-FUDS remediation program (U.S. ACoE, 2014). The depth to the water table is approximately 20 feet below the top of the building slab. The measured concentrations of TCE in monitoring wells near the building ranged from less than the reporting limit up to 120 µg/L, which could yield equilibrium soil vapor concentrations as high as about 30,000 micrograms per cubic meter (µg/$m^3$) based on Henry's Law partitioning. The U.S. EPA installed three subslab soil vapor monitoring points (SSP-1, 2 and 3 on Figure 6-1) in Building 200 during December 2004 (Shaw, 2012) and reported subslab TCE vapor concentrations ranging from 86 to 29,019 µg/$m^3$, which was consistent with expectations. In February 2005, Westin Inc., on behalf of the U.S. ACoE,

installed and sampled four soil borings (Figure 6-3) to depths of 8 ft BGS at locations inside the building (Westin 2005) and TCE was detected at concentrations up to 9,500 micrograms per kilogram on a dry weight basis (µg/kg). Based on those results, EPA sampled indoor air with a TAGA unit in January 2005; measuring a maximum indoor air concentration of 13 ppb (70 $\mu g/m^3$) (Figure 6-4). These concentrations exceeded their respective New Jersey Department of Environmental Protection screening levels by more than 10 times, so a SSD mitigation system was installed by the U.S.EPA (shown on Figure 6-1).

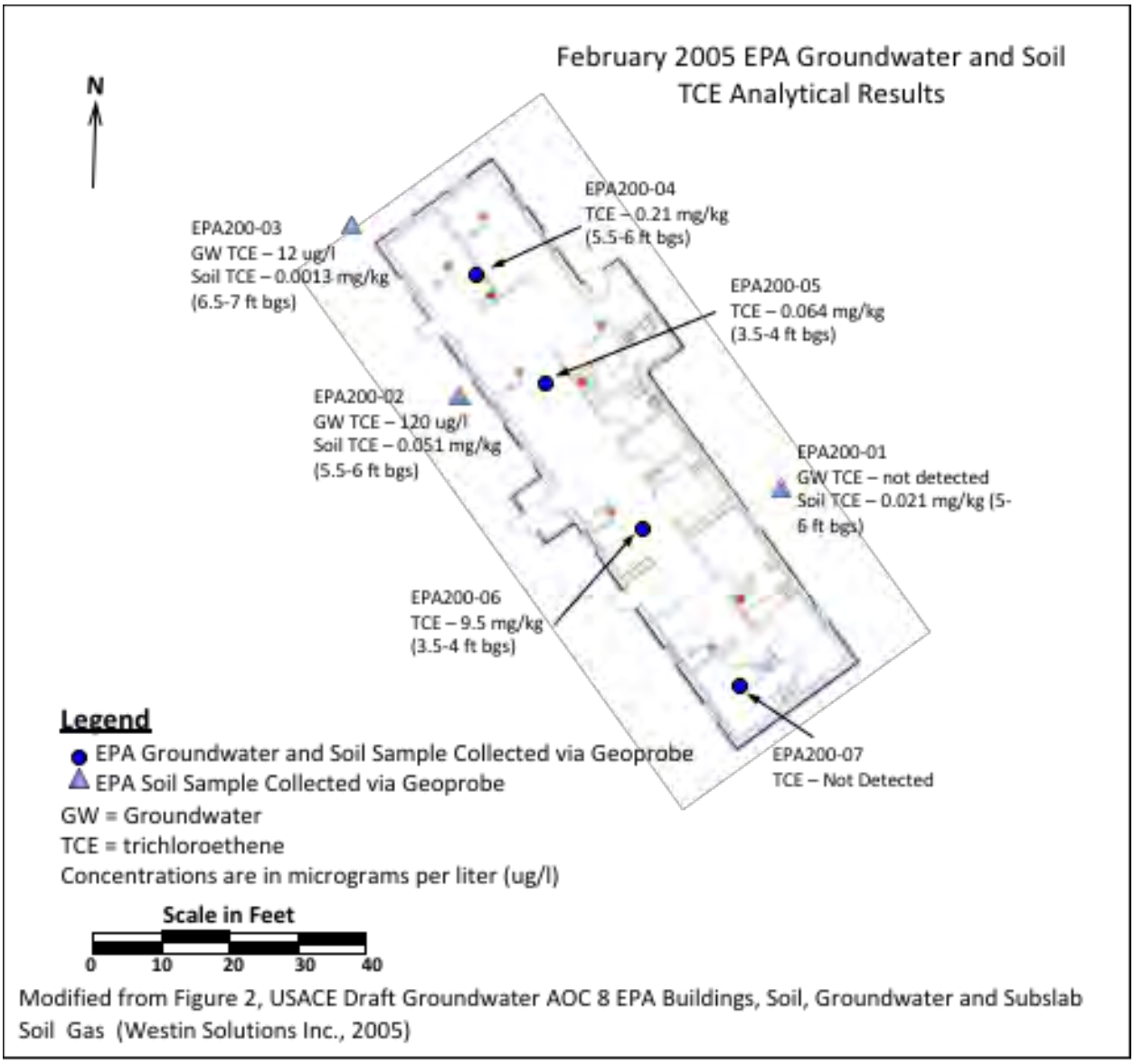
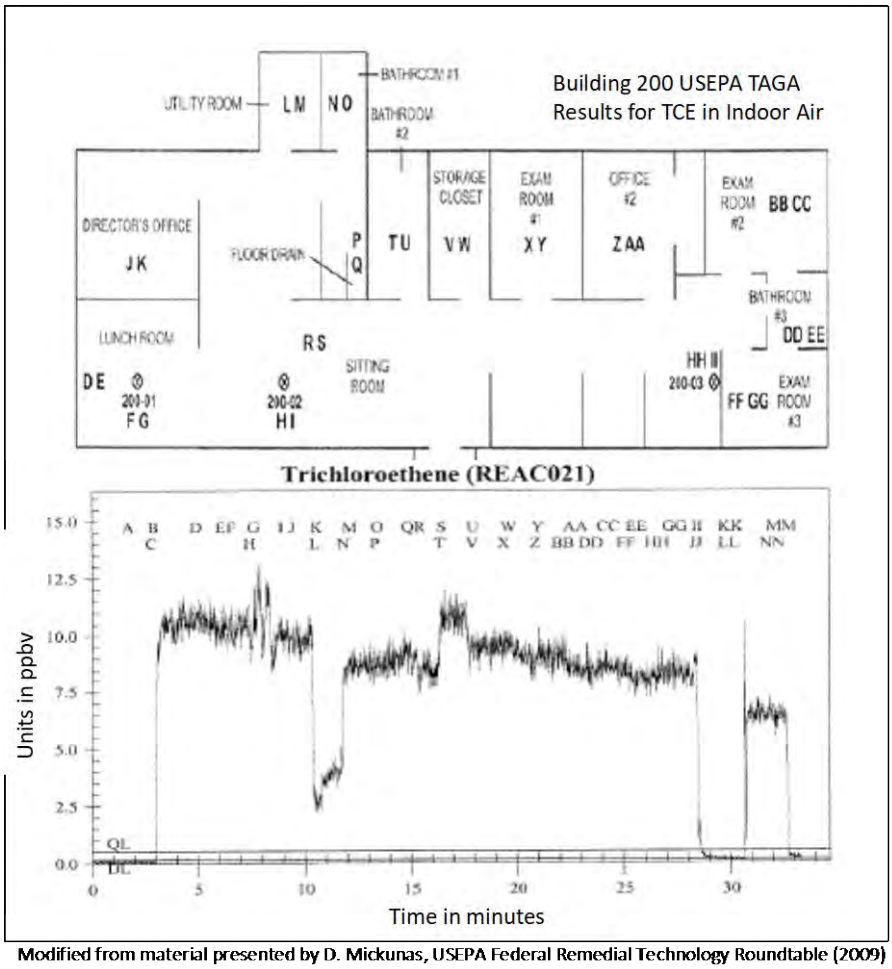



**Figure 6-3: TCE concentrations in soil, groundwater and soil gas samples from Building 200**




Modified from material presented by D. Mickunas, USEPA Federal Remedial Technology Roundtable (2009)

**Figure 6-4: Building 200 indoor air TCE concentrations measured by the TAGA unit**

The SSD system was designed using Conventional methods and installed in January 2005. The system was initially installed with two suction points (V-1 and V-2, Figure 6-1). VOC concentrations were monitored at two indoor air locations at the north and south ends of the building after the system began operating (Table 6-1) and there were consistent detections of TCE in indoor air. The system was upgraded in early 2008 with a third suction point (V-3) and a Rotron blower, which applied a vacuum as high as 47 in-$H_2O$. This resulted in acceptable indoor air concentrations (Table 6-2), but excessive noise and power draw. The system was retrofitted with a box to contain the blower as a noise barrier and a variable frequency drive to reduce the applied power, and eventually a recirculation loop to reduce the applied vacuum without overheating the blower and by 2014, the applied vacuum had been reduced to ~3 to 5 in-$H_2O$. Photos of the SSD system are provided in Figure 6-5. The total cost of operation and maintenance of the modified system was approximately $15,000 per year with an electricity cost of about $6,600 per year, which is high relative to the size of the building (~2,200 $ft^2$).

**Table 6-1: Indoor air monitoring data collected after the initial SSD system installation**

| Date | 200-02 North end of building | 200-03 South end of building |
|---|---|---|

| | PCE | TCE | PCE | TCE |
|---|---|---|---|---|
| 1/30/2006 | 1.4U | 4.60 | 1.4 | 3.9 |
| 3/9/2006 | 1.4U | 2.60 | 1.4U | 2.6 |
| 6/13/2006 | 1.4U | 3.00 | 1.4U | 2.10 |
| 9/13/2006 | 1.4U | 3.50 | 1.4U | 3.10 |
| 10/24/2006 | 1.4U | 3.50 | 1.4U | 4.40 |
| 1/11/2007 | 1.4U | 2.90 | 1.4U | 3.80 |
| 3/29/2007 | 1.4U | 2.30 | 1.4U | 2.40 |
| 8/23/2007 | 1.4U | 1.10 | 1.4U | 1.1 |
| 11/15/2007 | 1.4U | 2.70 | 1.4U | 3.1 |



**Figure 6-5: Photos of the existing SSD System, including (top, l to r) Rotron Blower, variable frequency drive, recirculation loop and entire assembly and vent pipes (bottom l to r) V-1, V-2, and V-3.**

**Table 6-2: Monitoring data collected after addition of V-3 and Rotron Blower**

| Date | SSV Vacuum (in $H_2O$) | SSV Flow ($ft^3$/min) | Subslab TCE at SSP-02 ($\mu g/m^3$) | Indoor Air TCE at North End ($\mu g/m^3$) |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| 6/11/2008 | 47.3 | 13* | 1.83 | 0.22U |
| 10/3/2008 | 41.3 | 29.8 | 1.4 | 0.59 |
| 12/12/2008 | 22.7 | 6.7 | 0.81 | 0.7 |
| 3/13/2009 | 8* | 7* | 0.43 | 0.21J |
| 5/29/2009 | 12* | 12* | 0.54J | 0.32J |
| 9/18/2009 | 20.4 | 6.0 | 0.32J | 0.21U |
| 12/18/2009 | 9.4* | 12* | 0.21J | 0.21J |
| 3/5/2010 | 7.8 | 6.0 | 0.21U | 0.21U |
| 9/24/2010 | 14.3* | 7* | 199 | 0.43 |
| 2/23/2011 | 4.9* | 12* | 0.86U | 0.21U |
| 9/20/2011 | 12.4* | 0* | 221 | 0.21U |
| 2/22/2012 | -- | -- | 104 | 0.21U |
| 10/23/2012 | -- | -- | 275 | 0.2J |
| 2/26/2013 | -- | -- | 170 | 0.38 |
| 9/24/2013 | -- | -- | 167 | 0.18 |
| 2/19/2014 | 5.1* | 1.0* | 140 | 0.45 |
| 9/10/2014 | 2.7* | 1.4* | 330 | 0.21U |
| 1/21/2015 | 3.7* | 1.6* | 183 | 0.64 |
| 10/14/2015 | 2.7* | 0.4* | 230 | 0.33 |
| 3/23/2016 | -- | -- | -- | 0.32 |
| 9/8/2016 | -- | -- | -- | 0.3 |
| 2/22/2017 | 5.5* | 7* | 140 | 0.36 |

-- Data not measured
*Vacuum measured at a different date but in the same time frame.
Rotron blower was replaced with Obar fan April 15, 2016

## 6.2 BUILDING-SPECIFIC TESTING

### 6.2.1 Site Reconnaissance

A site reconnaissance visit was conducted by Geosyntec on February 20, 2014, including:

1. A walk-through tour inside the building to assess the uses of the building, interior layout and access to planned sample areas;
2. Observations and photographs of the current SSD system configuration;
3. Evaluation of fan power controls (locations of on/off switches) and whether each suction point can be controlled by a balancing valve;
4. Evaluation of existing communication test point availability and condition; and,
5. Measurement of the flow rate from each of the 3 vent pipes;

To monitor the current system operating parameters, Geosyntec measured the velocities of the discharge from the vent pipes in August 2014, which were 94, 40 and 81 feet per minute (fpm) for V-1, V-2 and V-3, respectively. The diameter of the vent-pipes is 3 inches, therefore, the flow rates were 4.8, 2.0 and 4.8 standard cubic feet per minute (scfm), respectively or a total of 11.6 scfm (dramatically less than the maximum blower capacity of about 300 scfm).

### 6.2.2 Mass Flux Monitoring

Waterloo Membrane Samplers (WMS) were deployed in vent-pipes V-1, V-2 and V-3 on July 24, 2015, and retrieved again on August 13, 2015. Flow rates on July 24 were about 1.8 scfm in each vent-pipe. Summa canister samples were also collected on July 24 for analysis by U.S. EPA Method TO-15 open scan.

Radon concentrations were measured in the combined stack effluent and in each of the three individual vent pipes on August 13, 2015 with a combination of the Durridge RAD7 and via Tedlar Bag for analysis by Doug Hammond of USC.

### 6.2.3 Pneumatic Testing

Static vacuum was measured at subslab probes SSP-1 to SSP-9 with flow rates of 1.8, 1.7 and 1.5 scfm from vent pipes V-1, V-2 and V-3, respectively. The system was cycled on and off while data-loggers recorded the transient vacuum response at SSP-1 through SSP-6 with all three suction points operating at the same time.

Transient pneumatic tests were performed running only one vent pipe at a time and monitoring transient vacuum at SSP-1 (8.6 ft from vent pipe V-1), SSP-3 (8.9 ft from vent pipe V-2 and SSP-2 (8.2 ft from vent pipe V-3). Vacuum was measured as a function of radial distance during each of these tests once the vacuums stabilized.

### 6.2.4 Subslab Tracer Testing

Helium inter-well tracer tests were performed at SSP-9 (3 ft from vent-pipe V-1), SSP-8 (3 ft from vent-pipe V-2), and SSP-7 (3 ft from vent-pipe V-3). Helium Flood tests were performed at V-1 (6.9 scfm and 3.6% helium with data collected at subslab probe SSP-4, 12 feet away), V-2 (2.9 scfm and 4.3% helium with data collected at subslab probe SSP-3, 9 feet away) and at V-3 (2.7 scfm and 10.8% helium with data collected at subslab probe SSP-5, 10 feet away). For the flood test at V-2, there was no measurable helium at probe SSP-3 after 30 minutes, and time constraints required the test to be discontinued, so no average travel time could be determined.

### 6.2.5 Cross-Slab Tracer Testing

A cross-slab tracer test was performed by turning off the SSD system, then releasing about 100L of $SF_6$ from a small compressed gas cylinder into the interior of the building over a period of a few minutes while using large box-fans to disperse and mix the $SF_6$ into the indoor air. The $SF_6$ concentration was measured in real-time with a portable Ion Science $SF_6$ LeakCheck P1:p Portable $SF_6$ Gas Leak Detector. After the indoor air distribution of $SF_6$ was essentially uniform, the SSD system fan was turned on and $SF_6$ concentrations in the vent-pipes were monitored until $SF_6$ readings stabilized.

The maximum $SF_6$ level in indoor air was well below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), which are both 1,000 ppmv.

### 6.2.6 Building Depressurization Testing

The mass loading through the building during building depressurization testing was measured to be about 0.1 g/day using a blower door as part of ESTCP Project ER201503.

### 6.2.7 Confirmatory Indoor Air Quality Monitoring

Indoor air radon samples were collected at 6 locations inside Building 200 using EPERM Electrets starting on August 16, 2015 and retrieved on September 15, 2015.

Indoor air sampling via individually-certified Summa canister and analysis by U.S. EPA Method TO-15 SIM were performed by Avatar as part of routine monitoring in October, 2015, September 2016 and February 2016 at 2 locations in Building 200.

## 6.3 RESULTS AND DISCUSSION

### 6.3.1 Specific Capacity and Mass Flux

The specific capacity of the three vent-pipes is shown in Figure 6-6, for all monitoring events since January 2014 and including 5 events after replacement of the Rotron blower with a smaller fan. Vent pipe V-2 has a slightly lower specific capacity at 0.6 scfm/in-$H_2O$, compared to 1.0 and 0.9 for V-1 and V-3, respectively. Recall that the specific capacities for Building 205 vent-pipes ranged from 0.35 to 9.15 scfm/in-$H_2O$, so the Building 200 values are comparable.

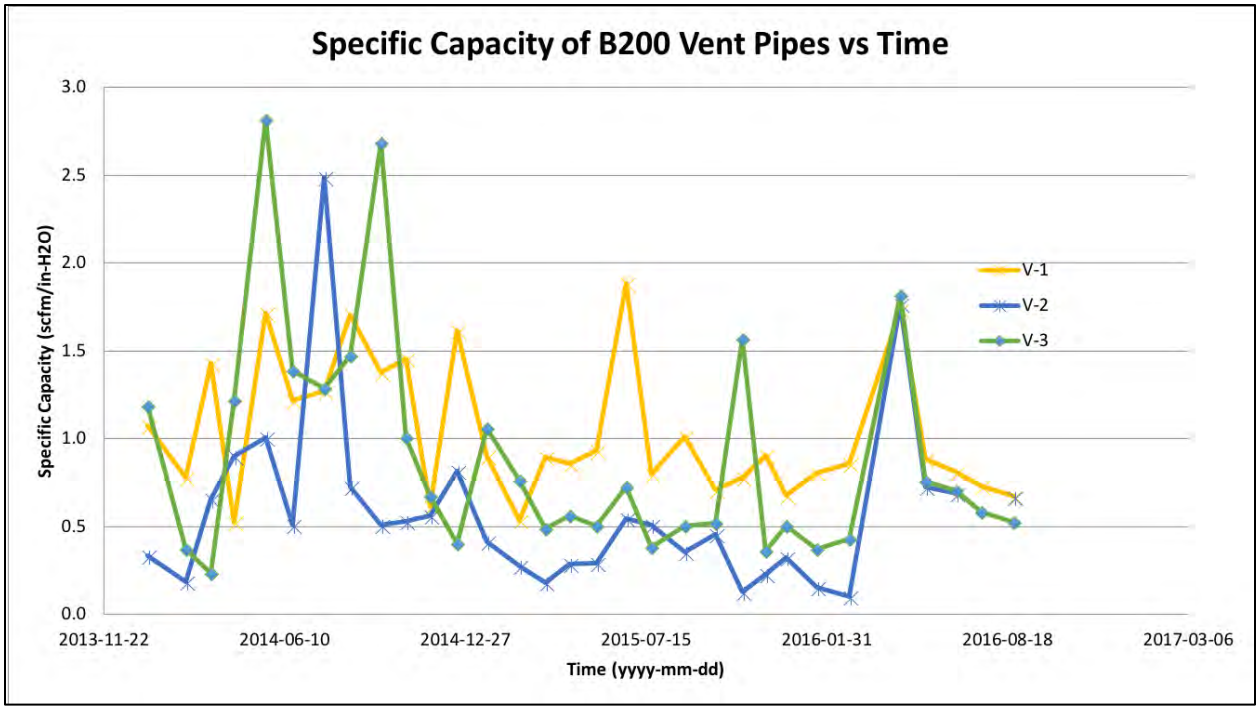



**Figure 6-6: Specific capacities for vent pipes at Building 200**

Table 6-3 provides the TCE mass removal rate data. The WMS samplers showed lower results than the Summa canisters by an average of about 2X, similar to the ratio observed at Building 205, so this appears to be a consistent calibration bias. Regardless of which data set is used to calculate the mass removal rate of the system, the result is greater than the rate of mass loading through the building when depressurized with a blower door, as measured by ESTCP Project ER201503 (0.1 g/day).

**Table 6-3: TCE Mass Flux from SSD System 2015**

| Date | Location | Method | TCE ($\mu g/m^3$) | Flow Rate (scfm) | Vacuum (in.-$H_2O$) | Mass Loading (g/day) |
|---|---|---|---|---|---|---|
| 07/24/2015 | VP1 | Summa | 1200 | 1.8 | 2.9 | 0.09 |
| 07/24/2015 | VP2 | Summa | 300 | 1.8 | 2.9 | 0.02 |
| 07/24/2015 | VP3 | Summa | 1600 | 1.7 | 2.2 | 0.11 |
| | TOTAL | | | | | 0.22 |
| 07/24/2015 - 08/13/2015 | VP1 | WMS | 290 | 1.8 | 2.8 | 0.02 |
| 07/24/2015 - 08/13/2015 | VP2 | WMS | 190 | 1.7 | 2.7 | 0.01 |
| 07/24/2015 - 08/13/2015 | VP3 | WMS | 1000 | 1.5 | 2.8 | 0.06 |
| | TOTAL | | | | | 0.09 |

Vent pipe activity readings and removal rates for radon and thoron are presented in Table 6-4.

**Table 6-4: Radon and thoron readings and removal rates in Building 200 vent pipes**

| | Method | Radon ($Bq/m^3$) | Thoron ($Bq/m^3$) | Flow rate (scfm) | Radon Removal Rate (MBq/day) | Thoron Removal Rate (MBq/day) |
|---|---|---|---|---|---|---|
| Combined | RAD7 | 2820 | 6940 | 5.1 | 580 | 1400 |
| Vent Pipe V-1 | RAD7 | 4690 | 21500 | 1.8 | 340 | 1600 |
| Vent Pipe V-2 | RAD7 | 3560 | 16800 | 1.7 | 250 | 1200 |
| Vent Pipe V-2 | Scintillation Cell (USC) | 3996 | -- | 1.7 | 277 | -- |
| Vent Pipe V-3 | RAD7 | 2990 | 13100 | 1.5 | 180 | 800 |
| Total emissions (MBq/day) | | | | | 780 | 3600 |

### 6.3.2 Static Vacuum Testing

Static vacuum levels under normal operating conditions are presented in Table 6-5. It is notable that SSP-8, located only 3 ft from vent-pipe V-2, measured only 2.5 Pa vacuum. This is in stark contrast to the vacuum measured at probes SSP-7 (25.4 Pa, 3 ft from vent-pipe V-3) and SSP-9 (224 Pa, 3 ft from vent-pipe V-1). Considering the similarities in the flow rates and specific capacities of the three vent-pipes, the vacuum at a radius of 3 ft is very different. This was not identified in the initial system installation and diagnostic testing because the three probes at radial distances of 3-ft (SSP-7 through 9) were only installed as part of this research. The importance of measuring vacuum at small radial distances as well as large radial distances is that it provides a better opportunity for a unique fit of T and B values when comparing vacuum vs distance data to Equation 4. In this case, it would have provided a valuable early warning that vent-pipe V-2 was not performing normally.

**Table 6-5: Static vacuum measured during operation of the SSD system**

| Probe | Static Vacuum (Pa) |
|---|---|
| SSP-01 | 50.1 |
| SSP-02 | 36.3 |
| SSP-03 | 2.5 |
| SSP-04 | 10.4 |
| SSP-05 | 0.4 |
| SSP-06 | 1.6 |
| SSP-07 | 25.4 |
| SSP-08 | 2.7 |
| SSP-09 | 224 |

The building air conditioning system ran intermittently and there was a 1 to 3 pascal difference recorded at the subslab probes in response, as shown in the chart of subslab differential pressure over a period of two weeks measured after the field sampling activities in August 2015 (Figure 6-7). For comparison, Figure 6-8 shows the differential pressure measured across the rear door (indoor-outdoor) over the same period of time. In both cases, a negative value indicates a gradient into the building. The indoor-outdoor differential pressure ranges from -10 to +20 Pa, whereas the indoor-subslab differential pressure ranges only from -3 to +1 Pa. This may be partly attributable to wind-effects on the exterior port of the indoor-outdoor differential pressure measurement.

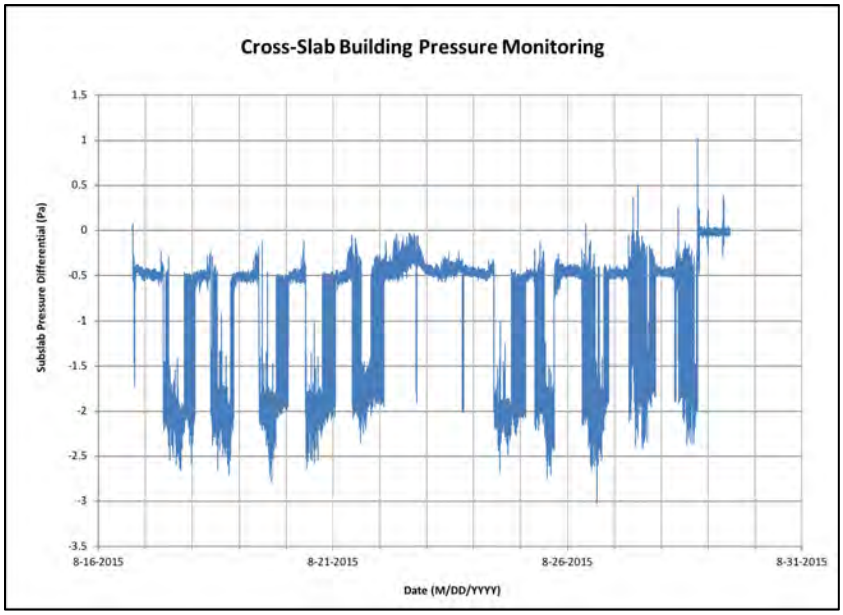



**Figure 6-7: Cross-slab differential pressure over a 2-week period at location SSP-5**

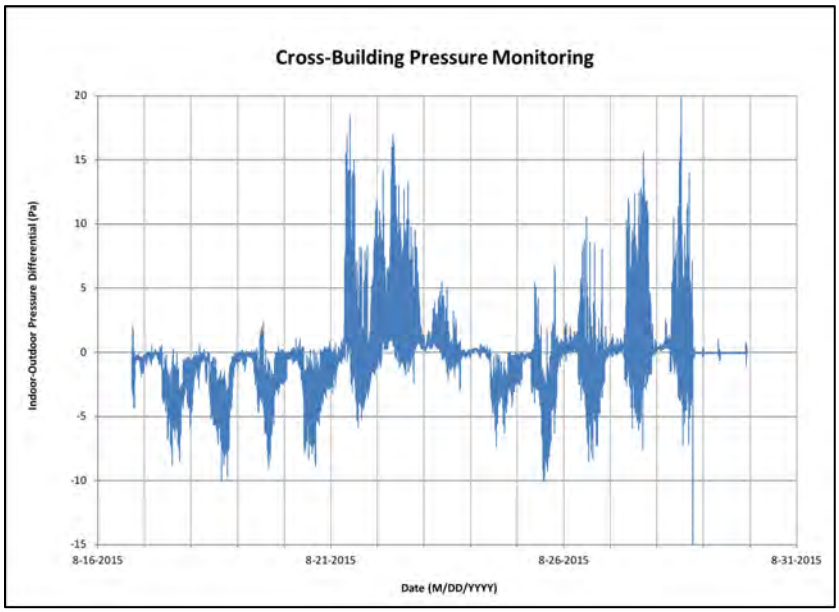



**Figure 6-8: Indoor-outdoor differential pressure over a 2-week period at Building 200**

The long-term static vacuum of the SSD vent pipes is shown on Figure 6-9. There were some adjustments made to the variable frequency drive and recirculation loop after the installation of the Rotron blower, but after that, the vacuum levels were relatively consistent in the range of 3 to 4 in-$H_2O$. On April 15, 2016 the Rotron blower was replaced with a smaller variable speed OBAR 76 SOE fan, and since then, the applied vacuum has consistently been in the range of 4 to 5 in-$H_2O$. The new fan draws 0.5 amps from a 120v/60w power source. The combined flow of the three vent-pipes during the same time is shown on Figure 6-10, and is generally in the range of 10 to 20 scfm.

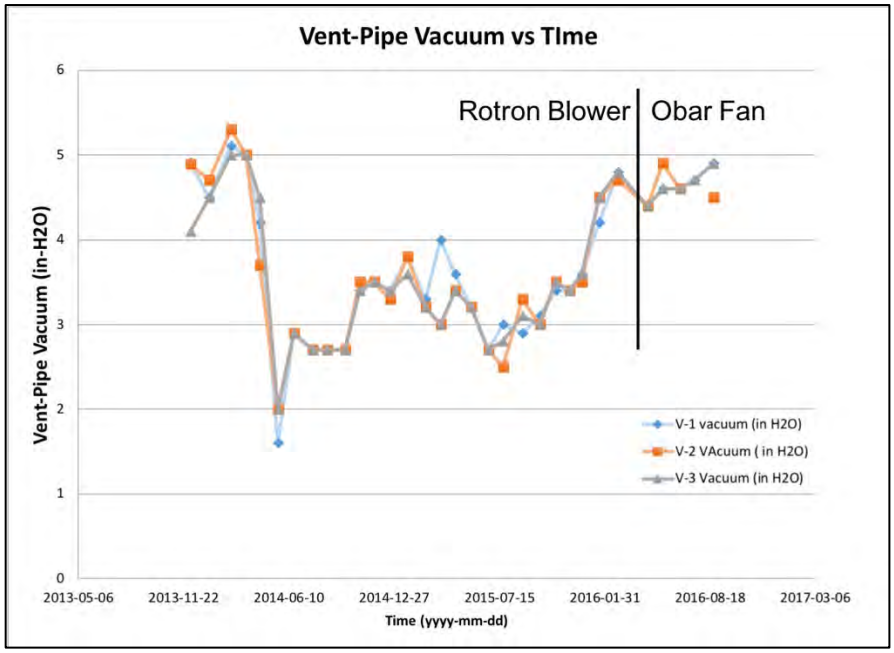



**Figure 6-9: Building 200 vent pipe vacuum versus time**

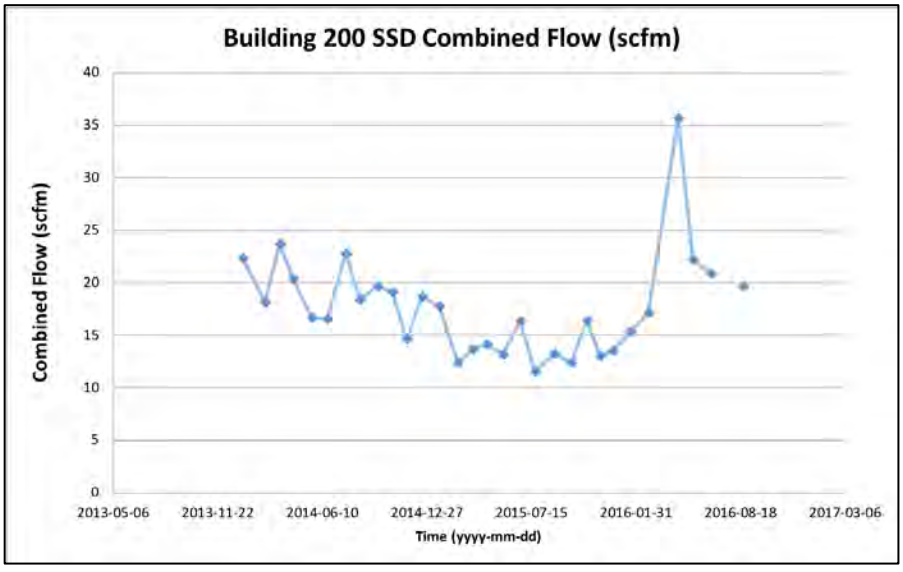



**Figure 6-10: Building 200 total system flow rate versus time**

### 6.3.3 Transient Pneumatic Testing and Analysis

The response of subslab probes SSP-1 to SSP-6 to cycling the SSD system off and on is shown in Figure 6-11. Vacuum dissipates within about 30 seconds after turning the fan off, and re-establishes steady readings within about 20 seconds after turning the fan back on. This slight asymmetry could be because the fan spins down slower than it spins up during a power cycle. Ball valves were only available to impose a more instantaneous start or stop to flow for the individual vent pipes, and not the combined system.

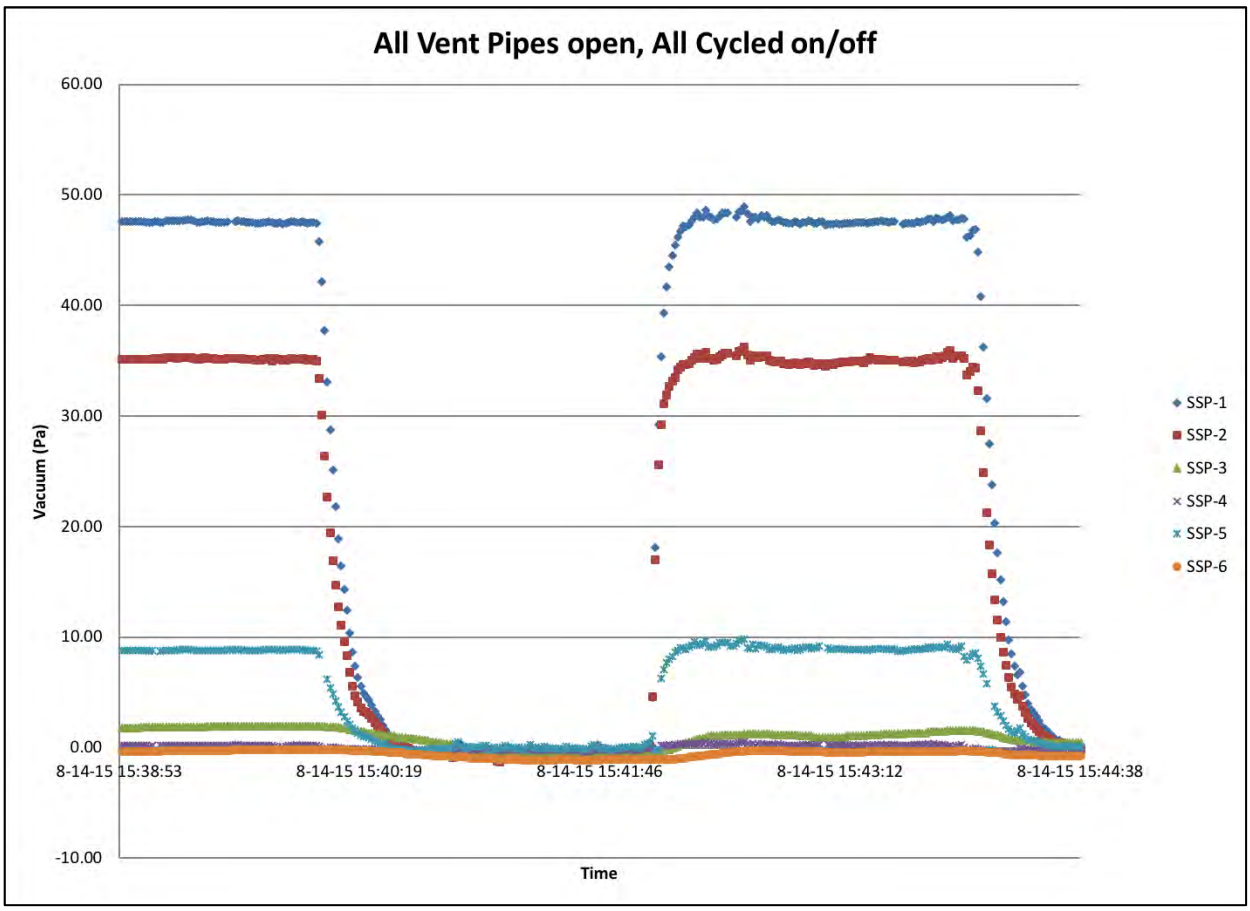
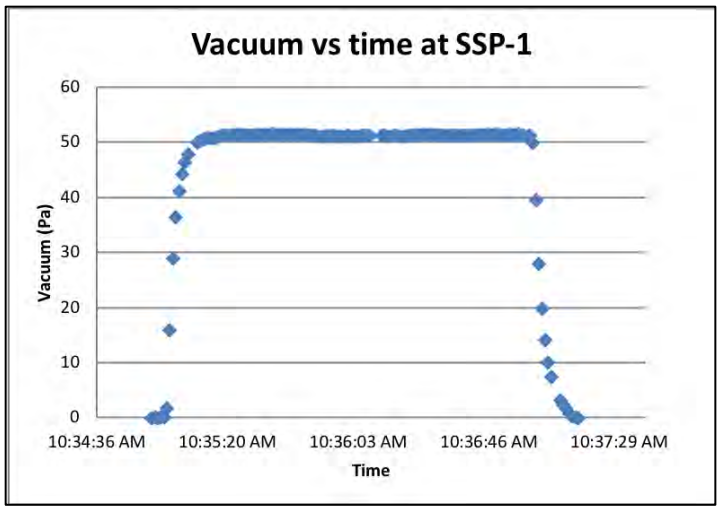
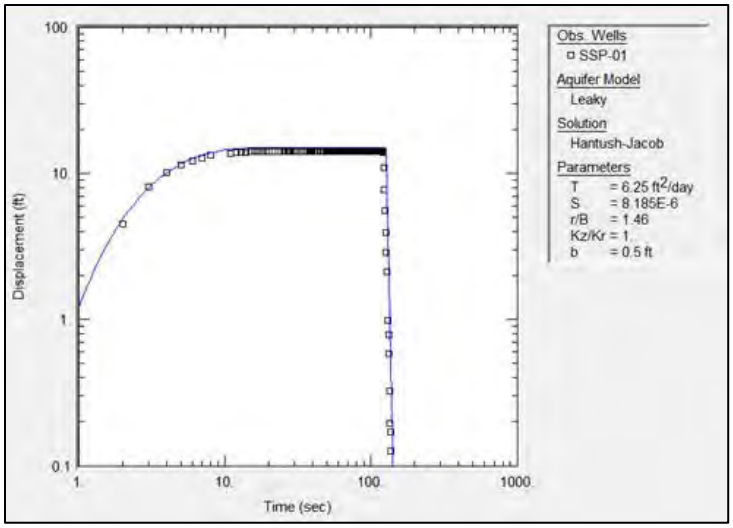



**Figure 6-11: Transient pneumatic response to cycling the SSD system at Building 200**

Each vent pipe is fitted with a ball valve, so they can be independently balanced. With only one vent-pipe operating at a time, the monitoring of vacuum vs time and distance and mathematical analysis of T and B values using Equations 1 and 4 is simplified. Figures 6-12, 6-13 and 6-14 show the transient vacuum data and Hantush Jacob Model curve fits from AQTESOLV for each of vent pipes V1, V2 and V3, respectively and the pneumatic properties are listed in Table 6-5.



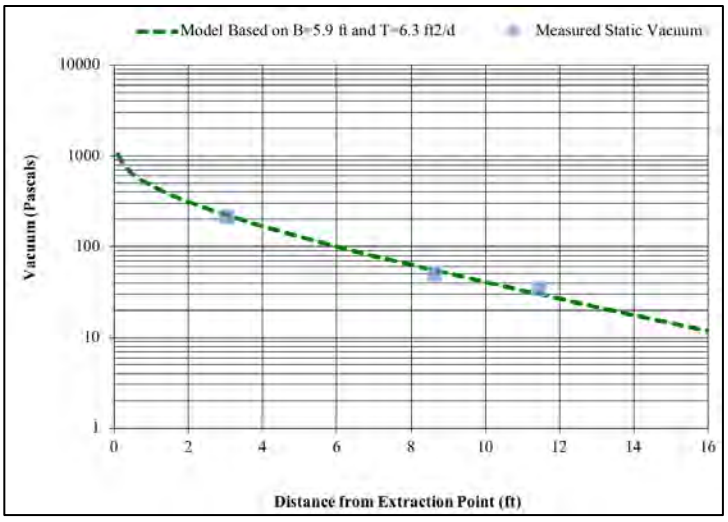
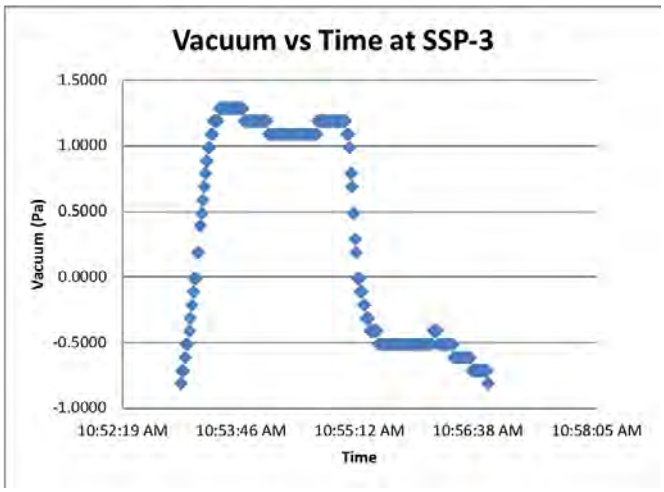
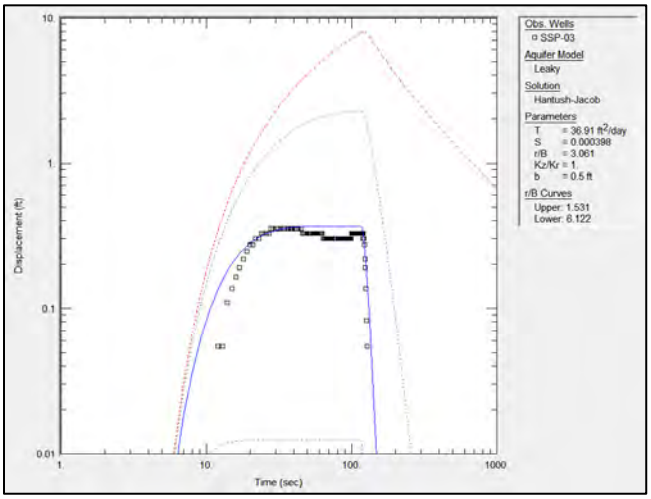




**Figure 6-12: Transient vacuum data and analysis at SSP-1 (8.6 ft from vent pipe V-1)**



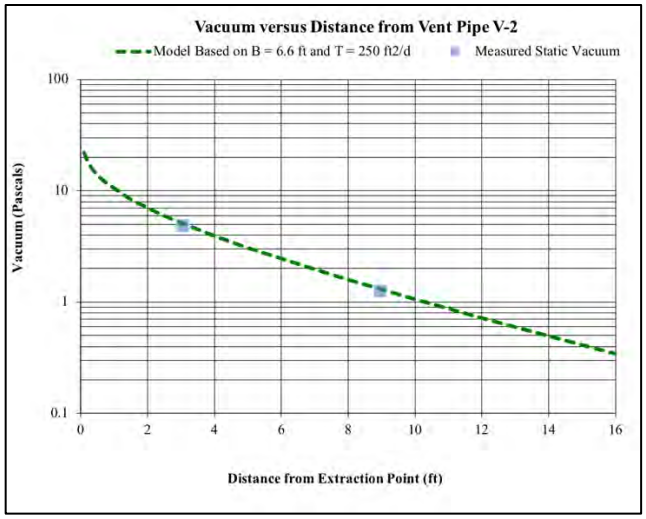




**Figure 6-13: Transient vacuum data and analysis at SSP-2 (8.9 ft from vent pipe V-2)**

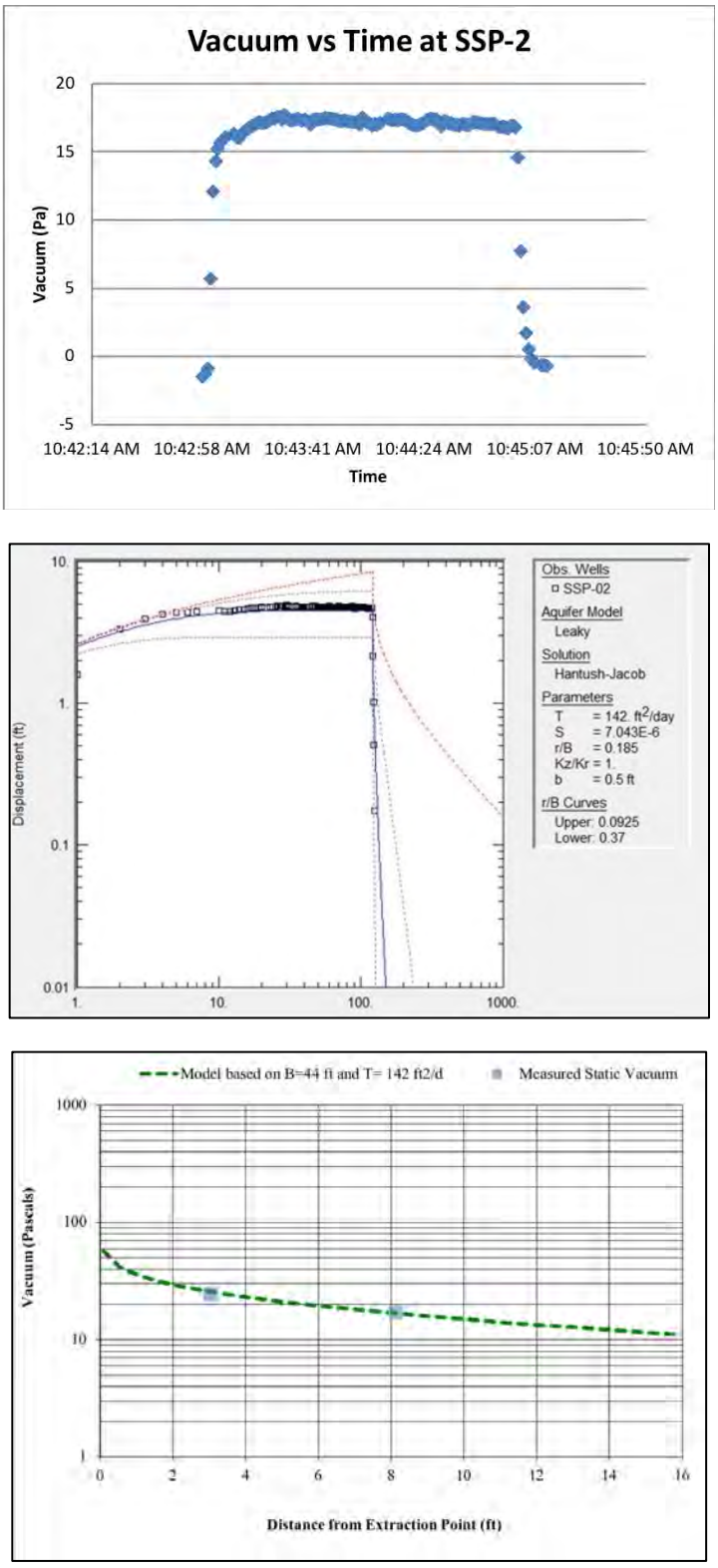



**Figure 6-14: Transient vacuum data and analysis at SSP-2 (8.2 ft from vent pipe V-3)**

**Table 6-6: Summary for Pneumatic Properties for Building 200 Vent Pipes**

| Fan | Subslab Probe | Transmissivity (T) | r/B | Radius (r) | Leakance (B) | Thickness of flow zone (b) | K´ |
|---|---|---|---|---|---|---|---|
| | | ($ft^2$/day) | (dim) | (ft) | (ft) | (ft) | (ft/day) |
| V-1 | SSP-1 | 6.3 | 1.46 | 8.6 | 5.9 | 0.3 | 0.090 |
| V-2 | SSP-3 | 250* | 1.35* | 8.9 | 6.6* | 6.5* | 2.9* |
| V-2 | SSP-3 | 37* | 3.1* | 8.9 | 2.9* | Not Assessed | 2.2* |
| V-3 | SSP-2 | 142 | 0.15 | 8.2 | 44 | 0.4 | 0.037 |

The vacuum versus time and vacuum versus distance data matched reasonably well to Equations 1 and 4 with one unique pair of T and B values for vent-pipes V1 (B = 5.9 ft and T = 6.3 $ft^2$/day) and V3 (B = 44 ft and T = 142 $ft^2$/day). This was not true for vent pipe V-2, so Table 6-5 includes two sets of T and B values for vent pipe V-2, one derived from fitting the vacuum vs time data to Equation 1 using AQTESOLV (B = 2.9 ft and T = 37 $ft^2$/day) and the other by fitting the vacuum vs distance data to Equation 4 using a spreadsheet (B = 6.6 ft and T = 250 $ft^2$/day), neither of which is considered ideal, so they are marked with asterisks in Table 6-5. The K' values (bulk average vertical gas conductivity of the floor slab) calculated from Equation 3 are within the range calculated in Table 5-5 for Building 205 when using the T and B values in Table 6-5 and a b' (floor thickness) value of 0.5 ft.

Note that for vent pipe V-2, the T and B values are very different for the two rows in Table 6-6, but the K' values are very similar, so in both cases, a high degree of floor permeability is indicated. This is not consistent with the results of the cross-slab tracer test, so the high value calculated for leakage in this case is a clear indication that flow to vent pipe V-2 is attributable to a subsurface pathway (not cross-floor leakage). Recall from Figure 6-6 that vent pipe V-2 has a similar (perhaps slightly lower) specific capacity compared to vent pipes V-1 and V-3. The TCE mass removal rate for vent pipe V-2 is lower than for vent pipes V-1 or V-3 (Table 6-3), but the radon and thoron activities are mid-range between vent pipes V-1 and V-2 (Table 6-4), so the supply of gas to vent-pipe V-2 appears to be from the subsurface through material of a similar or slightly lower permeability than V-1 or V-3, and not direct short-circuiting to atmospheric air. Through these multiple lines of evidence, the understanding of conditions at vent pipe V-2 is improved, although not completely resolved.

### 6.3.4 Subslab Tracer Testing and Analysis

The results of tracer testing at vent pipe V-1 are shown in Figures 6-15 (inter-well test from probe SSP-9 at r = 3 ft) and 6-16 (flood test to SSP-4 at r = 12 ft). These tests showed average travel times of 2 min 58 sec from a radius of 3 ft and 29 min 18 sec from a radius of 12 ft.

The results of tracer testing at vent pipe V-2 are shown in Figures 6-17 (inter-well test from probe SSP-8 at r = 3 ft), which showed an average travel time of about 19 minutes from a radius of 3 ft. With a flow rate of 1.5 scfm a much faster arrival would be expected. For example, if flow was occurring through a 4-inch gravel bed with 25% air-filled porosity with no slab leakage, an arrival time of 1.6 minutes would be expected. This is comparable to the result for vent pipe V-3 (Figure

6-18), which had the highest B value (least leakage) in Table 6-5. The very slow inter-well test at vent pipe V-2 clearly indicates that radial flow from a granular fill layer is not occurring (i.e., the conditions are not consistent with the model assumptions). Note that the peak concentration of helium in the inter-well test at V-2 (2,500 ppmv) is lower than the tests at V-1 (~7000 ppmv) and V-3 (12,500 ppmv for a 1L injection), but only by a factor of 5 or less, which indicates that most of the injected helium was recovered.

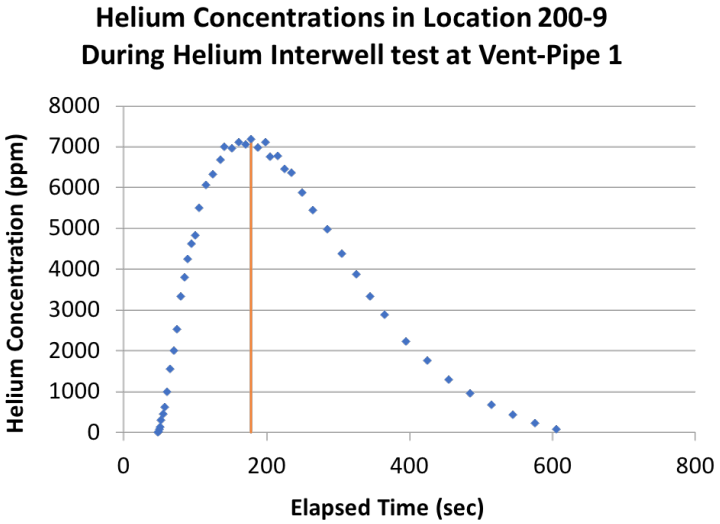



**Figure 6-15: Inter-well tracer test data from vent pipe V-1 after injection at SSP-9 (r=3ft), showing an average travel time of 2 minutes and 58 seconds**

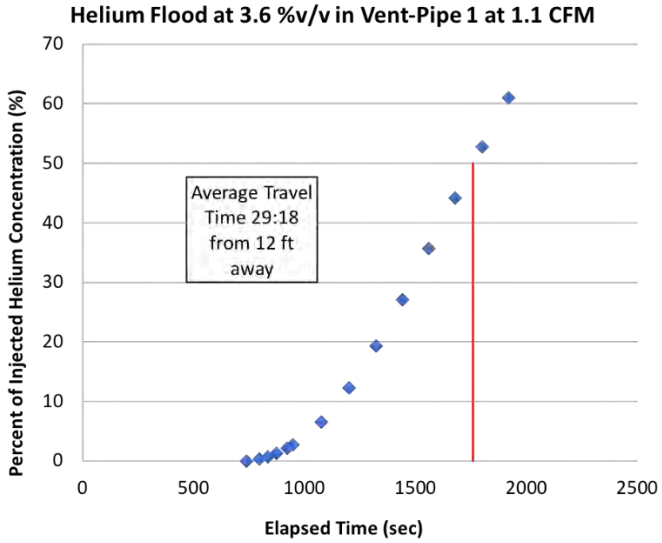



**Figure 6-16: Helium Flood from vent pipe V-1 to SSP-4 (r=12 ft), showing an average travel time of 29 minutes and 18 seconds**

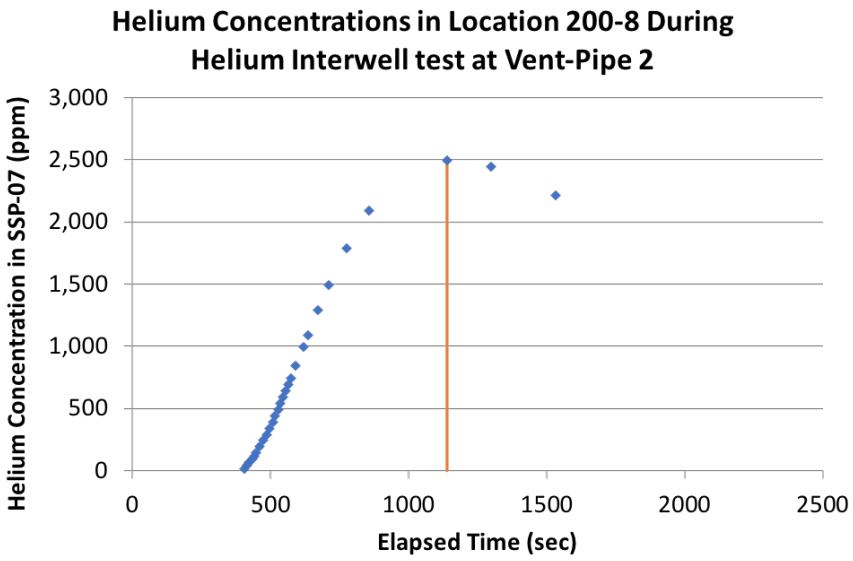



**Figure 6-17: Inter-well tracer test data from vent pipe V-2 after injection of helium at SSP-8 (r=3 ft) showing an average travel time of 18 minutes and 58 seconds**

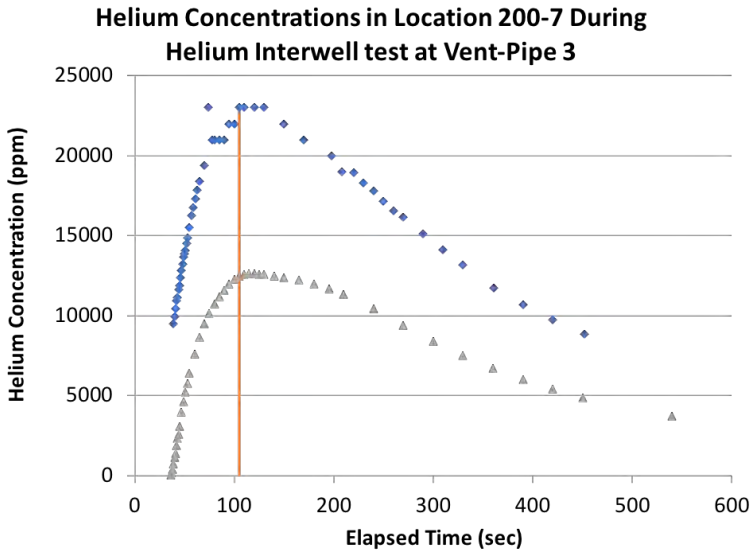



**Figure 6-18: Two inter-well tracer tests from vent pipe V-3 after injection of 1L and 3L of helium at SSP-7 (r=3 ft), showing travel times of 1 minute and 45 seconds for both tests**

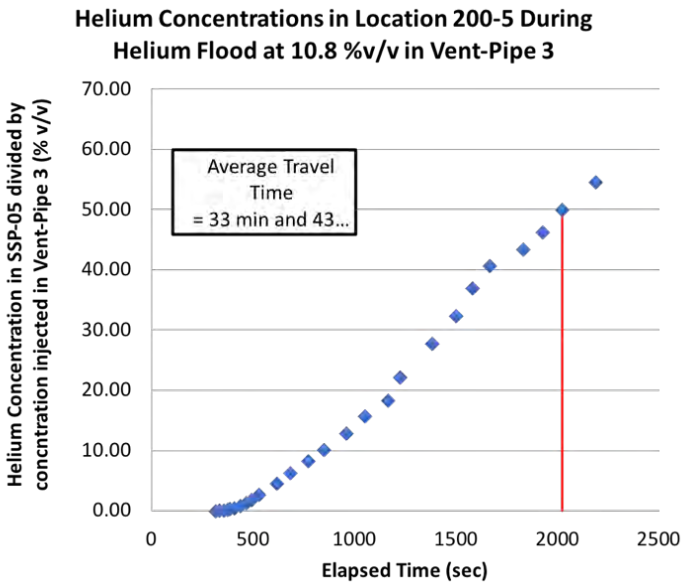



**Figure 6-19: Helium flood from vent pipe V-3 to SSP-5 (r=10 ft), showing an average travel time of 33 minutes and 43 seconds**

The inter-well and flood tracer data sets were used to calibrate the thickness (b) of the zone of active flow through the subsurface needed to solve Equation 5, as shown in Figures 6-20, 6-21 and 6-22 for vent pipes V-1, V-2 and V-3, respectively. For vent-pipes V-1 and V-3, the b value that provided the best fit to the tracer data using the T and B values calibrated to the vacuum vs time and vacuum vs distance data were 0.3 and 0.4 ft, respectively. This is consistent with an assumed granular fill layer of about 4-inch (0.33 ft) thickness. For vent pipe V-2, Equation 5 and 6 could only be matched to the inter-well tracer test travel time if the b value was set at 6.5 ft, which is considered misleading because the tracer was injected through a subslab probe 3 feet from the vent pipe, so it is unlikely that it would flow to the vent pipe uniformly through an interval with depth up to 6.5 feet. This further supports the interpretation that the supply of gas to vent pipe V-2 occurs through a pathway that is not radial flow through a granular fill layer.

The fitted travel time model for V-1 and V-3 provides reasonable confidence in the profile of velocity as a function of radial distance calculated using Equation 5 and the T, B and b values calibrated via the pneumatic and tracer testing (Table 6-5). For vent pipe V-1 and V-3, the induced velocities below the floor at a radial distance of 16 feet from the suction point were calculated to be 50 ft/day and 170 ft/day, respectively, which is considered more than ample for capture. A chart showing the calculated profile for vent pipe V-2 is also included in Figure 6-21, but it is not considered representative, for the reason described in the preceding paragraph, and is included only for completeness.

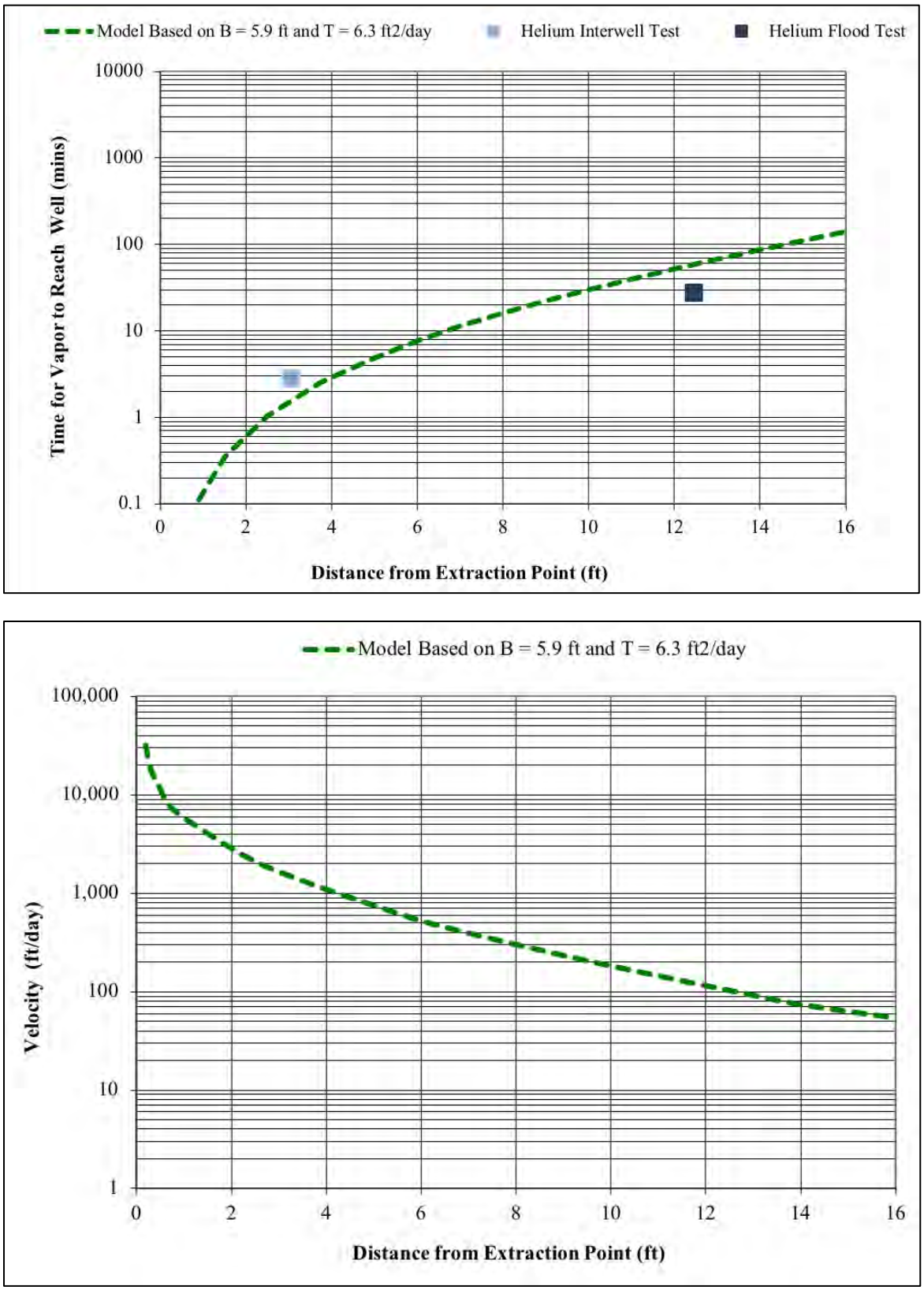
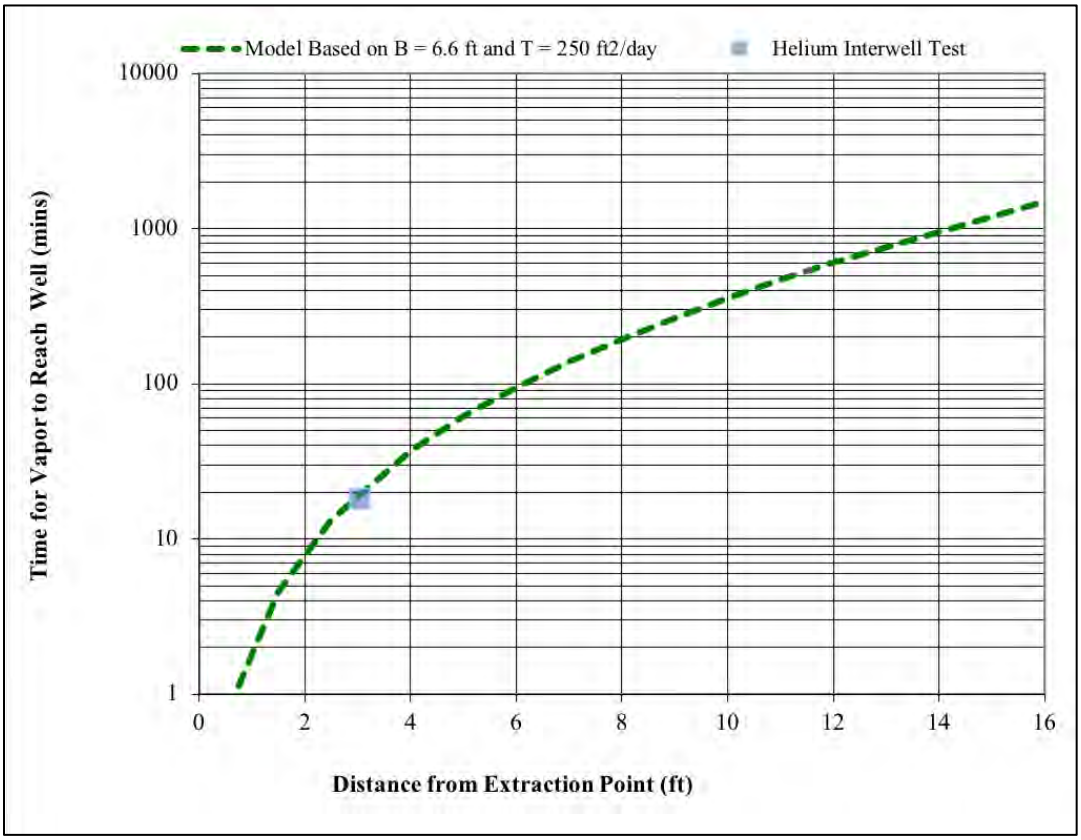



**Figure 6-20: Velocity (top) and travel time (bottom) vs radius for V1 at 1.8 scfm flow rate**



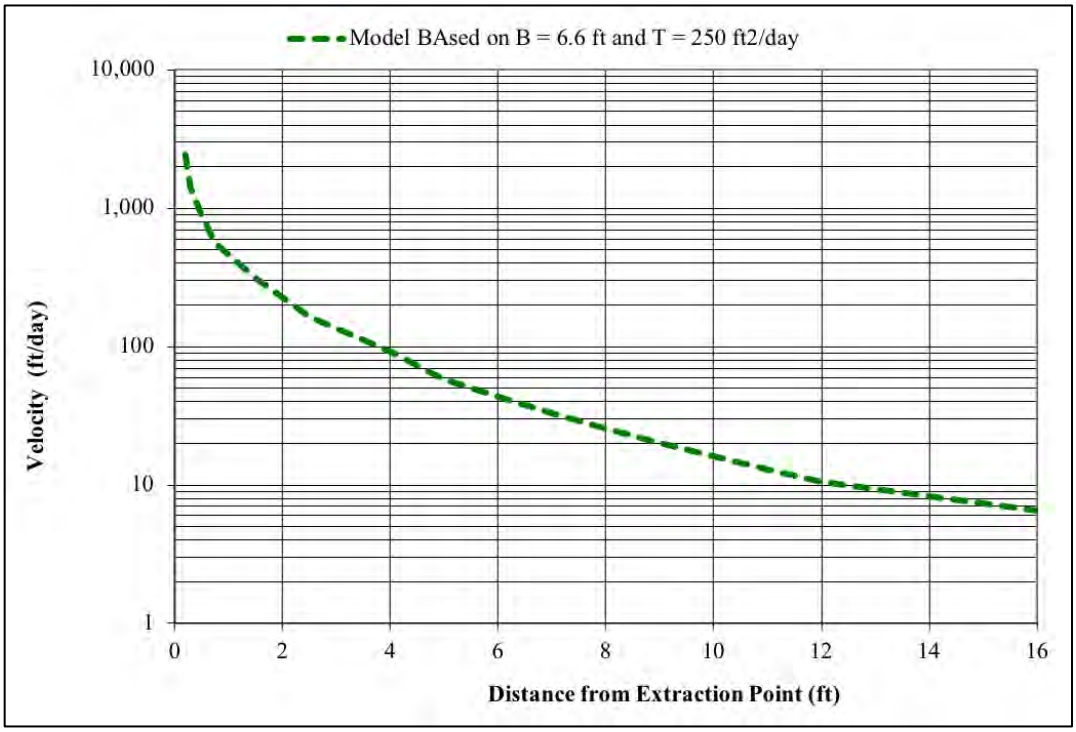
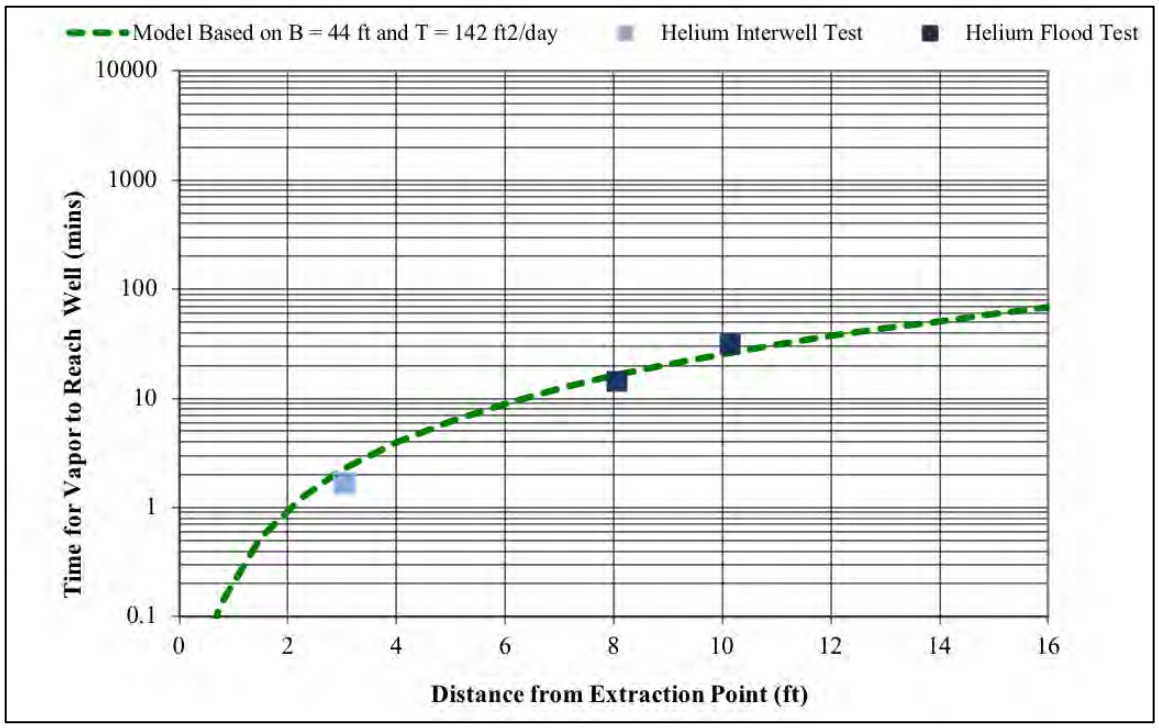




**Figure 6-21: Velocity (top) and travel time (bottom) vs radius for V2 at 1.5 scfm flow rate**



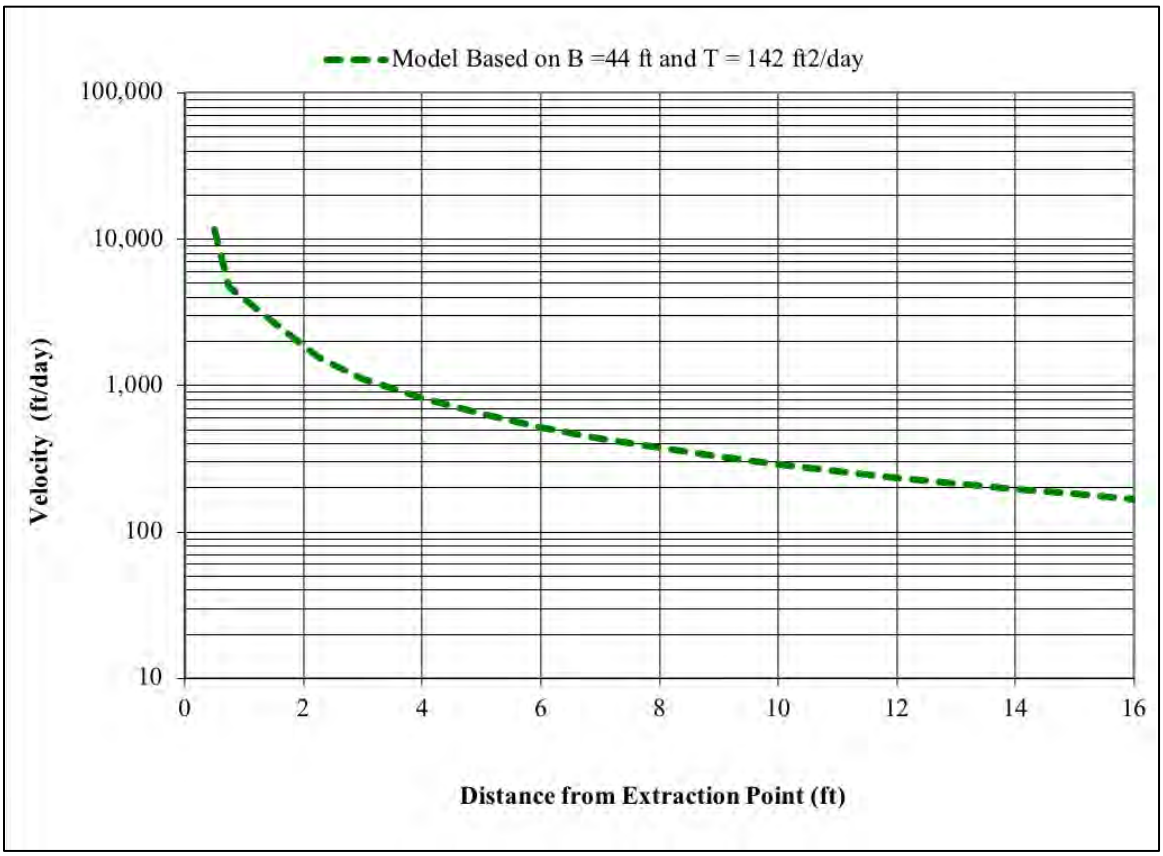




**Figure 6-22: Velocity (top) and travel time (bottom) vs radius for V3 at 1.5 scfm flow rate**

### 6.3.5 Cross-Slab Tracer Test

The data collected in the cross-slab tracer test is presented in Table 6-6. The indoor air concentrations decreased slightly over time, so additional $SF_6$ was added after about ~50 minutes.

The vent-pipe concentrations of $SF_6$ in V-1 gradually increased to about 90 ppmv after about 46 minutes, indicating about 55% indoor air in the extracted gas. Figure 6-23a (top) shows the profile of gas withdrawn from the subsurface as a function of radial distance calculated using Equation 7 and the T, B and b values in Table 6-5. Recall from Figure 6-15 that a travel time of just over 29 minutes was recorded for the helium flood at a radius of 12 ft. At r = 12 ft on Figure 6-23b, the calculated proportion of flow from the subsurface is 25%, meaning indoor air would be 75% of the total. The $SF_6$ tracer data shows that at 25 minutes, the proportion of indoor air was about 38%, so the model tends to overestimate the leakage across the floor slab, so this slightly overpredicts the cross slab leakage. Fitting Equation 7 to the cross-slab tracer test and maintaining a reasonable match of the vacuum vs distance data to Equation 4 yielded a T value of 12 $ft^2$/day and a B value of 9 ft, which are within a factor of 2 of the values in Table 6-5.

The vent-pipe concentration of $SF_6$ in V-2 was not detectable throughout the entire test (87.5 min). If a leakance value were to be calculated from this result it would be over 100 ft. This is markedly different than the B value calculated from vacuum vs time (2.9 ft) or vacuum vs distance (6.6 ft) analysis and further proof that the conditions at V-2 are not consistent with the model assumptions.

At vent pipe V-3, the $SF_6$ concentration was within 16-20 % of the indoor air concentration in the range of 18-47 minutes of the cross-slab tracer test. Figure 6-19 shows a ~34 minute travel time to a radius of 10 ft, at which radius, Figure 6-23c indicates 5% indoor air in the extracted gas, which also shows the B value from the pneumatic testing tends to overpredict leakage. A T value of 100 $ft^2$/day and a B value of 20 ft provides a reasonable fit to the cross-slab tracer, subslab tracer, and vacuum vs distance data, which is also within about a factor of 2 of the values in Table 6-5.

**Table 6-7: Cross-Slab Tracer Test Data Building 200**

| Vent Pipe ID | Elapsed Time | Indoor $SF_6$ (ppmv) | Vent Pipe $SF_6$ (ppmv) | % indoor air |
|---|---|---|---|---|
| 1 | 18:21 | 128 | 48 | 38 |
| 1 | 25:00 | 160 | 60 | 38 |
| 1 | 45:52 | 165 | 90 | 55 |
| 3 | 18:21 | 128 | 20 | 16 |
| 3 | 41:22 | 126 | 20 | 16 |
| 3 | 47:20 | 128 | 26 | 20 |
| **Additional SF6 added to indoor air** | | | | |
| 2 | 64:25 | 150 | | |
| 2 | 67:00 | 141 | | |
| 2 | 73:00 | 164 | 0.0 | 0 |
| 2 | 81:45 | 108 | | |
| 2 | 87:32 | 100 | 0.0 | 0 |

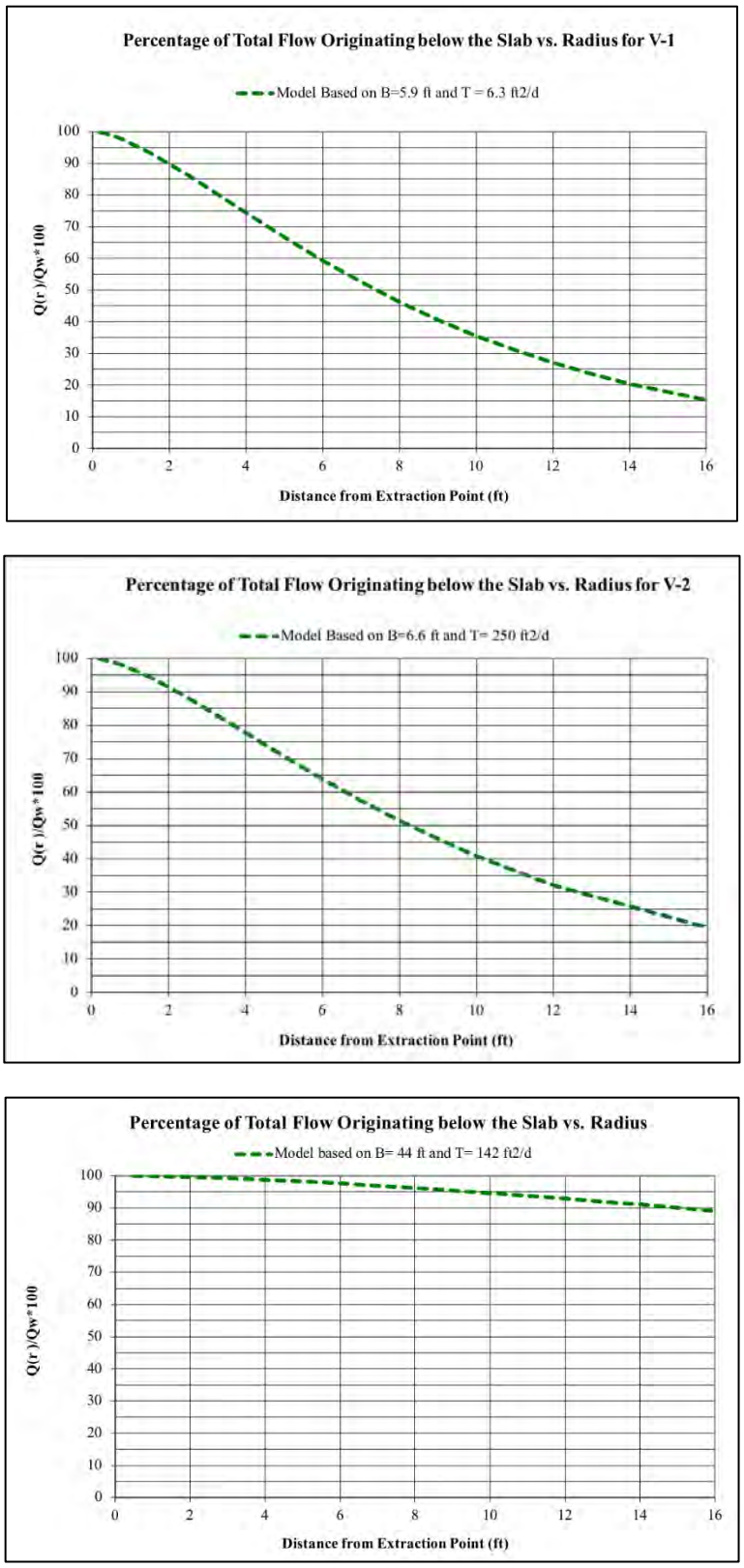



**Figure 6-23: Proportion of flow originating below the floor versus radius calculated using Equation 6 for vent pipes V1 (a, top), V2, (b, middle) and V3 (c, bottom)**

### 6.3.6 Radon Measurements

Radon activity measured in indoor air via 30-day EPERM Electrets in September 2015 with the SSD system operating were in the range of 0.3 to 0.6 pCi/L, well below the target level of 4 pCi/L. Concentrations in the vent pipes via Tedlar bag samples were in the range of 81 to 102 pCi/L, as shown in Figure 6-24. These data demonstrate that the system is effective at protecting occupants from unacceptable radon exposures.

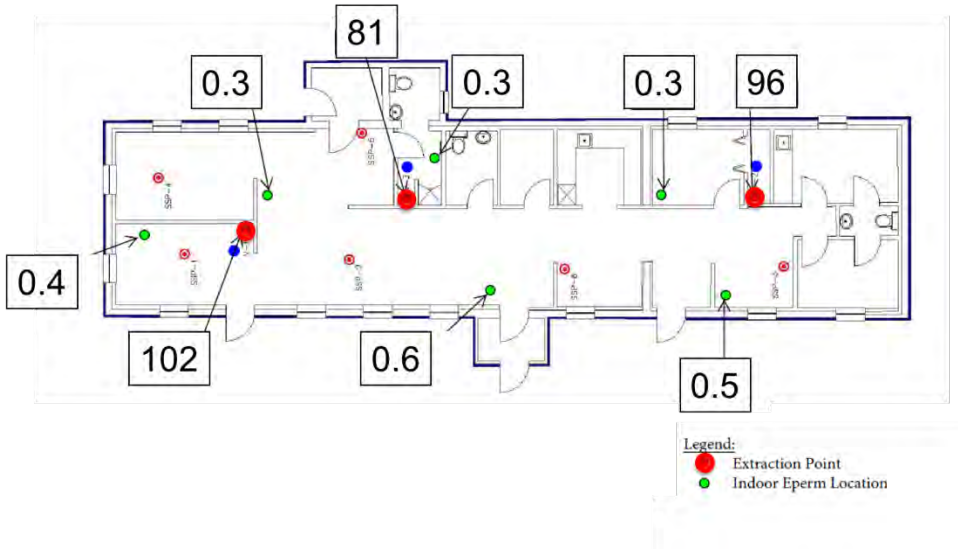



**Figure 6-24: Radon activity (pCi/L) measured in indoor air and vent-pipe samples with system operating**

Radon was removed at a rate of about $6x10^6$ pCi/day, which would be sufficient to pose indoor air concentrations as high as 18 pCi/L in indoor air, but only if the Qsoil value was equal to the SSV extraction rate (i.e., AF ~ 0.25). With a building-specific AF calculated at 0.002, the indoor air radon concentration would be expected to be below 0.18 pCi/L, similar to typical outdoor air concentrations and more than an order of magnitude below the target level of 4 pCi/L.

### 6.3.7 Building-Specific Attenuation Factor

Building-specific attenuation factors were calculated using Equation 17 using the T and B values calibrated for vent pipes V-1 and V-3 and are provided in Table 6-7. The mean AF was 0.002, which is 15 times lower than the generic subslab attenuation factor of 0.03 recommended in U.S. EPA guidance (U.S. EPA, 2012).

**Table 6-8: Building-Specific Attenuation Factors for Building 200**

| Fan | Supporting Data | T | B | h | deltaP | AER | AF |
|---|---|---|---|---|---|---|---|
| | | ($ft^2$/day) | (ft) | (ft) | (ft) | (/day) | (-) |
| V-1 | Pneumatic data | 6.3 | 5.9 | 10 | 0.7 | 6 | 2E-03 |
| V-1 | SF6 Tracer | 12 | 9 | 10 | 0.7 | 6 | 2E-03 |
| V-3 | Pneumatic data | 142 | 44 | 10 | 0.7 | 6 | 8E-04 |
| V-3 | SF6 Tracer | 100 | 20 | 10 | 0.7 | 6 | 2E-03 |

The maximum indoor air concentration of TCE prior to mitigation was about 70 µg/$m^3$ and the maximum subslab concentrations was about 29,000 µg/$m^3$, so the empirical attenuation factor would have be on the order of 2E-3, which is consistent with the calculations in Table 6-8.

### 6.3.8 Long-Term Monitoring

The combined effluent from all three vent pipes was monitored on several occasions to verify that the mass removal rate from the SSD system continued to be protective. Table 6-8 shows TCE mass removal rates were consistently around 0.2 g/day.

**Table 6-9: Long-term monitoring of post-optimization system performance at Building 200**

| Date | Test | TCE Concentration | Flow Velocity | Vacuum | Stack Area | Flow Rate | Mass Rate | Loading |
|---|---|---|---|---|---|---|---|---|
| | | µg/$m^3$ | ft/min | in H2O | sq ft | cfm | µg/min | g/day |
| 23-Dec-15 | Baseline | 1000 | 97 | 3.8 | 0.049 | 4.8 | 135 | 0.19 |
| 6-Jan-16 | Step 1 | 910 | 134 | 8.5 | 0.049 | 6.6 | 169 | 0.24 |
| 20-Jan-16 | Step 2 | 700 | 134 | 8.3 | 0.049 | 6.6 | 130 | 0.19 |

Indoor air sampling and analysis conducted as part of routine base-wide monitoring by Avatar was conducted on several occasions. Table 6-9 shows that TCE concentrations were consistently below the NJDEP screening level of 3 µg/$m^3$.

**Table 6-10: Long-term monitoring of indoor air quality at Building 200**

| Date | North End | | South End | |
|---|---|---|---|---|
| | TCE (µg/$m^3$) | PCE (µg/$m^3$) | TCE (µg/$m^3$) | PCE (µg/$m^3$) |
| 14-Oct-2015 | 0.33 | <1.4 | 0.23/0.38 | <1.4 |
| 23-Mar-2016 | 0.28 | <1.4 | 0.32 | <1.4 |
| 8-Sept-2016 | 0.3/1.5 | 0.76J/0.67J | 0.33 | 0.6J |
| 22-Feb-2017 | <0.21 | <0.14 | <0.21 | <0.14 |

## 6.4 COST CONSIDERATIONS

The SSD system at Building 200 was originally installed with two suction points, which would appear to be necessary because the building footprint is long and narrow, and also sufficient based on the fact that V-1 and V-3 both show strong performance metrics at a radius of 16 feet (vacuum >10 Pa, velocity >50 ft/day, travel time < 140 min and a high proportion of flow originating from the subsurface). Unfortunately, vent pipe V-2 does not behave the same way, and this was not apparent based on conventional diagnostics because V-2 yielded a similar flow at a similar vacuum as V-1 and little other data was included in the assessment. Two years of quarterly indoor air quality monitoring in 2006 and 2007 repeatedly confirmed that the system was not achieving the goal of maintaining indoor air concentrations below regulatory screening levels. This monitoring and reporting could have been reduced considerably if the system had been effective at startup.

The initial revision to the system design (install V-3 and replace the fan with a Rotron Blower to enhance subslab vacuum) was only partially justified. V-3 yields about half of the total TCE mass removal, so it was a valuable addition. But the Rotron Blower was unnecessary, and was a waste of both capital cost and operating electricity draw. If the initial diagnostics had included any one of the following lines of evidence, the performance issues with V-2 would have been apparent:

1. A "near-field" vacuum monitoring point (SSP-8 at a radius of 3 ft showed <3Pa vacuum);
2. An inter-well tracer test (the travel time was almost 19 minutes for a radius of 3 feet); or
3. Comparison of T and B values calculated from vacuum vs time and vacuum vs distance measurements (no unique pair of T and B values could fit both data sets of data to Equations 1 and 4).

Any one of these tests can be performed in a matter of a few minutes and the need for a third (or replacement) suction point would have been identified immediately. This would have prevented two years of ongoing exposures of occupants to VOCs at concentrations near the regulatory screening level and unnecessary expenditures for a Rotron blower, variable frequency drive and electricity costs that were predominantly driving air flow through a recirculation loop, which was a waste of energy.

Table 6-11 provides a summary of the cost comparison for the conventional vs optimized mitigation system for Building 200. The incremental cost of the optimization testing and analysis service (assuming a production level of detail and not a research level of detail) would be about $9,600, but would result in a net savings of $54,000 over a 30 year lifecycle, which is a return on investment of 5.6 times. The cost differential between the conventional and optimized system is a factor of about 1.5.

**Table 6-11: Building 200 Cost Consideration Summary**

| Cost Components | Conventional | Optimized |
|---|---|---|
| Initiation | $ 4,690 | $ 4,690 |
| Reconnaissance | $ 3,620 | $ 4,320 |
| Pilot Test | $ 2,900 | $ 11,500 |
| Installation | $ 20,775 | $ 17,150 |
| Operation | $ 115,355 | $ 50,795 |
| Maintenance | $ 300 | $ 600 |
| Fan Replacement | $ 4,000 | $ 8,000 |
| Training | $ 5,000 | $ 6,000 |
| TOTALS | $ 156,640 | $ 103,055 |
| Total incremental cost of optimization activities | | $ 9,600 |
| Net Savings | | $ 53,585 |
| Return on Investment | | 5.6 |
| Ratio of Conventional Costs vs Optimized Costs | | 1.5 |

# 7.0 SUN DEVIL MANOR

## 7.1 SITE DESCRIPTION AND HISTORY

Sun Devil Manor (SDM, Figure 7-1) is a residential property currently owned by Arizona State University (ASU) in Layton, Utah, hydraulically downgradient of Hill Air Force Base (Hill AFB). This building is being used for vapor intrusion research as part of the Strategic Environmental Research and Development Program (SERDP) Project 1686. This building has also been referred to as the ASU vapor research house or the Layton house.

SDM is one of the most extensively characterized buildings in the world for vapor intrusion assessment (Guo, 2015, Guo et al., 2015, Holton et al., 2013, Holton et al., 2015, Holton, 2015). The house also has an existing subslab depressurization (SSD) system that was designed similar to a traditional radon mitigation system. Dissolved TCE and 11DCE are present below the building and ASU has confirmed that vapor intrusion of these compounds into the building is occurring (Johnson et al., 2013).

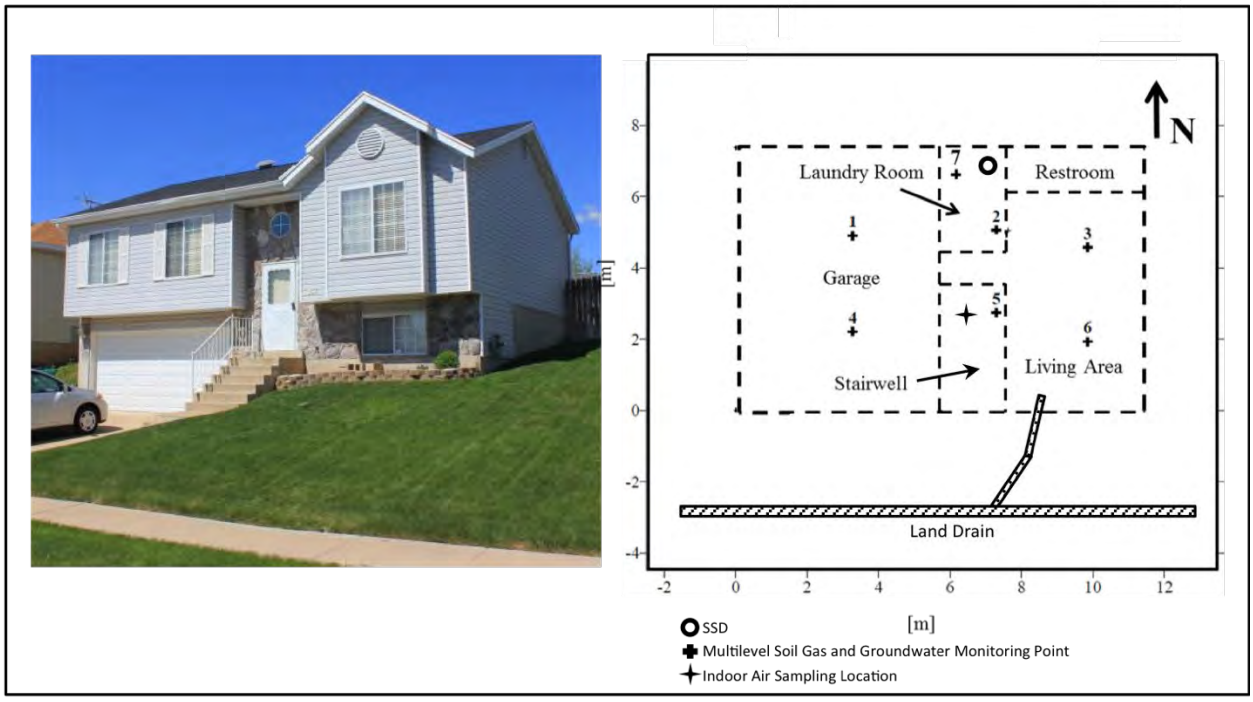



**Figure 7-1: Sun Devil Manor exterior photograph and interior layout (after SERDP 1686)**

The Layton house is a split-level, two-story house with the lower story partially below grade. The house is on a slope with an elevation decrease of approximately 2.5 m from the back to the front of the property. It has a concrete slab on grade foundation at the front of the house and is below grade at the back of the house. The sub-grade area of the building consists of a garage, a laundry room, a restroom and a living area. The slab footprint is approximately 900 $ft^2$ (84 $m^2$).

Multi-level soil vapor monitoring probes were installed by ASU in 6 locations, with subslab probes and probes at 3, 6 and 9 ft depths. A subslab probe was also installed close the vent pipe (SSP-7).

Figure 7-2 shows the instrumentation isometrically. ASU also equipped the garage with analytical instruments for real-time on-site monitoring (Figure 7-3).

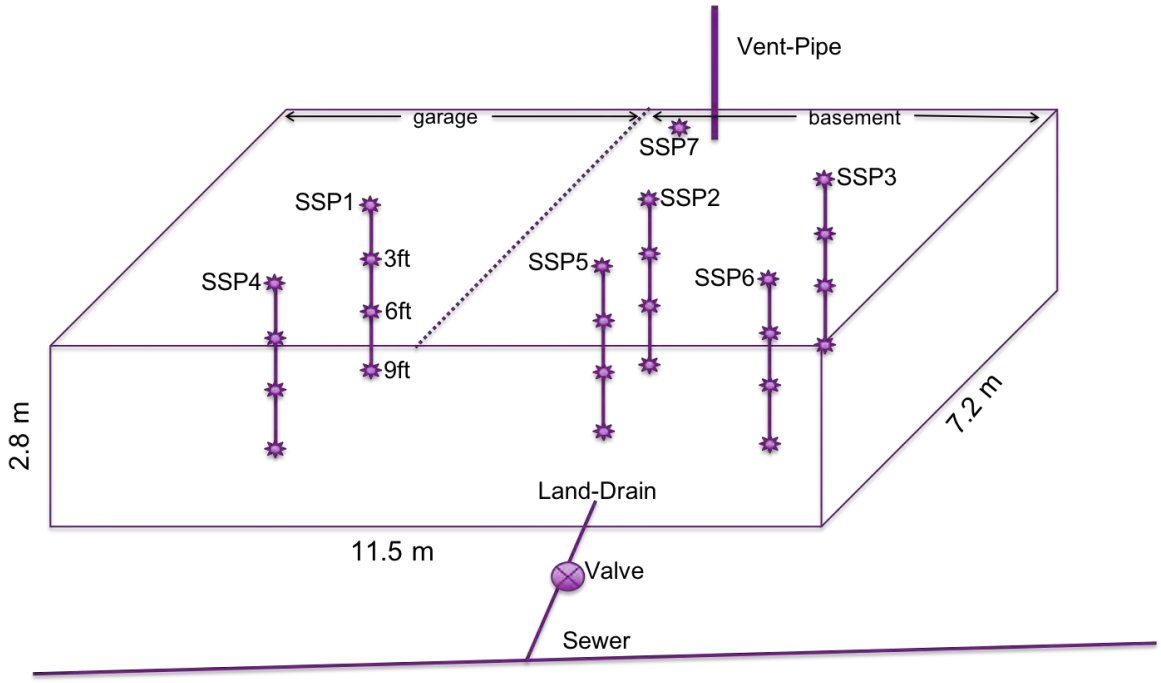



**Figure 7-2: Isometric representation of nested soil gas probes, the land drain and the vent pipe of the SSD system at SDM**

Figure 7-4 (left) shows a photograph of the mitigation system vent pipe, which has been fitted with a shut-off valve just above the floor slab, and a T-fitting to allow connection to other fans. The valve just above the floor was used to cycle the flow on and off during the transient pneumatic tests because the response was very fast compared to the time required for the fan to run up to full speed after being turned on or spin down to a stop after the power was turned off. The T-fitting was used to connect a Shop-Vac (Figure 7-4, right) for enhanced extraction during the step-test and with the flow reversed for the helium flood test.

The lower level indoor air exchange rates measured by ASU varied from 10 – 35 per day (~ 0.4 to 1.5 air exchanges per hour) (Holton 2015). Assuming an effective air exchange volume of 350 $m^3$, the building ventilation rate (Qbuild) is about 2.3 to 8.75 cubic meters per minute ($m^3$/min). Note that in most residential buildings, the subslab to indoor air attenuation factor is about 0.01 or less, so the volumetric flow of soil gas into the building (Qsoil) would be expected to be about 0.023 to 0.088 $m^3$/min (3.1 cfm) or less. The flow rate of the SSV system as configured was about 100 scfm (2.83 $m^3$/min).




**Figure 7-3: Analytical instruments in the garage of SDM**



**Figure 7-4: Photographs of the vent pipe (left) and Shop Vac hose assembly (right)**

### 7.1.1 Site Geology/Hydrogeology

The soil beneath SDM is predominantly fine sandy silt with >70% fines (<0.0063mm particle diameter). Soil borings through the floor of the basement showed a 20 to 30 cm (8 to 12 inch) thick layer of granular fill beneath the building; however, the floor of the garage is 9 inches lower than the floor of the basement and does not have a granular fill layer beneath it. The soil moisture was typically 0.22 to 0.30 grams of water per gram of soil from the water table to about 1 m below the floor slab (Guo, 2015). The water table typically ranges in depth seasonally from about 3.1 to 3.5 m below the slab.

### 7.1.2 Contaminant Distribution

Groundwater, subslab soil gas, and indoor air have been monitored extensively for years (Holton et al., 2013). The primary volatile organic compound of concern is TCE, which occurs in the greatest concentrations. The TCE concentrations ranged up to 50 µg/L in subslab groundwater (sampled directly below the foundation), up to 300 µg/m$^3$ in deep soil gas and less than 2 µg/m$^3$ in subslab soil gas.

Indoor air concentrations in SDM were demonstrated to be highly variable over time via a series of samples collected over 4-hour intervals for about 2 years. Daily (24-hour) averages were calculated and are shown on Figure 7-5. The range is from <0.01 to >10 parts per billion by volume (ppbv), which spans a factor >1,000. Considering this range of indoor air concentrations, it is very challenging to calculate an empirical attenuation factor.

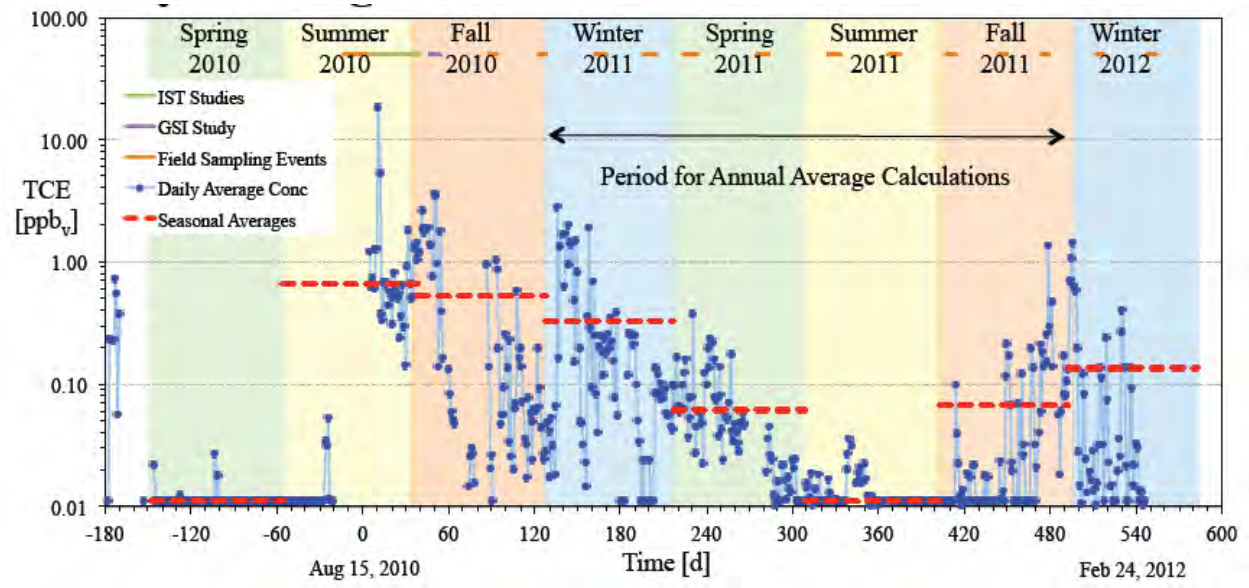



**Figure 7-5: Calculated 24-hour average concentrations for TCE in indoor air at SDM (Johnson et al., 2015)**

SDM was also monitored over a period of about 9 months via building depressurization testing to assess the mass flux of VOC vapors entering the building. This yielded an average flux of about 0.2 g/day for TCE (Figure 7-6), which was much higher than expected based on vertical profiles

of vapor concentrations beneath the building. This unexpectedly high emission rate through the building is what prompted ASU to discover a land drain beneath the building, which was acting as a preferential pathway for vapor transport. ASU subsequently installed a valve in the land drain to allow the drain to be either open or closed. Note that the span in the emission rates in Figure 7-6 is about a factor of 3, dramatically less than the span of indoor air concentrations in Figure 7-5. Also note that the scale on the radon plot in Figure 7-6 is in units of Ci/d, but should be in milliCi/d.

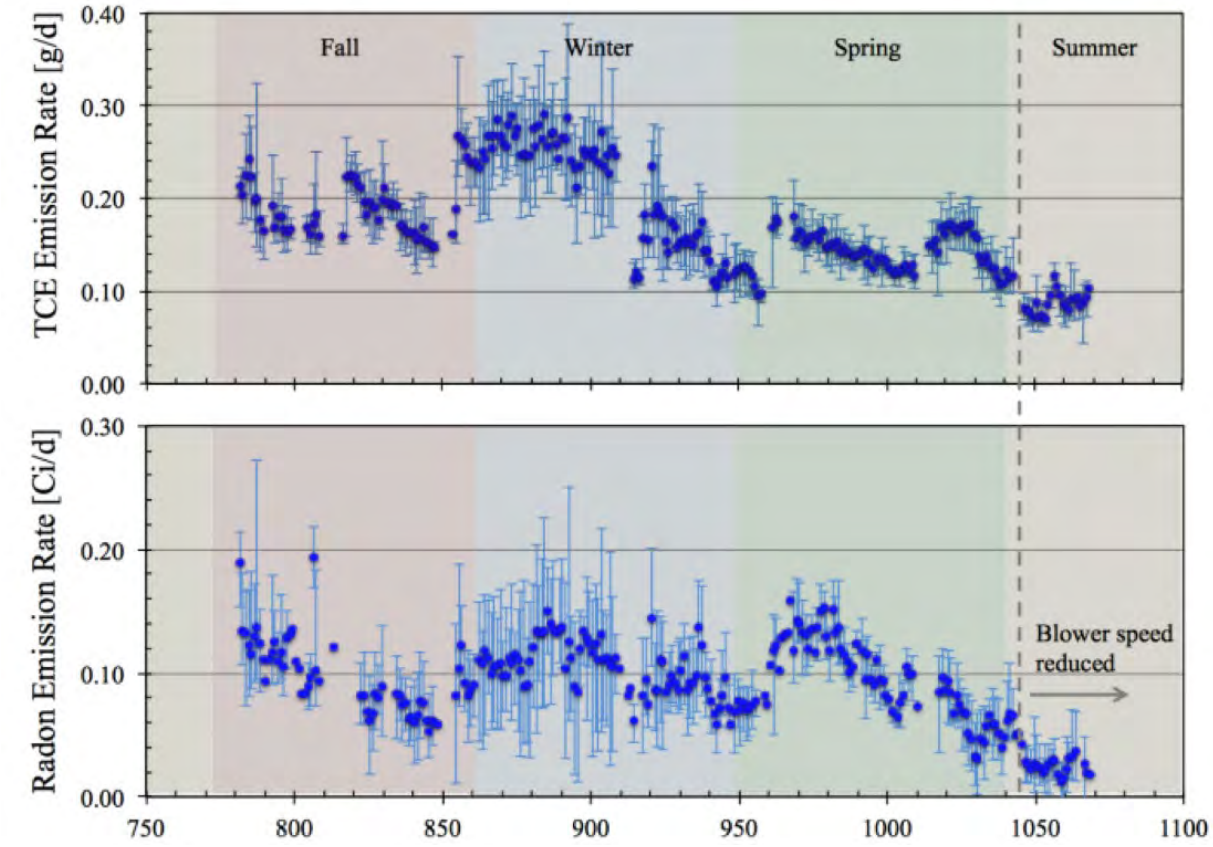



**Figure 7-6: TCE (top) and Radon (bottom) emission rates from SDM during controlled building pressure testing (Johnson, et al., 2015)**

## 7.2 BUILDING-SPECIFIC TESTING

Testing conducted at SDM included the lines of evidence described for Buildings 205 and 200, but at SDM, the tests were performed twice, once with the land drain open and once with the land drain closed.

### 7.2.1 Mass Flux Step-Test

The rate of mass removal from the vent-pipe was characterized by setting the flow rate of the SSD system to a range of different levels using the valve just above the floor. At each of four steps, samples of the effluent were collected for on-site analysis by a gas chromatograph with an electron capture detector (GC/ECD) until concentrations stabilized. At the end of each step, a Tedlar bag sample was collected from the vent pipe via vacuum chamber and sent to Doug Hammond at the

University of Southern California for analysis of the radon activity using alpha scintillation in a Lucas cell (McHugh et al., 2008). The vent pipe velocity was measured with a Dwyer 471 thermal anemometer and multiplied by the interior cross sectional area of the pipe to quantify the flow rate. The mass removal rates for both TCE and radon were compared to the mass emission rates measured by ASU using controlled pressure monitoring (Figure 7-6).

### 7.2.2 Pneumatic Tests

Single-point constant discharge tests were performed at all 18 nested soil gas probes and 7 subslab probes, to assess spatial distribution of pneumatic conductivity. Flow rates were set at 0.1, 0.3 and 0.5 L/min and the corresponding vacuum was measured with a Dwyer Magnehelic gauge. The gas conductivity (K) was calculated using Equation 11 from Johnson et al., 1990.

Transient pneumatic tests were conducted at all probe locations. Data was collected from subslab, 3 ft, 6 ft, and 9 ft depth probes at SSP-02, SSP-4, SSP-5 and SSP-07 with the land drain open and closed. Digital micromanometers with data loggers (TEC DG-700) were connected to the subslab and deeper soil gas probes and set to record data at 1 second intervals. Transient pneumatic tests were also conducted at the subslab locations at SSP-01, SSP-03 and SSP-06 with the land drain open and closed, using pressure transducers provided by ASU. The fan was turned on with the ball-valve closed and after a few seconds to allow the fan to spin up to speed, the ball valve was opened to record the drawdown part of the cycle. After vacuums stabilized, recovery was recorded by closing the ball valve, then turning off the fan. The vacuum readings were converted into units of feet of air head (1 pascal = 0.27 feet of air head at 15 $^{o}$C) and imported into AQTESOLV for analysis by the Hantush-Jacob Leaky Aquifer Model. The curve matching was performed using linear-linear and log-log plots because the transient response was very fast, as a result there were fewer points to fit the curve to. An example of the fit between the transient data and Equation 1 using the two different scales is shown in Figure 7-7.

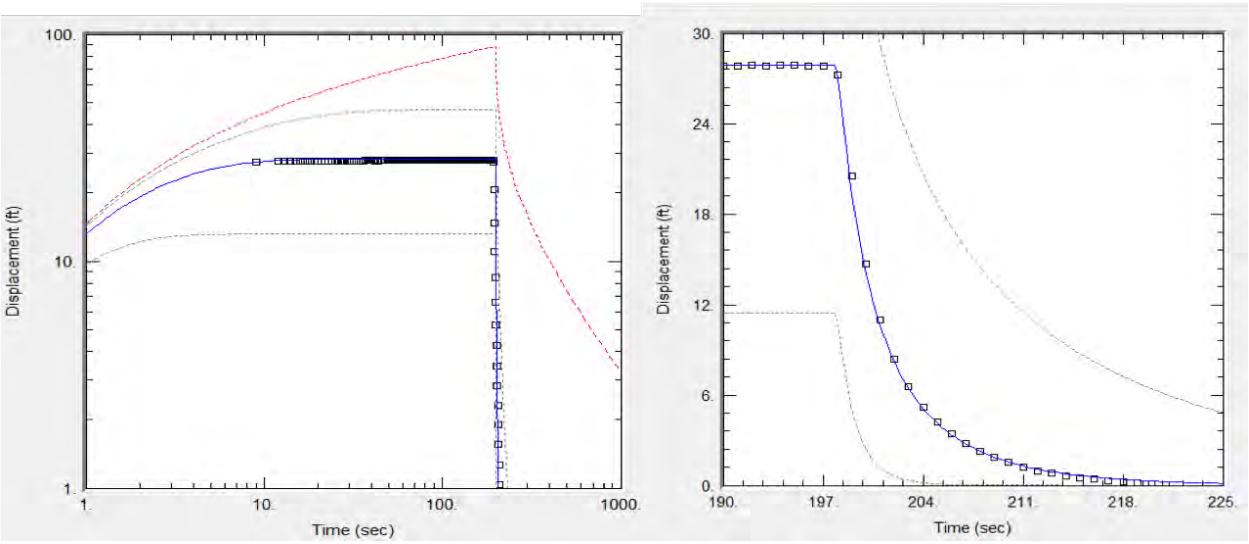



**Figure 7-7: Log-log (left) and linear-linear (right, recovery only) plots of transient response data and curve fitting for subslab probe SSP2**

Steady state vacuum vs radial distance was also measured as a second line of evidence for deriving T and B values. Steady vacuum levels were plotted vs radial distance, compared to Equation 4, and the T and B values were iteratively adjusted as needed to provide the best fit to both vacuum vs time and vacuum vs distance.

### 7.2.3 Subslab Tracer Testing

Inter-well helium tracer tests were performed by injecting a slug of about 10 L of 100% helium into a subslab probe and monitoring its arrival at the SSD system. The average travel time from the SSP to the vent-pipe was taken as the time between the midpoint of the helium injection interval and the time of the maximum vent-pipe concentration. There is a slight lag in the instrument reading (5 to 10 seconds), but this is only significant if the travel time is very short. Helium inter-well tracer tests were conducted from SS probes 3, 5 and 6, and the land drain. SS probes 3, 5 and 6 were each tested at an SSD system flow rate of 100 scfm with the land drain closed (twice to provide data regarding reproducibility) and open (to compare and contrast the LDO vs LDC flow regimes). Probes SS3 and SS5 were also tested with the land drain closed and a flow of 21 scfm to assess the linearity of the flow/velocity relationship. The land drain was tested in the open position for 29 and 91 scfm flow rates and helium was injected into the land drain at the location of the valve in the front yard of the house.

Helium floods were performed with the land drain open and closed (LDO and LDC) by blowing air into the SSD system using a ShopVac and adding helium at a concentration of about 0.8% by volume. The direction of flow is reversed compared to the normal operation, but the flow rate was set at the maximum fan output (100 scfm) in both cases (LDO and LDC), so the flow paths would be similar but opposite in direction to the normal SSD operation.

### 7.2.4 Cross-slab Tracer Test

$SF_6$ tracer testing was performed by ASU to determine the amount of indoor air leakage across the floor slab during operation of the SSD system. $SF_6$ was released into the house and dispersed with a bank of mixing fans. Concentrations of $SF_6$ were measured in the house and in the vent-pipe by GC/ECD during the step tests at multiple flow rates to assess trend of leakage vs SSD system flowrate. The results represent the amount of indoor air that is drawn down through the slab and pulled out by the SSD system, which was compared to calculations using Equation 7.

### 7.2.5 Mathematical Analysis

The Hantush-Jacob model assumes radial flow with semi-infinite lateral extent to the layered system, which is not strictly applicable at SDM. The suction point is very near an exterior wall, and it is uncertain whether there is a footing beneath the wall that might act as a barrier to flow or whether the proximity to the edge of the building allows additional leakage of outdoor air to the suction point. The model assumes uniform thickness of the transmissive layer with an impermeable base; however, at SDM there is 20-30 cm of granular fill below the interior lower level of the house (but not below the garage floor), and about 9 ft of moderate permeability soil above the water table, which is a departure from the model assumptions. The model also assumes homogenous leakage through the overlying layer (i.e., the floor slab), but leakage across the floor slab is not expected to be uniform and as a result, vacuum levels measured in probes near the

perimeter expansion joint between the floor slab and the wall or near the land drain are expected to be lower magnitude than predicted by the model. Note that SSP-5 is near a visible perimeter crack between the floor and wall with a large aperture and SSP6 is closest to the land drain. Regardless of these challenges, the mathematical analysis was performed and the interpretation included consideration for the disparities between the field measurement and model predictions, which provide clues regarding where and to what degree the model assumptions are more or less applicable.

## 7.3 RESULTS AND DISCUSSION

### 7.3.1 Spatial Distribution of Gas Conductivity

Table 7-1 provides measured specific capacity (defined as the flow rate [Q] divided by applied vacuum [ΔP]) and gas conductivity (K) values (calculated using Equation 11 of Johnson et al., 1990) for each probe and Figure 7-8 shows the K values graphically in a box and whisker style plot. All locations showed decreasing gas conductivity with depth. The subslab gas K in the living section was about an order of magnitude higher on average than the native soils (deeper probes), which reflects granular fill below the floor slab in the basement.

**Table 7-1: Calculated Specific Capacity, Permeability, Gas Conductivity and Transmissivity**

| Probe ID | Specific Capacity | Calculated Permeability | Gas Conductivity | Transmissivity | |
|---|---|---|---|---|---|
| | (L/min/in. $H_2O$) | ($m^2$) | (m/day) | ($m^2$/day) | ($ft^2$/day) |
| 1-SS | 0.71 | 1.3E-07 | 7.3 | 13 | 140 |
| 1-3BS | 0.63 | 1.1E-07 | 6.4 | | |
| 1-6BS | 0.45 | 8.2E-08 | 4.6 | | |
| 2-SS | 8.33 | 1.5E-06 | 85 | 40 | 430 |
| 2-3BS | 1.19 | 2.1E-07 | 12 | | |
| 2-6BS | 0.63 | 1.1E-07 | 6.4 | | |
| 3-SS | 10.00 | 1.8E-06 | 100 | 39 | 420 |
| 3-3BS | 1.00 | 1.8E-07 | 10 | | |
| 3-6BS | 0.38 | 6.9E-08 | 3.9 | | |
| 4-SS | 5.56 | 1.0E-06 | 57 | 24 | 260 |
| 4-3BS | 0.56 | 1.0E-07 | 5.6 | | |
| 4-6BS | 0.42 | 7.5E-08 | 4.2 | | |
| 5-SS | 8.33 | 1.5E-06 | 85 | 33 | 360 |
| 5-3BS | 0.83 | 1.5E-07 | 8.5 | | |
| 5-6BS | 0.33 | 6.0E-08 | 3.4 | | |
| 6-SS | 8.33 | 1.5E-06 | 85 | 34 | 370 |
| 6-3BS | 0.71 | 1.3E-07 | 7.3 | | |
| 6-6BS | 0.56 | 1.0E-07 | 5.6 | | |
| 7-SS | 7.14 | 1.3E-06 | 73 | >18 | >200 |

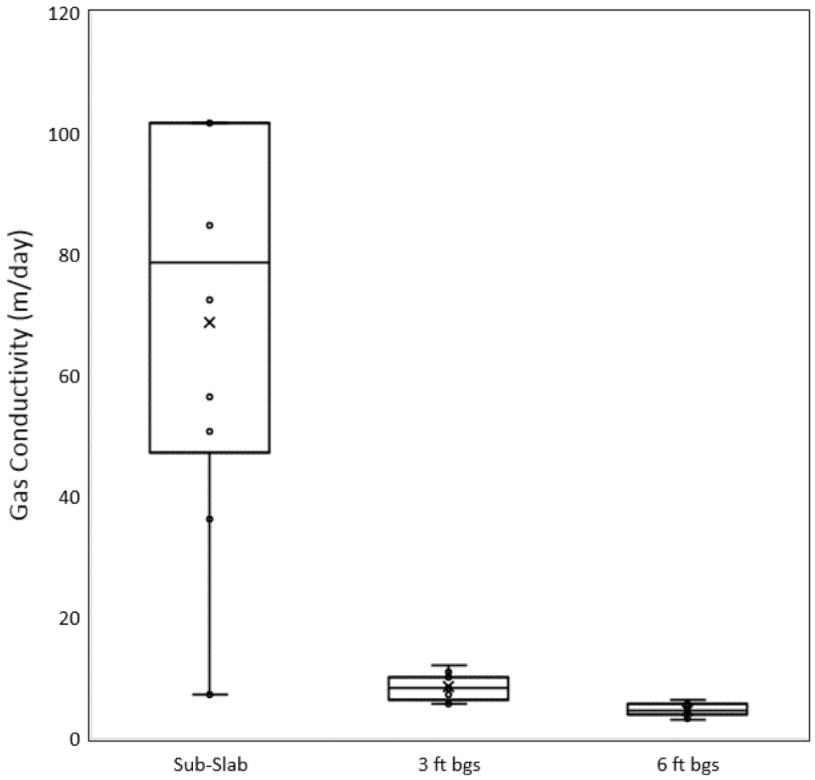



**Figure 7-8: Comparison of gas K calculated from the subslab, 3ft and 6ft probes**

The 2.7 m (9 ft) deep probes all generated >100 in-$H_20$ vacuum at a flow rate of 0.1 L/min, and appeared to be saturated, so the flow and vacuum data was not used to calculate gas conductivity. Some of the deep probes had static pressure of up to 45 pascals, likely attributable to saturated conditions and a rising water table.

These measurements were completed with the land drain open and closed and the relative percent difference between the gas conductivity values was less than 3 % on average, which is to be expected because these tests respond only to the gas conductivity of materials in very close proximity to the probe. In all locations, the gas conductivity value decreased with increasing depth.

The gas conductivity values in Table 7-1 were multiplied by a thickness of 0.25 m for the subslab probe, and 1 m for each of the deeper probes to calculate the transmissivity of each interval. The total transmissivity of the unsaturated zone can be calculated by addition of the T values for each vertical interval, which yielded a range of 140 to 430 $ft^2$/day, slightly less than determined by the analysis of vacuum vs time and vacuum vs distance data. The gas conductivity of the granular fill layer is about an order of magnitude higher than the native soil, but the native soil has a thickness that is about an order of magnitude higher than the granular fill, so both layers would have a similar contribution to the transmissivity.

### 7.3.2 Steady state vacuum distribution

Steady vacuum readings in all probes at maximum system flow (2.8 $m^3$/min or 100 scfm) are presented in Table 7-2. Vacuum decreased with increasing depth at locations 2 and 3, showed

minimal vertical trend at locations 1 and 4 and increased with depth at locations 5 and 6. Leakage across the perimeter crack in the floor slab beside location 5 and leakage associated with the land drain near location 6 appears to have contributed to diminished vacuum in the subslab probes, relative to the 3 and 6 ft probes.

**Table 7-2: Steady vacuum measured with the venting system operating at full flow**

| Location and depth | Radial Distance | Vacuum with Land Drain Open | Vacuum with Land Drain Closed | Difference |
|---|---|---|---|---|
| | (m) | (Pa) | (Pa) | (Pa) |
| 1 - 0.1m | 4.6 | 42 | 41 | -1 |
| 1 - 1m | | 52 | | |
| 1 - 2m | | 53 | | |
| 2 - 0.1m | 1.8 | 109 | 108 | -1 |
| 2 - 1m | | 91 | 91 | 0 |
| 2 - 2m | | 78 | 78 | 0 |
| 3 - 0.1m | 3.7 | 60 | 61 | 1 |
| 3 - 1m | | 49 | 52 | 3 |
| 3 - 2m | | 48 | 49 | 1 |
| 4 - 0.1m | 5.8 | 14 | 13 | -1 |
| 4 - 1m | | 13 | 13 | 0 |
| 4 - 2m | | 14 | 15 | 1 |
| 5 - 0.1m | 4.3 | 13 | 17 | 2 |
| 5 - 1m | | 26 | 28 | 2 |
| 5 - 2m | | 28 | 29 | 1 |
| 6 - 0.1m | 5.2 | 5.2 | 8.3 | 3.1 |
| 6 - 1m | | 9.5 | 12 | 2.5 |
| 6 - 2m | | 12 | 13 | 1 |
| 7 - 0.1m | 0.61 | 134 | 134 | 0 |

### 7.3.3 Transient vacuum tests

The transient responses were very rapid at all depths, indicating a relatively high transmissivity. Vacuum vs time charts for all four depths (subslab, 3, 6 and 9 ft) at locations 2 and 5 are presented in Figures 7-9 and 7-10 to compare and contrast the two trends, which are notably different. Location 2 is 1.8 meters (m) (6 feet [ft]) from the vent-pipe and not near the land drain. Location 5 is 14 feet from the vent-pipe and closer to the land drain. There is also a visible expansion joint between the floor slab and the wall adjacent to location 5. Location 2 showed diminishing vacuum response with increasing depth, but Location 5 showed almost double the vacuum at 3 and 6 ft

depths compared to the subslab probe. The diminished vacuum in subslab probe SSP5 is attributable to leakage of air across the nearby perimeter crack.

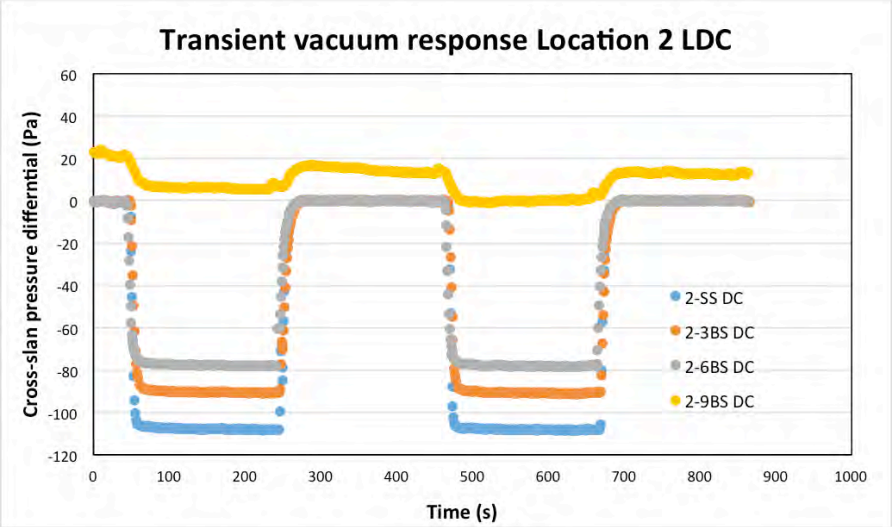



**Figure 7-9: Transient vacuum at different depths at location 2**

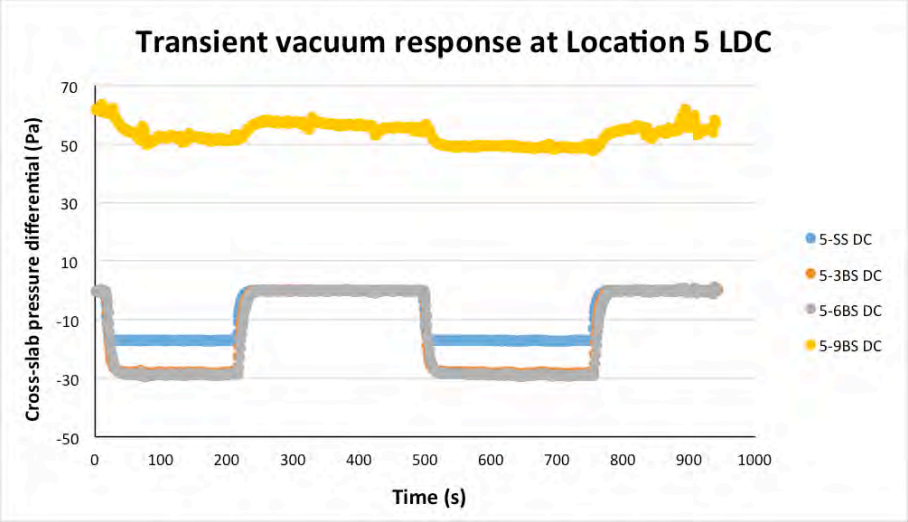



**Figure 7-10: Transient vacuum at different depths at location 5**

Note that all subslab, 3 ft and 6 ft deep probes had initial and final vacuum of essentially zero gauge. The 9 ft deep probes had baseline pressure, which indicates that the water table was likely high enough to saturate the region around the probe tips. Nevertheless, the 9 ft deep probes did show a response to cyclic operation of the fan, and a rapid response, although with a lower magnitude than at shallower depths.

The magnitude of the vacuum response was identical with the land drain open (LDO) or closed (LDC) at SSP2 (Figure 7-11), but SSP5 showed notably less vacuum with the land drain open (13 Pa) compared to closed (17 Pa) (Figure 7-12). The subslab probe at location 6 showed 8.3 Pa vacuum with the land drain closed and 5.2 Pa with the land drain open. SSP5 and SSP6 are located

closest to the land drain (see Figure 7-1). This demonstrates that a preferential pathway (whether it be across the floor slab or through the subfloor region) that facilitates gas flow will also dissipate vacuum, which provides an opportunity to identify the presence and possibly general location of a preferential pathway by comparison of measured vacuum to expected vacuum levels based on trends in other locations and the mathematical model.

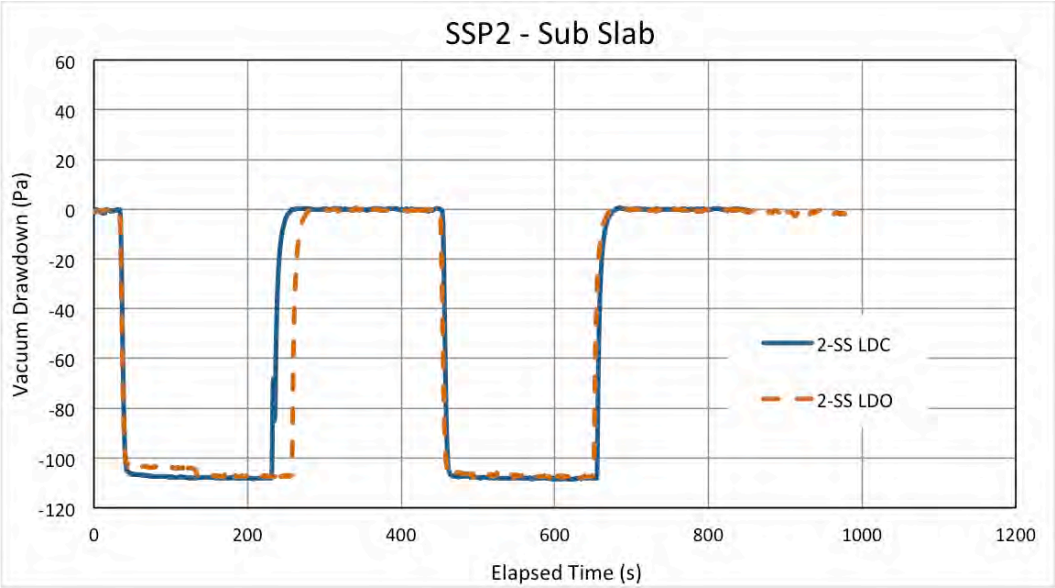



**Figure 7-11: SSP2 transient pneumatic response with land drain open and closed**

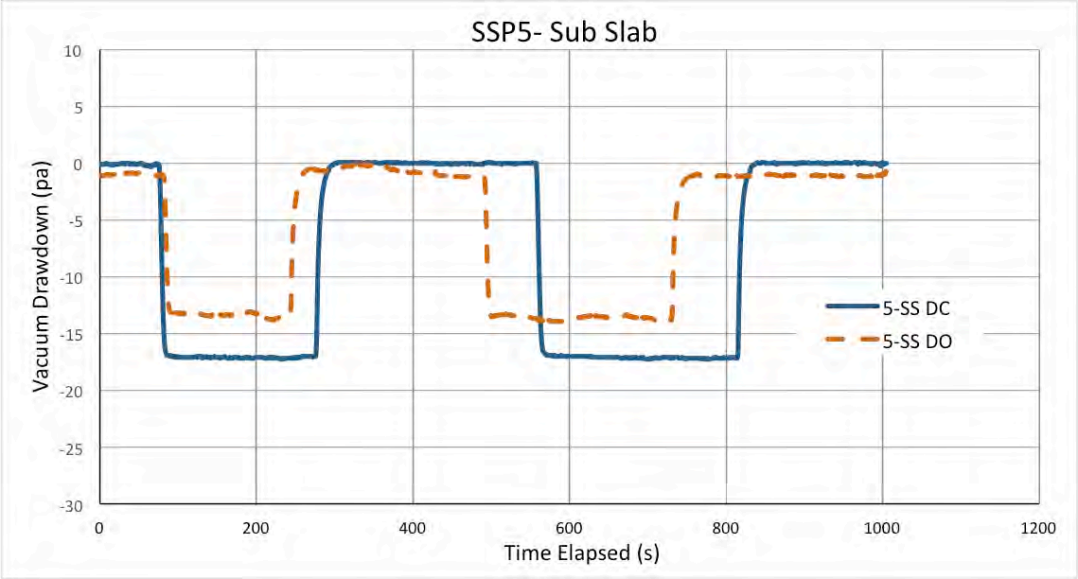



**Figure 7-12: SSP5 transient pneumatic response with land drain open and closed**

Figure 7-13 to 7-22 show the transient and steady data matches for SSP2, SSP3, SSP4, SSP5 and SSP6, each with the land drain open and closed. The T value depends primarily on the subsurface materials near the point of suction. The B value depends on flow through the floor slab or other

preferential pathways, and would be expected to vary somewhat between locations. A T value of 1200 $ft^2$/day was found to provide a good match to all of the data, which was higher than calculated in Table 7-1 by a factor of 3 or more. The B value was adjusted to fit the transient and steady vacuum data in each of the 20 data sets (5 probes, transient and steady, land drain open and closed). The average relative percent difference (RBD) between the B values fit using transient versus steady vacuum data was 6% and the average RPD between the B values fit with the land drain open versus closed was 16% (slightly more leakage with the land drain open on average). The B values are summarized in Table 7-3.

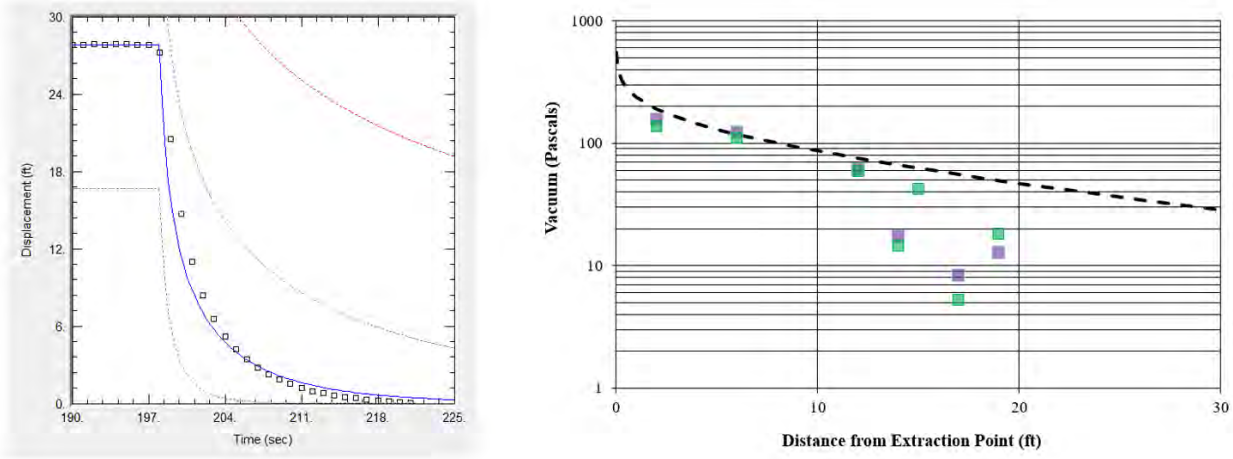



**Figure 7-13: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP2, T=1200 ft2/day, land drain closed**

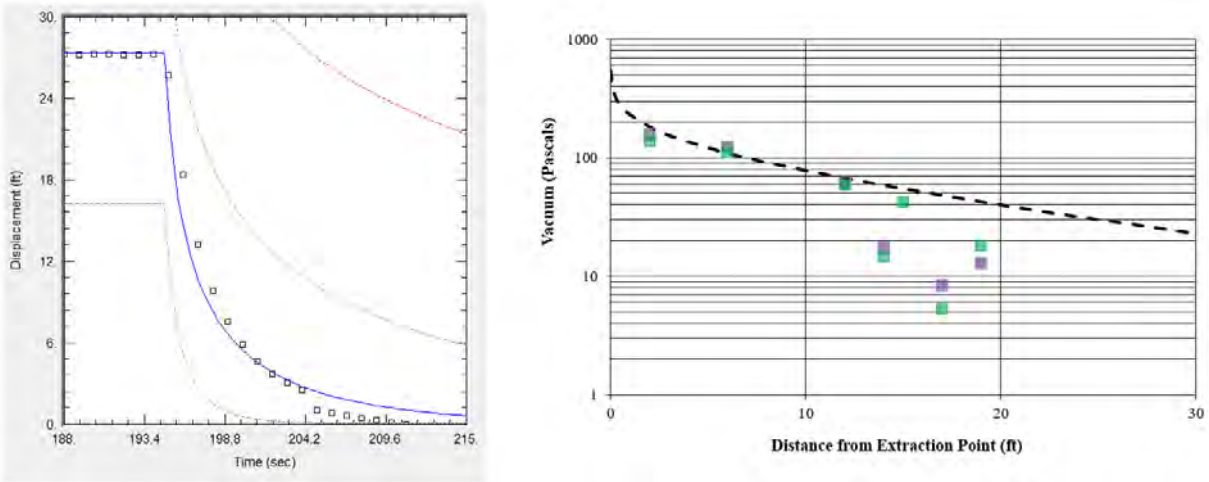



**Figure 7-14: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP2, T=1200 ft2/day, land drain open**

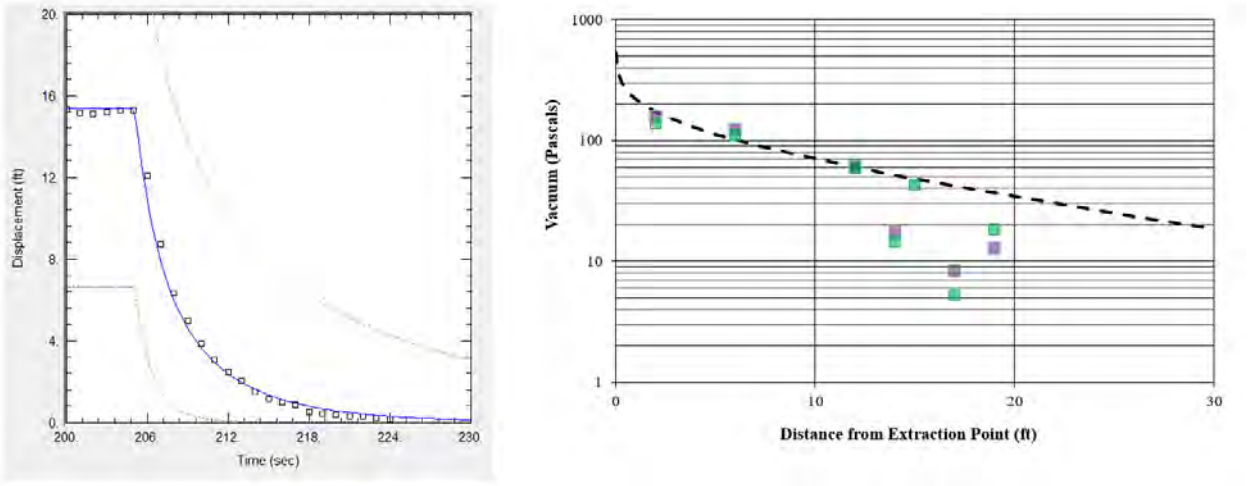



**Figure 7-15: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP3, T=1200 ft2/day, land drain closed**

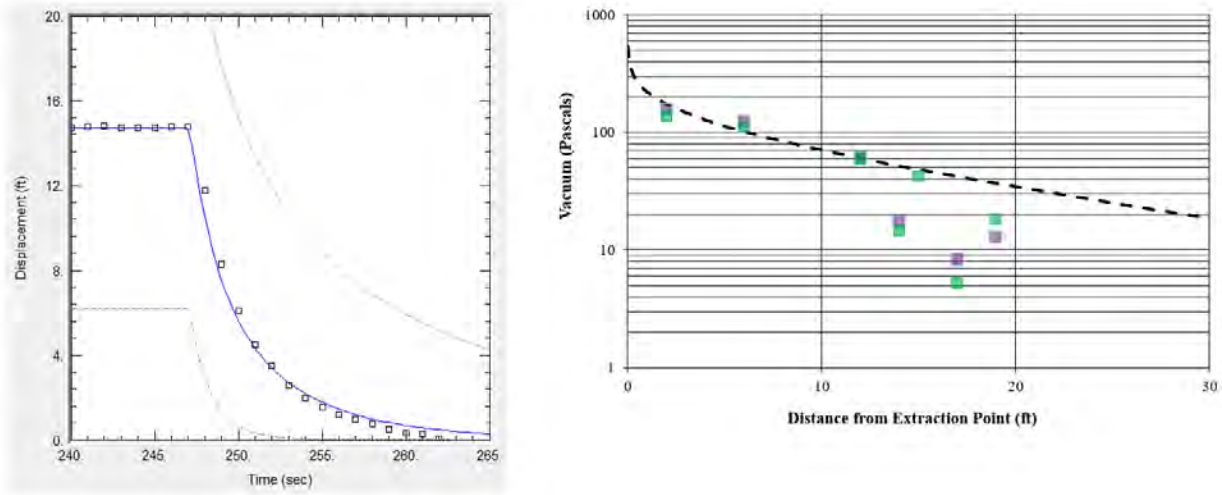



**Figure 7-16: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP3, T=1200 ft2/day, land drain open**

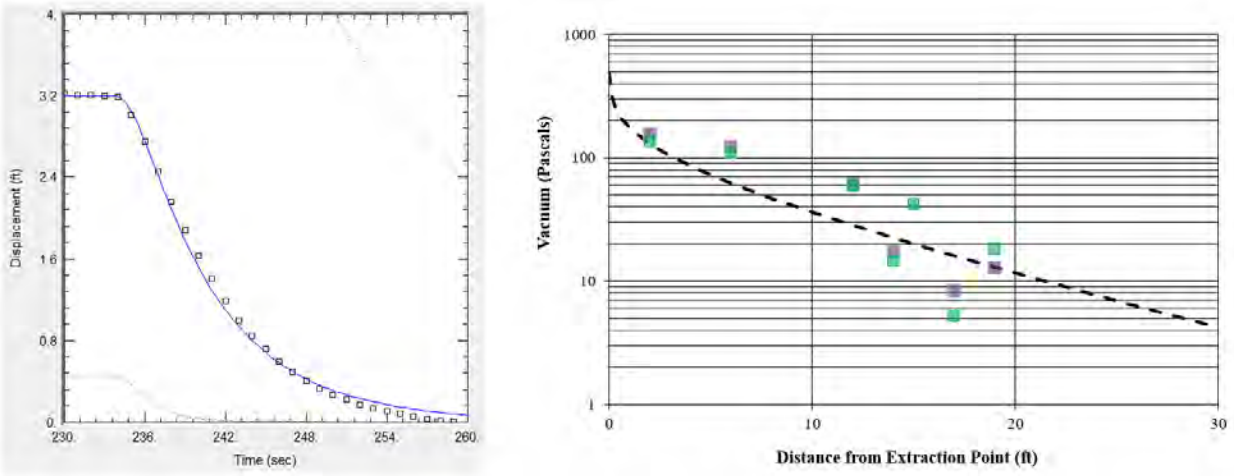



**Figure 7-17: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP4, T=1200 ft2/day, land drain closed**

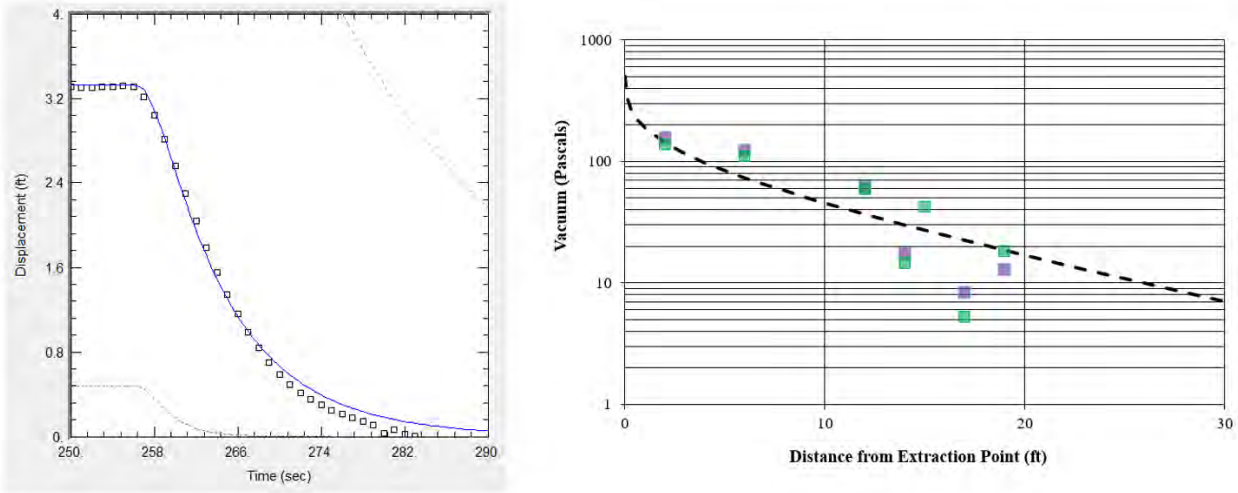



**Figure 7-18: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP4, T=1200 ft2/day, land drain open**

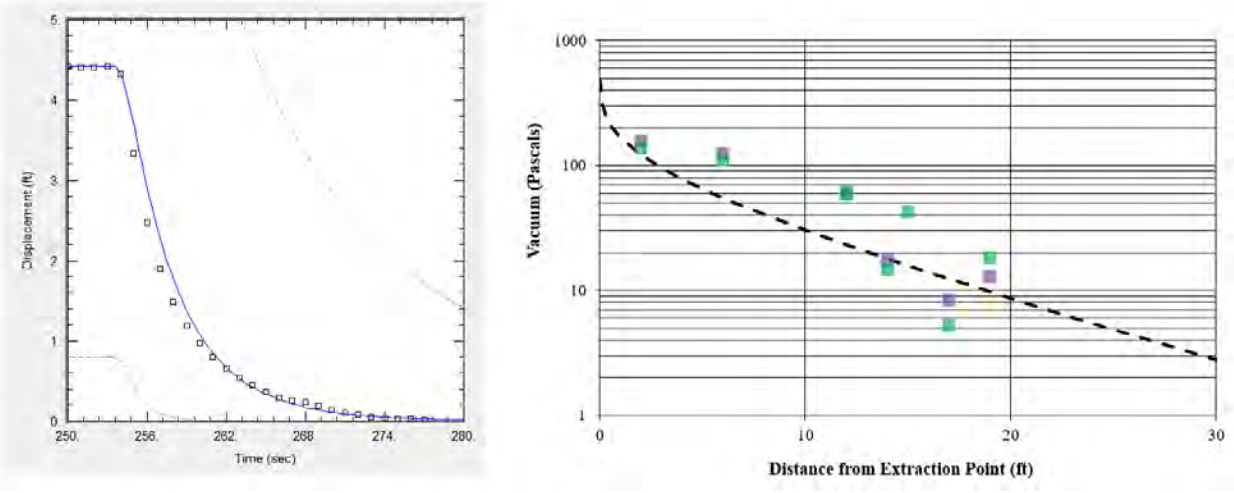



**Figure 7-19: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP5, T=1200 ft2/day, land drain closed**

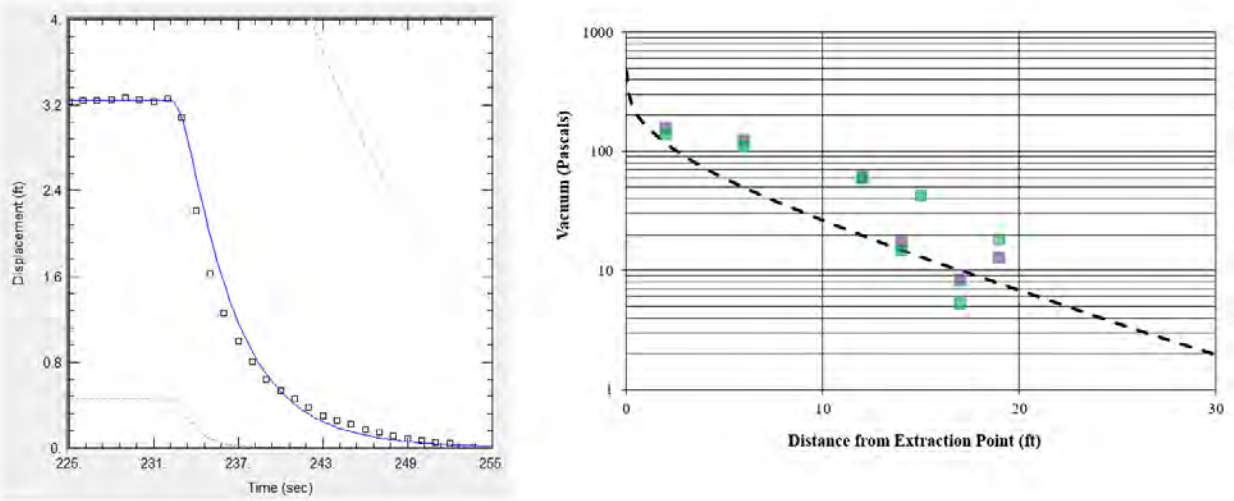



**Figure 7-20: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP5, T=1200 ft2/day, land drain open**

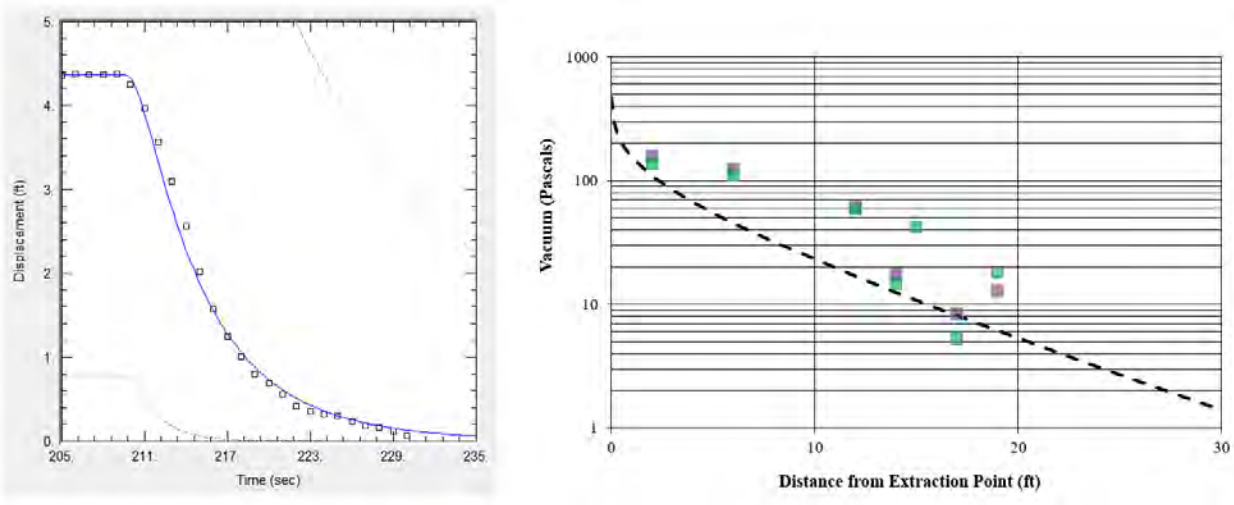



**Figure 7-21: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP6, T=1200 ft2/day, land drain closed**

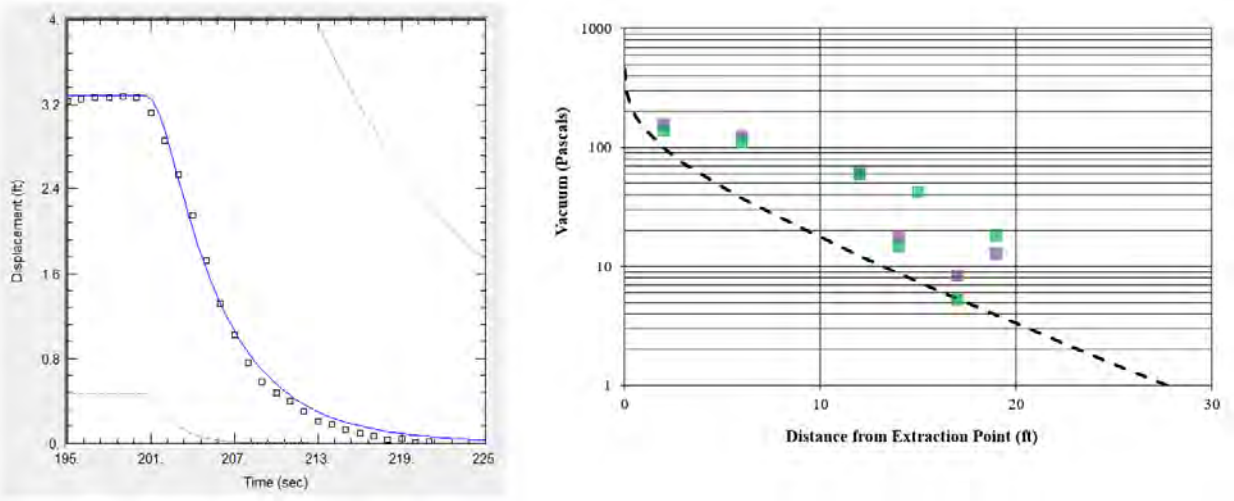



**Figure 7-22: Time-drawdown (left) and distance-drawdown (right) models fit to the recovery data from SSP6, T=1200 ft2/day, land drain open**

**Table 7-3: Summary of Transmissivity and Leakance Values from analysis of Vacuum vs Time and Vacuum vs Distance data**

| Probe ID | Radial Distance (m) | Land Drain Valve Position | Vacuum v Time or Vacuum v Distance | Transmissivity (T) ($ft^2$/day) | Leakance (B) (ft) | RPD between Methods |
|---|---|---|---|---|---|---|
| SSP2 | 1.8 | Closed | Time | 1200 | 23.8 | 21% |
| | | | Distance | | 30.0 | |
| | | Open | Time | | 23.1 | 11% |
| | | | Distance | | 26.0 | |
| SSP3 | 3.7 | Closed | Time | 1200 | 21.8 | 16% |
| | | | Distance | | 26.0 | |
| | | Open | Time | | 21.1 | 19% |
| | | | Distance | | 26.0 | |
| SSP4 | 5.8 | Closed | Time | 1200 | 11.5 | 4% |
| | | | Distance | | 12.0 | |
| | | Open | Time | | 11.7 | 19% |
| | | | Distance | | 14.5 | |
| SSP5 | 4.3 | Closed | Time | 1200 | 10.0 | 5% |
| | | | Distance | | 10.5 | |
| | | Open | Time | | 8.5 | 10% |
| | | | Distance | | 9.5 | |
| SSP6 | 5.2 | Closed | Time | 1200 | 12.1 | 28% |
| | | | Distance | | 8.7 | |
| | | Open | Time | | 10.4 | 29% |
| | | | Distance | | 7.4 | |

Figure 7-23 shows the subslab vacuum versus distance data along with model profiles calculated using Equation 4, a T value of 1200 $ft^2$/day and the highest and lowest B values form Table 7-3 (30 ft and 7.4 ft, respectively). The model curves bound the measured data. SSP1, SSP2, SSP3 and SSP7 are very close to the curve calculating using a B value of 30 ft, which indicates they are responding to similar amounts of leakage. SSP4, SSP5 and SSP6 show much lower static vacuum by comparison to the trend for the other probes (note that these probes are near the front of the house and the land drain is also near the front of the house). Figure 7-23 also shows the measured static vacuum levels with the land drain open and closed, and the largest differences were observed at SSP4, 5 and 6. Note also that the vacuum measured at 3 and 6 ft depths at location 5 were about 30 pascals, which agree much more closely with the trend fitting probes SSP1, 2 3 and 7, which further supports the interpretation that the vacuum at the subslab probe is biased low by air flow across the perimeter crack.

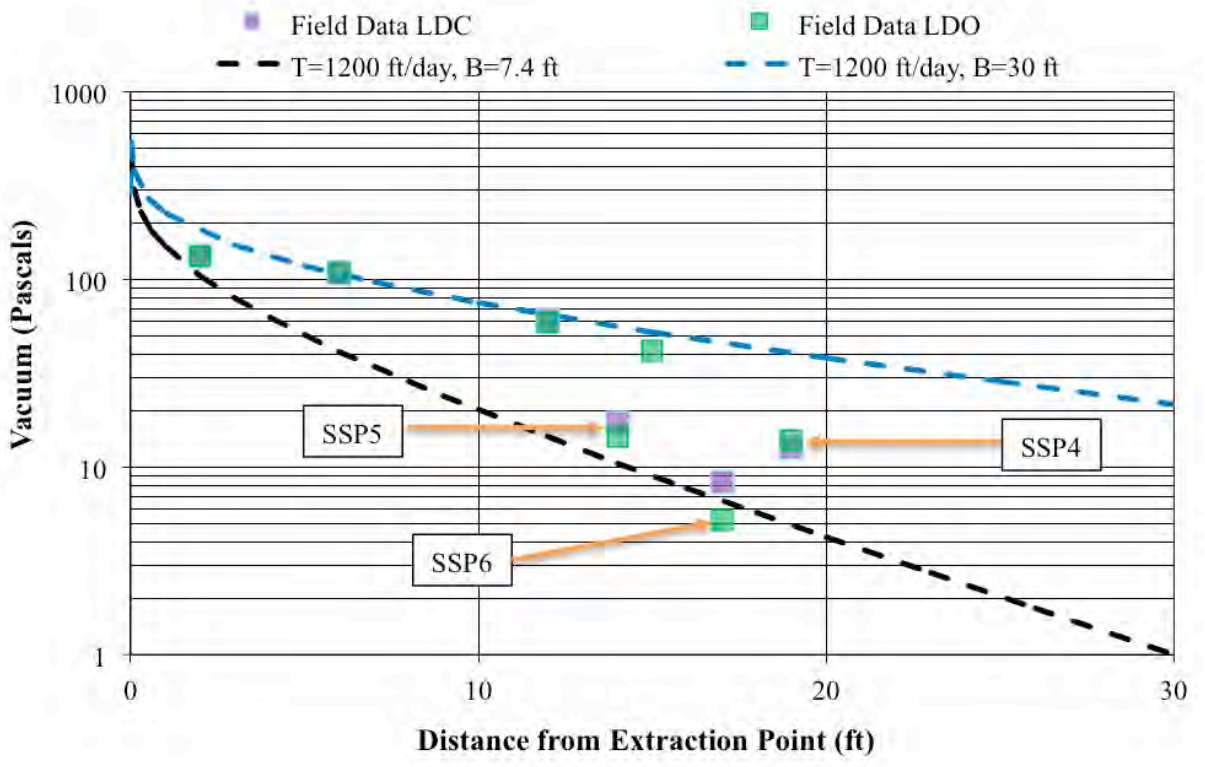



**Figure 7-23: Vacuum versus distance measurements and model curves using Equation 4**

### 7.3.4 Subslab Helium Tracer tests

Inter-well tracer test data are shown on Figures 7-24 to 7-26. The travel times from subslab probes at locations 3, 5 and 6 were similar for tests whether the land drain was open or closed. Travel times generally increased with distance as expected, except for the test at the land-drain, which had a travel time that was faster than from SSP6, indicating the land drain may extend under the building to a location closer to the suction point than SSP6.

The tests done at 21 scfm (LDC) and 29 scfm (LDO) had about 3.6 to 5.7 times slower arrival time at a flow rate about 4.6 times lower then with the system running at full speed (91-99 scfm), which shows that the velocity varies essentially linearly with the flow rate, as would be expected if the flowpaths are the same in both cases. The tests done at full speed were very fast, so they were repeated for the land drain closed scenario, to verify the reproducibility.

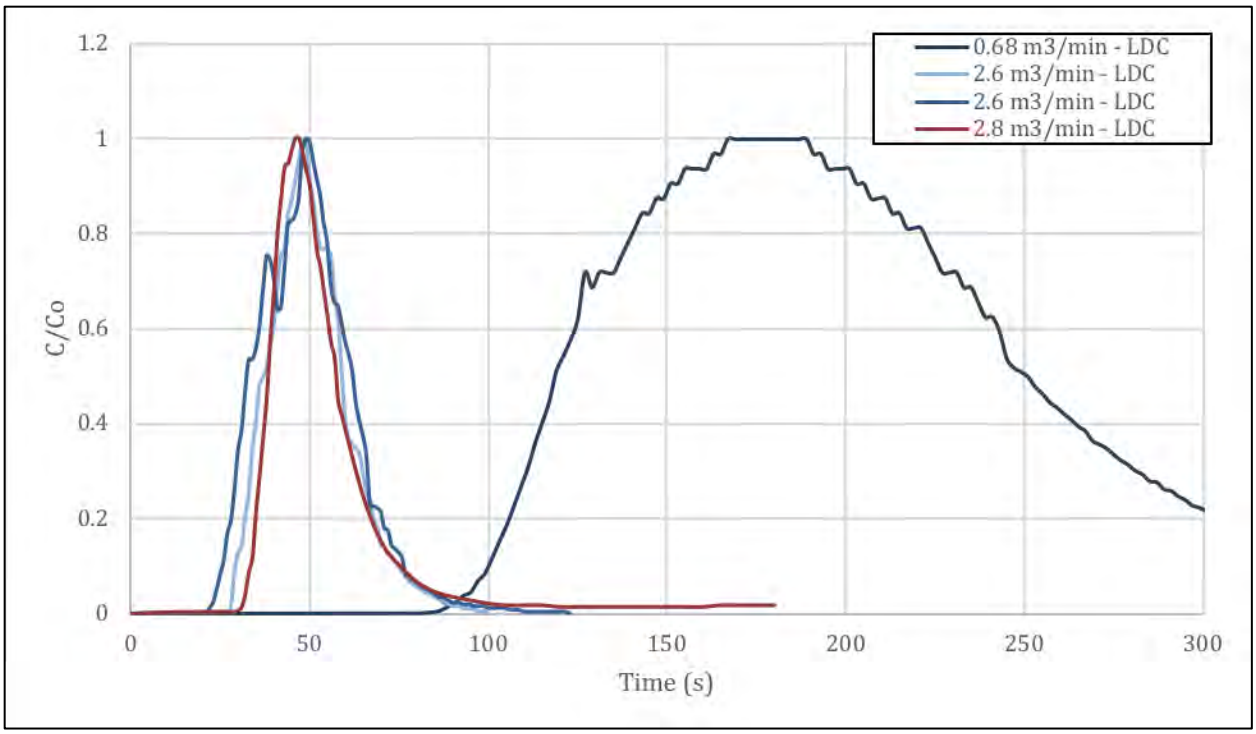



**Figure 7-24: Helium inter-well tracer tests data from location SSP3**

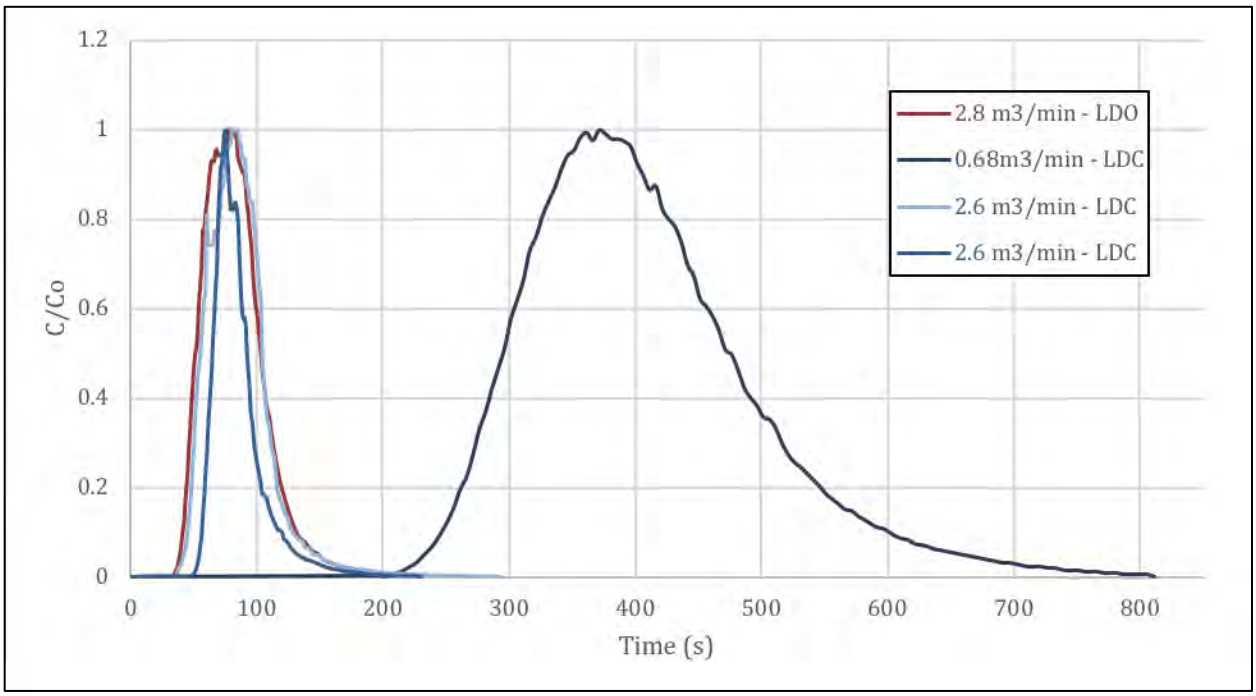



**Figure 7-25: Helium inter-well tracer tests data from location SSP5**

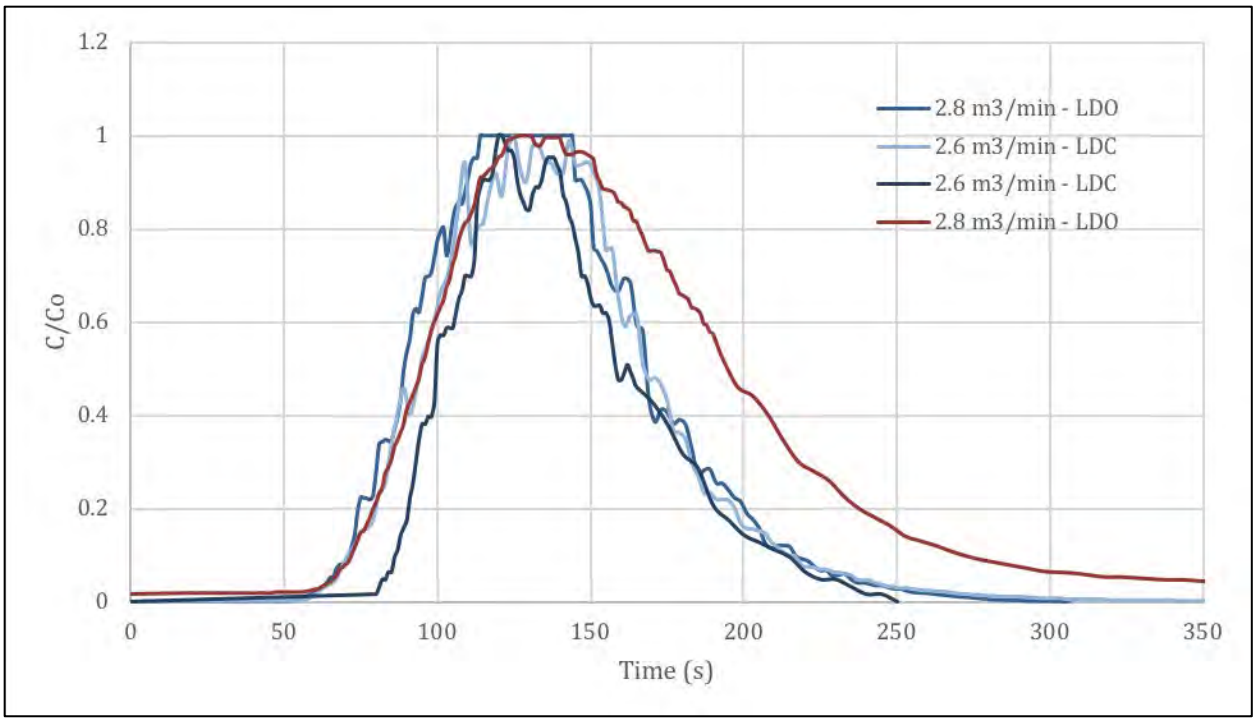



**Figure 7-26: Helium inter-well tracer tests data from location SSP6**

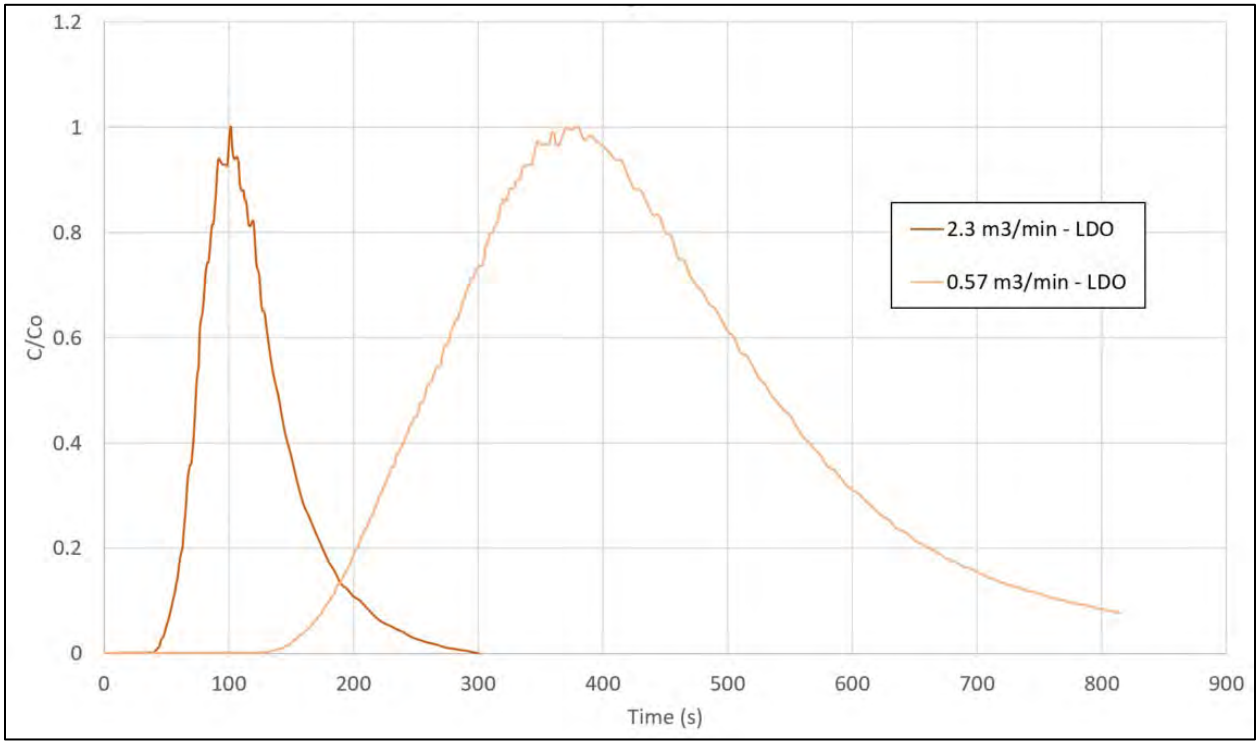



**Figure 7-27: Helium inter-well tracer test data from land drain**

### 7.3.5 Helium Flood Tests

The helium flood test data are shown on Figures 7-27 to 7-29. With the land drain open, the test proceeded as planned with an injection concentration of 8,000 ppm. However, with the land drain closed, the test did not proceed as planned because one of the helium meters was out of calibration and as a result, the helium concentration in the injected air was initially about 5,000 ppmv. When this discrepancy was discovered (less than a minute after the start of the test), the helium supply rate was adjusted, and as a result, the breakthrough curves show an approach to a peak, followed by a second increase in helium concentrations. Figures 7-27 to 7-29 show an interpolated segment where the helium concentrations would have leveled off if the helium concentration had not been changed during the test, which is based on the curvature observed for the tests conducted with the land drain open, which are essentially ideal breakthrough curves. For both LDC and LDO tests, the travel time is taken as the elapsed time from the start of helium injection to the midpoint of the breakthrough curve (helium concentration in the probe equal to 50% of the injected concentration).

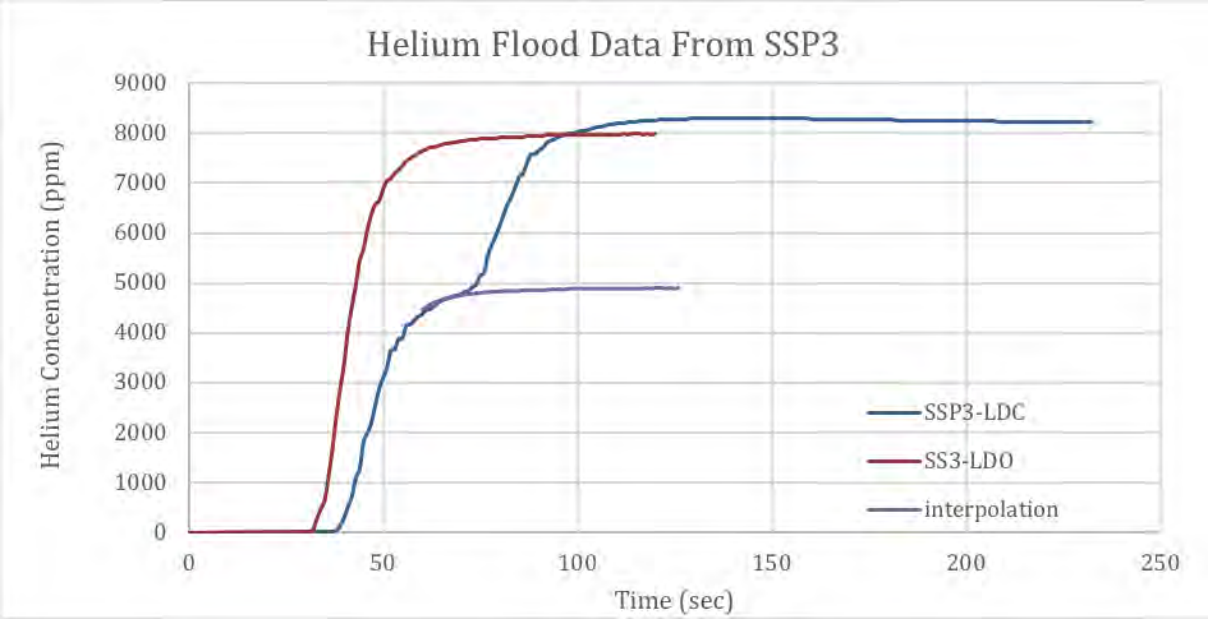



**Figure 7-28: Helium flood test data from location SSP3**

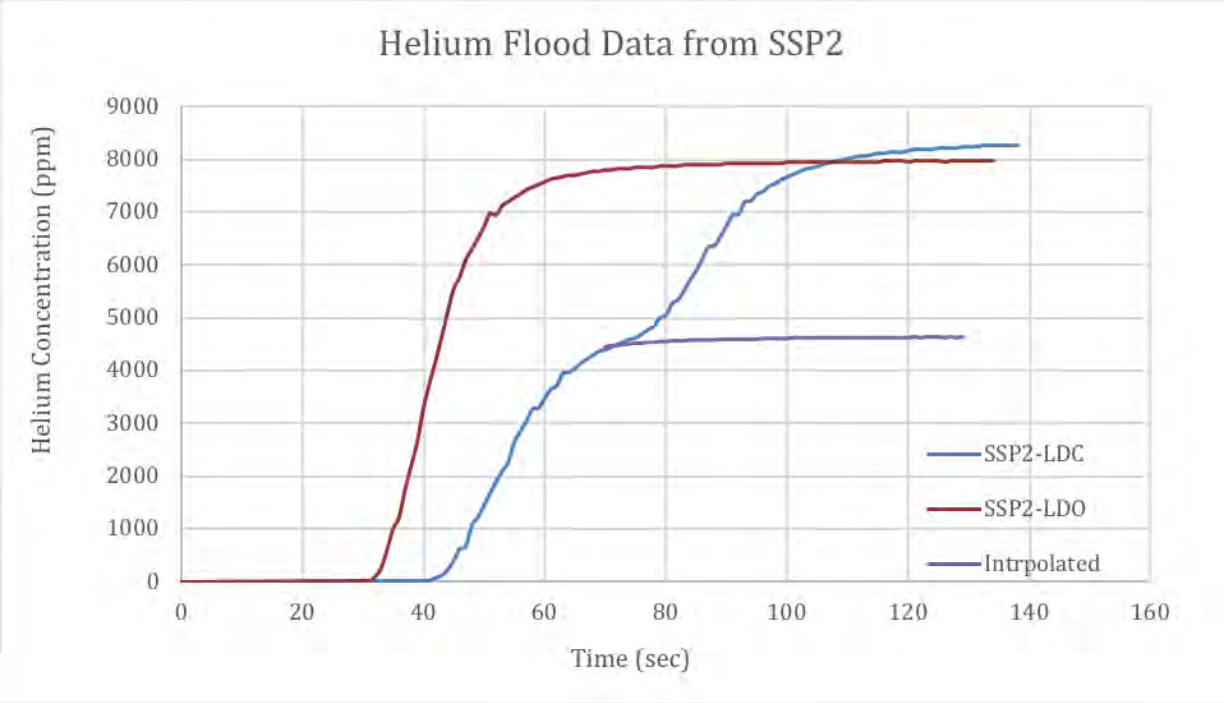



**Figure 7-29: Helium flood test data from location SSP2**

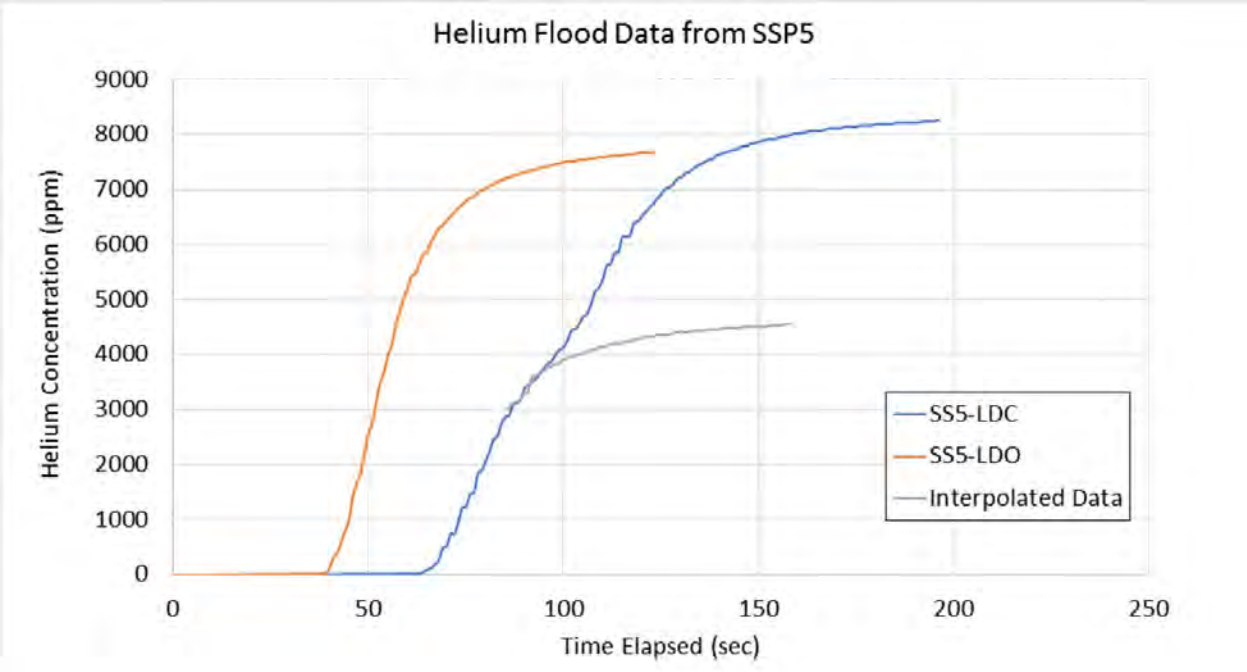



**Figure 7-30: Helium flood test data from location SSP5**

After each helium flood test was completed, helium was removed from the sub-surface by changing the SSV system to regular operation (extraction at about 2.7 $m^3$/min) and running until helium concentrations were no longer measurable.

Table 7-5 provides a summary of all the travel times measured with the inter-well tests and helium floods. The helium flood for SSP2 (the closest location monitored during the flood) showed an arrival time of 54 seconds with the LDC and 42 seconds with LDO. This is slower than expected for a radial distance of 6 feet, based on Equations 3 and 4, which yielded estimates closer to about 12 seconds. The suspected cause of this is that the helium meter has three settings (high, medium and low flow rates), and the lag-time required for gas to flush through the line between the detector and the probe tip increases at lower flow rates. Measurements were intended to be made at the high flow setting, but the instruments were occasionally turned to the low setting to conserve battery life and in this instance may not have been returned to the high flow setting. The helium flood showed communication to the 3 and 6 ft bgs probes at SSP2 and SSP5 with travel time to the 3 ft bgs probes being ~20-50x longer than the travel time to the subslab probes. The gas K values were about 7-10x lower in the 3 ft bgs probes (Table 7-1). This indicates shallow flow is dominant more than expected based on K alone. This is likely because the vent pipe does not have a fully penetrating well screen.

The agreement between the inter-well test and the flood tests are good for SSP3 (LDO and LDC), SSP5 (LDO and LDC) and at SSP6 (LDO). However, the SSP6 flood test result with LDC showed approximately 4x slower travel than inter-well tests (LDO or LDC) and flood test with LDO, which may have been attributable to the meter being left on the low flow rate setting, as described above. The results for the inter-well and flood tests otherwise showed good agreement, which indicates that both tracer testing methods are representative. The flood tests showed travel times to SSP1 and SSP4 were much longer than for locations under the occupied part of the structure. This is consistent with the CSM because there is no granular fill layer below the floor slab in the garage, and the native soil has a much lower gas conductivity.

**Table 7-4: Results of Inter-Well and Flood Subslab Gas Velocity Tracer Tests**

| Probe ID | Land Drain Valve | Radius (ft) | Flow (scfm) | Travel Times (s) | | |
|---|---|---|---|---|---|---|
| | | | | Interwell | Flood | RPD (%) |
| SSP1 | Open | 15 | 91 | | >4200 | |
| SSP1 | Closed | 15 | 99 | | ~2300 | |
| SSP2 | Closed | 6 | 99 | | 54 | |
| SSP2 | Open | 6 | 91 | | 42 | |
| SSP2-3 ft bgs | Open | 6 | 91 | | 2500 | |
| SSP2-3 ft bgs | Closed | 6 | 99 | | 1300 | |
| SSP2-6 ft bgs | Open | 6 | 91 | | 3500 | |
| SSP3 | Closed | 12 | 21 | 177 | | |
| SSP3 | Closed | 12 | 91 | 49 | 48 | -2% |
| SSP3 | Closed | 12 | 91 | 49 | | |
| SSP3 | Open | 12 | 99 | 47 | 41 | -14% |
| SSP4 | Open | 19 | 91 | | >3900 | |
| SSP5 | Open | 14 | 29 | 380 | | |
| SSP5 | Open | 14 | 91 | 67 | 54 | -21% |
| SSP5 | Open | 14 | 91 | 79 | | |
| SSP5 | Closed | 14 | 99 | 82 | 81 | -1% |
| SSP5 | Closed | 14 | 99 | 75 | | |
| SSP5 - 3 ft bgs | Open | 14 | 91 | | 3700 | |
| SSP6 | Closed | 17 | 99 | 128 | ~500 | |
| SSP6 | Closed | 17 | 99 | 125 | | |
| SSP6 | Closed | 17 | 99 | 121 | | |
| SSP6 | Open | 17 | 91 | 128 | <210 | |
| Land Drain | Open | 26 | 29 | 375 | | |
| Land Drain | Open | 26 | 91 | 102 | | |

The subslab tracer test results were compared to calculated travel times using Equation 3 and 4 and the calibrated transmissivity (T) and leakance (B) values, the measured flow rate (Q) and an estimated porosity (n) of 25%. The thickness (b) of the active flow zone was adjusted until the model matched the field data. The best fit was obtained with a b value of 15 cm, which is similar to the 20 to 30 cm range that was observed in boreholes through the floor. Helium inter-well and flood tracer test data are plotted on Figure 7-30, along with model curves for B=7.4 and 30 ft, Q=95 CFM and b=0.5 ft, using Equations 3 and 4. Note that the travel time is much less than the target of 3 to 4 hours.

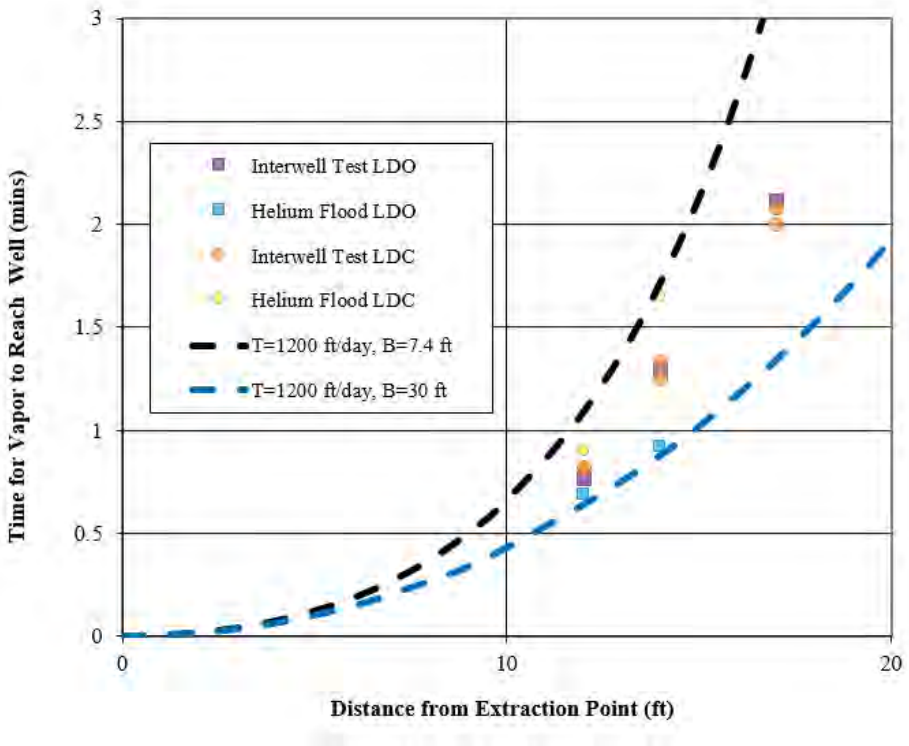



**Figure 7-31: Modeled Travel Times vs Distance with Helium Inter-well and Helium Flood Data Plotted**

With the calibrated model, a profile of velocity versus radial distance can also be calculated using Equation 5, as shown in Figure 7-31. Note that the velocity is much greater than 3 ft/day.

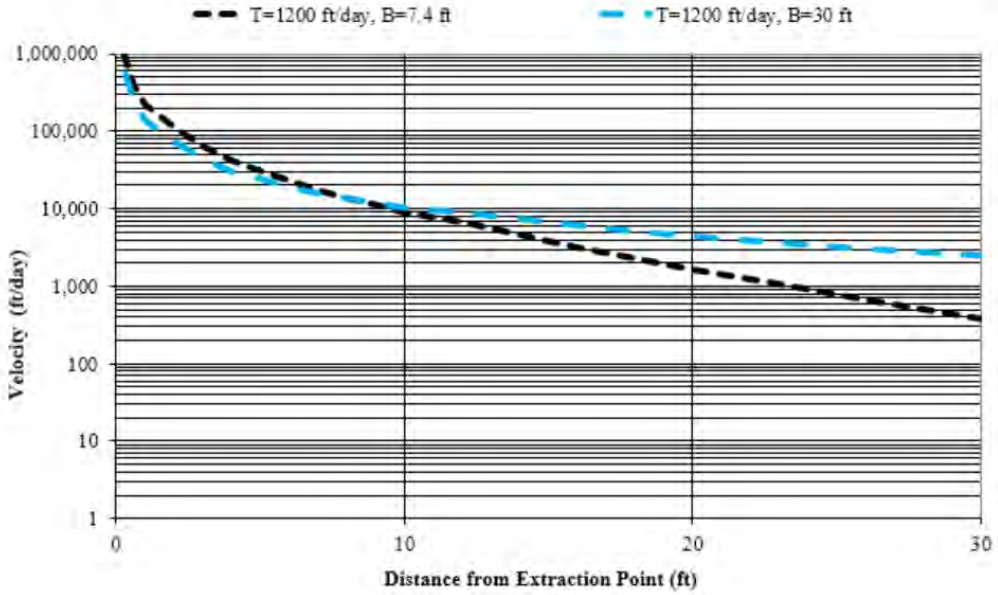



**Figure 7-32: Velocity versus radial distance from the vent pipe calculated with Equation 5**

### 7.3.6 Cross-Slab $SF_6$ Tracer Test Results

The $SF_6$ tracer test data for both land-drain open and closed conditions is shown on Figure 7-32. The $SF_6$ concentrations measured in the vent pipe were approximately 95%-48% of the concentrations measured in indoor air, with an average value of about 80%. There was no apparent trend as a function of the flow rate. The amount of leakage was also not notably influenced by the position of the valve on the land drain (open or closed). This indicates that about 4/5ths of all gas extracted by the system originated from leakage of indoor air across the floor slab. This is noteworthy considering the vent-pipe is located only about 1 foot from an exterior wall of the building, and it was not known whether outdoor air would flow to the suction point by passing beneath the footing, and this data proves that component must have been minimal. The measured proportion of $SF_6$ in the vent-pipe was compared to the leakage calculated using Equation 7 to provide an additional line of evidence to verify the model. The $SF_6$ data demonstrated that the floor must be relatively leaky, which has implications for the calculation of a building-specific attenuation factor.

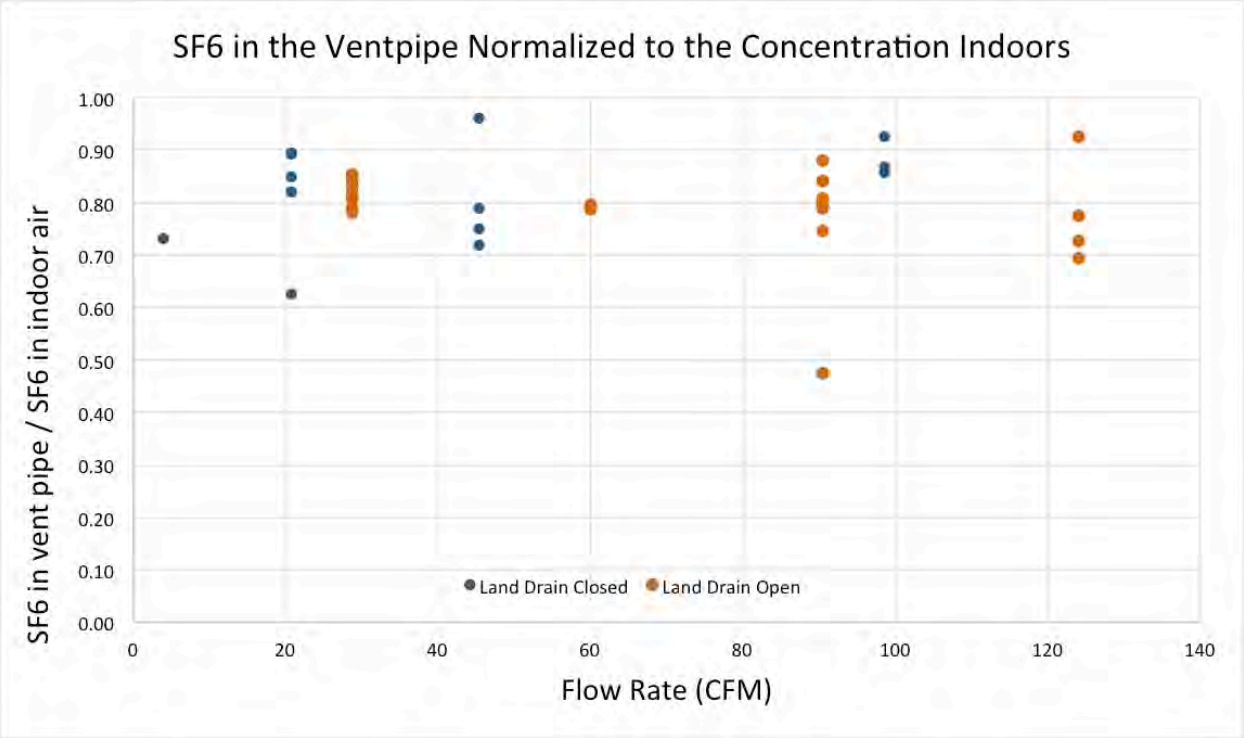



**Figure 7-33: $SF_6$ concentration in the vent-pipe as a fraction of the indoor air concentration**

Figure 7-33 shows the calculated proportion of soil gas versus indoor air in the extracted gas as a function of radial distance from the suction point, calculated using the calibrated range of B values and Equation 7. The percentage of soil gas is represented on the Y-axis of Figure 7-33, whereas the percentage of indoor air is represented in Figure SI-32. The sum of the two equal 100%, so one value is simply 1 minus the other. The walls furthest from the extraction point are about 30 ft away from the suction point. At that radius, the model shows a range of 95% to 40% leakage of indoor air for the calibrated range of B values, similar to the range that was measured using the $SF_6$ tracer test. These data indicate that the calibrated Hantush-Jacob Model provides a reasonable

estimate of the leakage of air across the floor slab. This can be used to estimate the cost of energy losses of air drawn across the floor by the mitigation system.

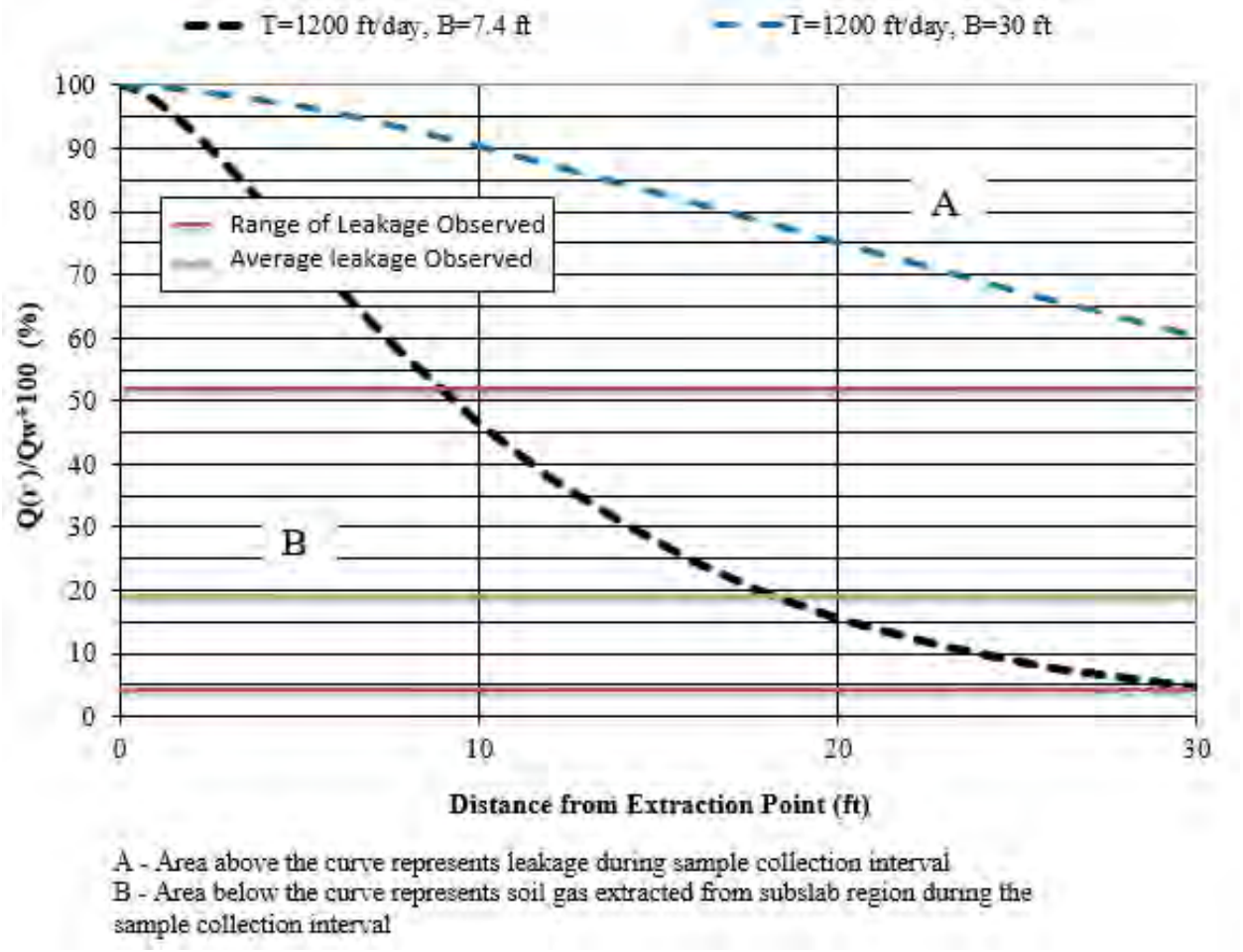



**Figure 7-34: Percentage of Flow originating from the sub-surface vs distance (Eqn 7)**

### 7.3.7 Mass Removal Rates

With the land drain open, the Controlled Pressure Method (CPM) (Guo et al., 2015) resulted in TCE mass removal rates of between 0.1-0.3 g/day, as shown in Figure 7-6. The corresponding Radon mass removal rates were between 0.03 and 0.2 mCi/day. These values provide a benchmark for comparison to the mass removal rates measured during the step test and can be used to select an optimal flow rate for the SSV system to capture all or nearly all of the available mass of TCE and radon. Figure 7-34 shows the mass removal rate of TCE from the vent-pipe with the land drain open. A flow rate of 2.8 $m^3$/min (100 scfm) would capture 0.3 g/day of TCE, which is the upper range value measured during the CPM test. Coincidentally, this is the flow rate achieved by the current system as designed, so it is already optimized for TCE removal. With a porosity (n) of 25%, a leakage rate of 80%, and a flow rate of 60 scfm, the pore volume of the fill material under the occupied part of the house would be flushed approximately every 16 minutes and one pore volume of the entire vadose zone beneath the building would be flushed every 6 hours on average.

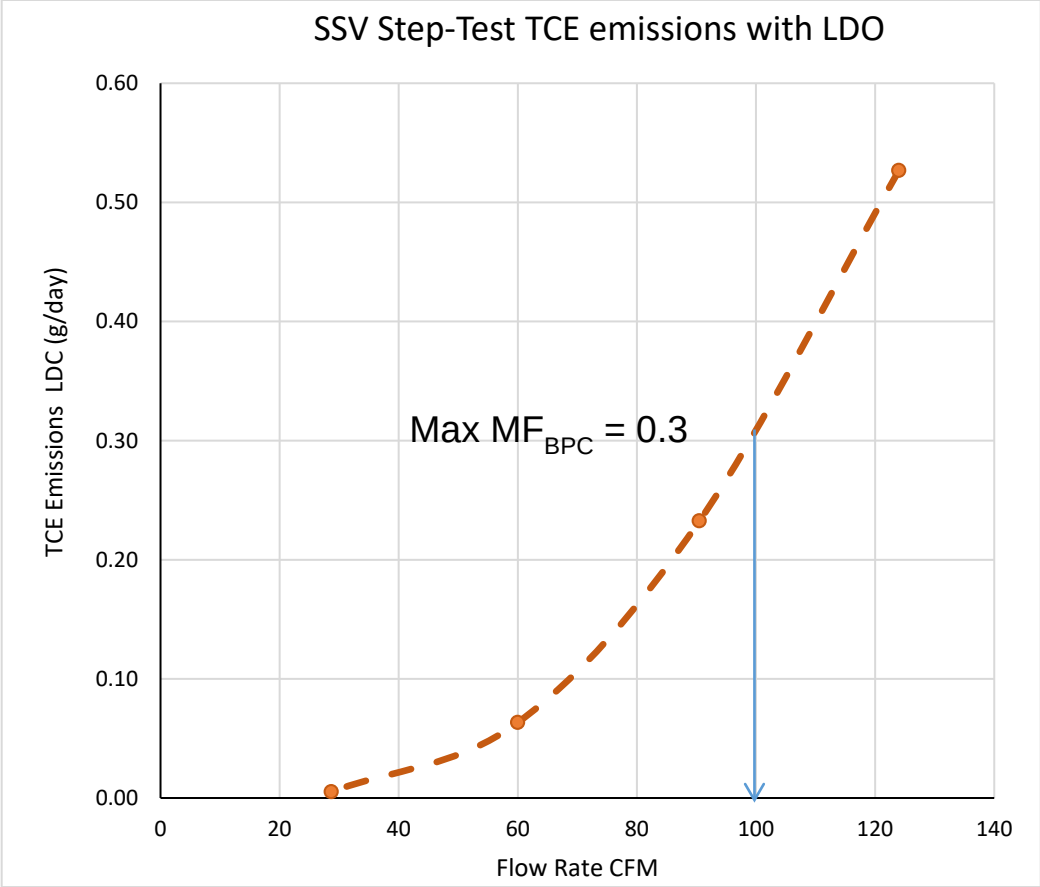



**Figure 7-35: Flow rate needed to capture all of the available TCE flux with the LDO, using the CPM as the benchmark**

With the land drain closed, the CPM method resulted in TCE mass removal rates of about 0.0001 to 0.006 g/day (although only a few values were above 0.002 g/day and may be outliers), with an average of 0.0013 g/day. The mass removal rate as a function of the vent-pipe flow rate with the LDC is shown on Figure 7-35. By interpolation, a flow rate as low as about 4 scfm would capture the minimum TCE mass flux (0.0001 g/day), a flow rate of about 60 scfm would capture the average mass flux (0.0013 g/day), and 120 scfm would capture 0.002 g/day, which covers the majority of the fluxes quantified by the Controlled Pressure Method. The wide range here may be an artifact of the very low indoor air concentrations measured with the LDC which may result in greater variability in the sampling and analysis of indoor air used to calculate the mass flux.

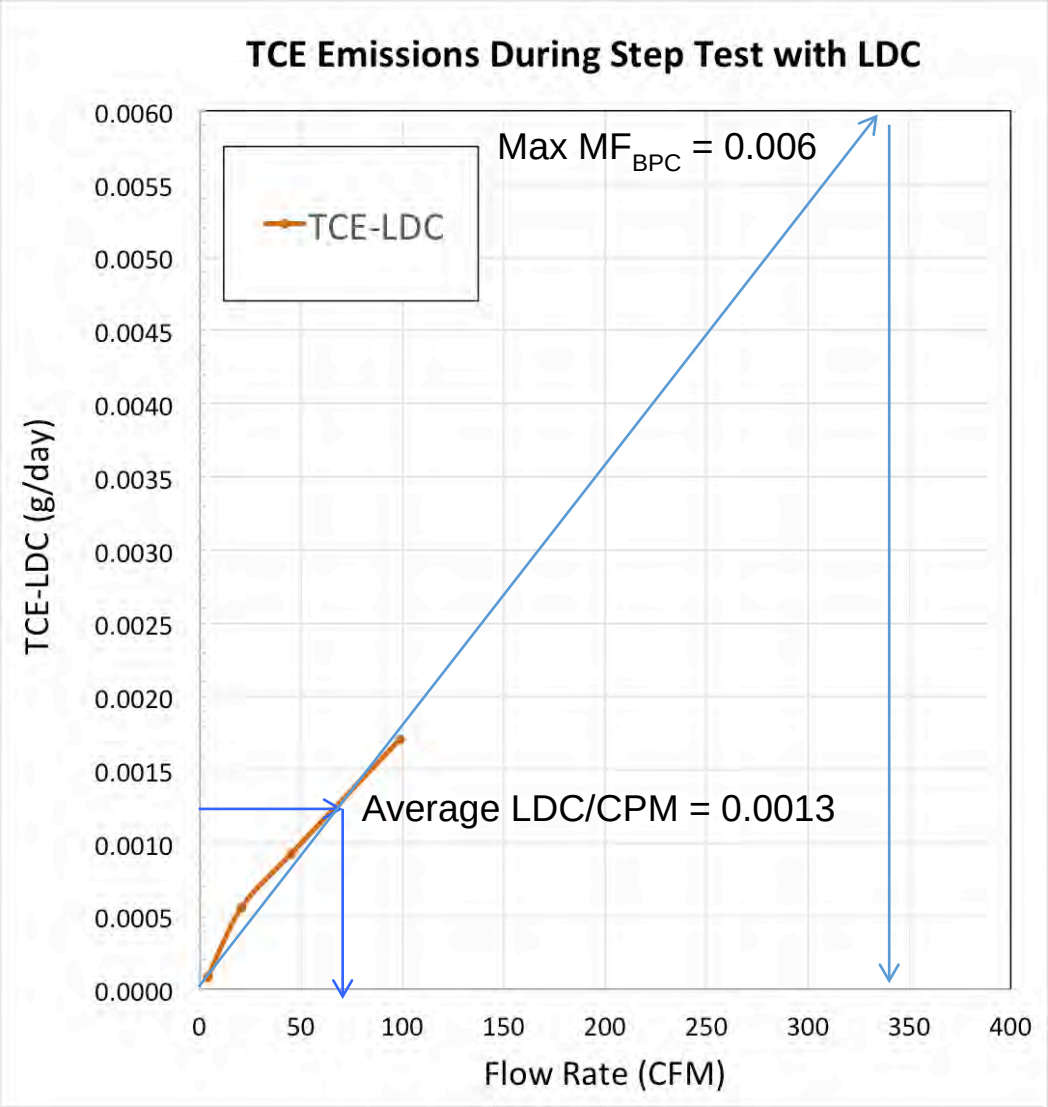



**Figure 7-36: Flow rate needed to capture TCE with the LDC, using the CPM as the benchmark**

Table 7-4 provides the measured radon concentrations in the SSD effluent as a function of the flow rates during the step tests with the land drain open and closed. Figure 7-36 shows the mass removal rate for radon with the land drain open, and indicates a flow rate up to about 11 $m^3$/min (400 scfm) would be required to capture all the available radon mass flux (0.2 millicuries per day). This benchmark may be biased, because a flux of 0.2 mCi/day would cause an indoor air concentration of about 25 pCi/L under ambient air exchange rates (about 20 per day) and exchange volume (350 $m^3$); however, the average measured by Holton (2015) was only 0.45 pCi/L under ambient pressure conditions. The radon concentrations measured by Holton for calculating the radon emissions were from the lower floor of the building, whereas the TCE concentrations were from the attic near where the exhaust fan drew air from the building. The flow rate of air extracted in the CPM test includes air leaking into the building from the upper floor, which would have diluted the TCE samples, but not the radon samples. Radon is also present in outdoor air and to some degree that could have imposed a positive bias in the basement level radon measurements. Therefore, the

analysis of system flow rates needed to capture the radon mass flux are shown for completeness, but are not considered to be representative.

As an alternate benchmark for radon, the average measured indoor air concentration under ambient conditions was 0.45 pCi/L (Holton, 2015), which would correspond to a flux of 0.004 mCi/day, which could be contained with a modest flow rate of about 25 scfm (Figure 7-36).

**Table 7-5: Radon Concentrations measured in effluent samples from SDM**

| | Collection | | Analysis | Radon | |
|---|---|---|---|---|---|
| **ID** | **Date** | **Time (MDT)** | **Date** | **pCi/L** | **Bq/m$^3$** |
| ST-LDC-80 | 6/6/2016 | 11:30 | 6/10/2016 | 4.7 | 174 |
| Lab dupe | 6/6/2016 | 11:30 | 6/13/2016 | 4.4 | 163 |
| ST-LDC-40 | 6/6/2016 | 13:25 | 6/10/2016 | 4.4 | 163 |
| ST-LDC-20 | 6/6/2016 | 18:56 | 6/10/2016 | 3.5 | 130 |
| ST-LDC-10 | 6/7/2016 | 7:30 | 6/10/2016 | 2.6 | 96 |
| Lab dupe | 6/7/2016 | 7:30 | 6/13/2016 | 4.0 | 148 |
| ST-LDO-80 | 6/9/2016 | 7:30 | 6/13/2016 | 11.2 | 414 |
| ST-LDO-20 | 6/7/2016 | 16:20 | 6/13/2016 | 4.8 | 180 |
| ST-LDO-60 | 6/7/2016 | 17:40 | 6/10/2016 | 13.9 | 510 |

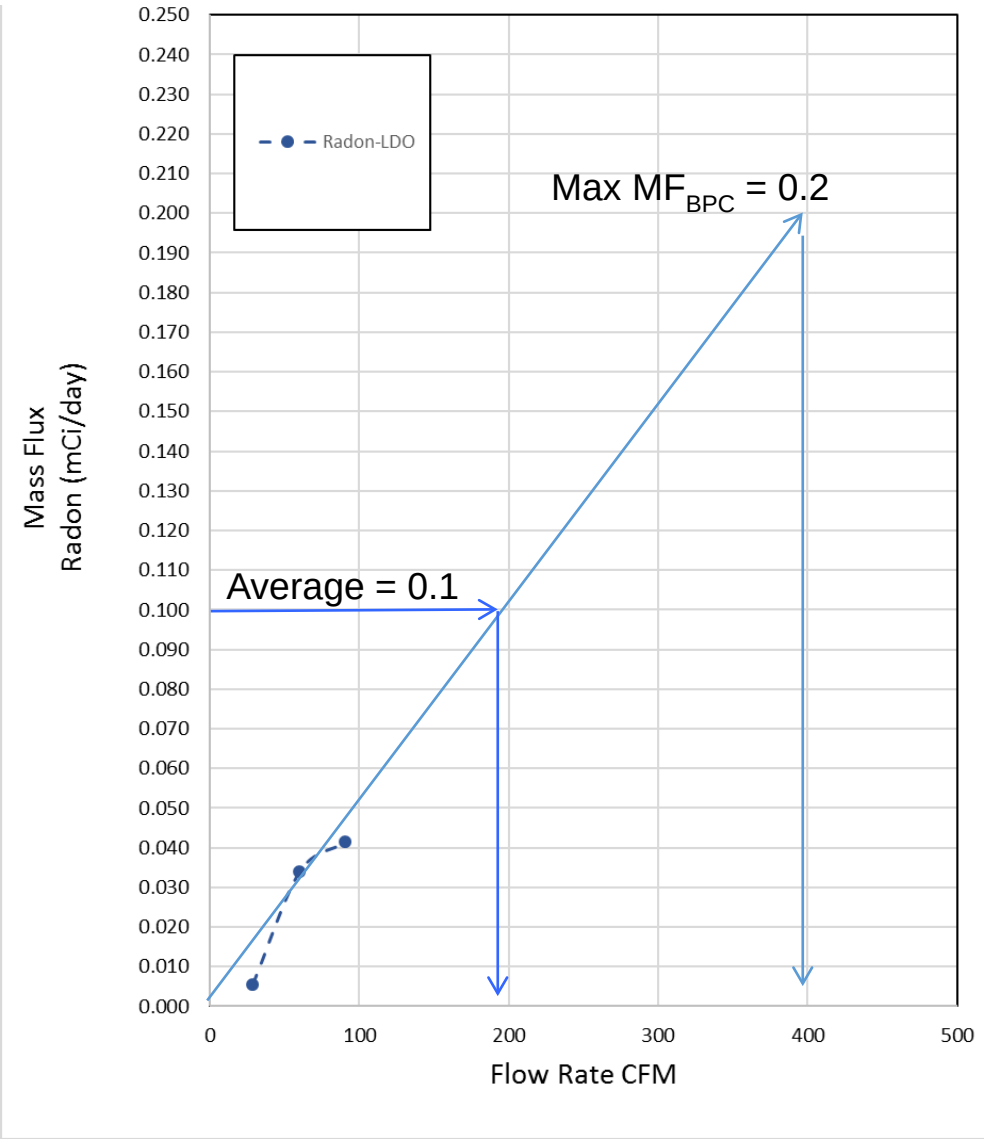



**Figure 7-37: Flow rate needed to capture all of the Radon with the LDO, using the CPM as a benchmark and the step test as a way to identify the flow rate**

With the land drain closed, Figure 7-37 indicates a flow rate of about 4.8 $m^3$/min (170 scfm) would be required to capture the maximum radon flux (0.034 mCi/day). Only 25 scfm would be required to capture the alternative benchmark of 0.004 mCi/day.

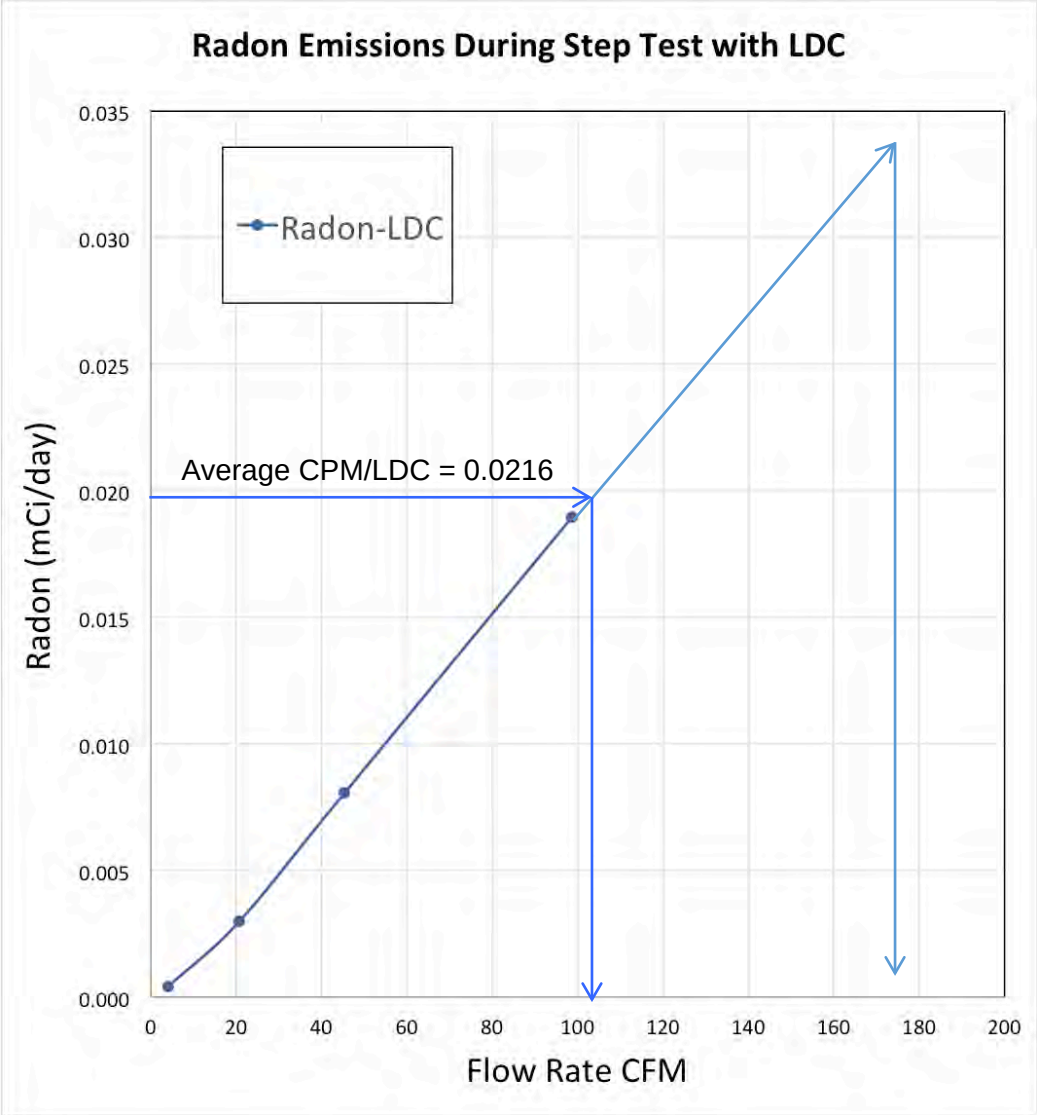



**Figure 7-38: Flow rate needed to capture all of the Radon with the LDC, using the CPM as a benchmark and the step test as a way to identify the flow rate**

## 7.4 BUILDING-SPECIFIC ATTENUATION FACTORS

Building-specific attenuation factors calculated using Equation 17 and the T and B values calculated from the pneumatic testing are provided in Table 7-5. The building height, differential pressure and air exchange rate were all estimated based on data in Holton, 2015.

**Table 7-6: Building-specific attenuation factors calculated for SDM using Equation 17**

| Probe | Distance from Vent Pipe (ft) | T ($ft^2$/day) | B (ft) | h (ft) | deltaP (ft) | AER (/day) | AF (-) |
|---|---|---|---|---|---|---|---|
| SSP2 | 6 | 1200 | 24 | 15 | 0.5 | 20 | 6E-03 |
| | | 1200 | 30 | 15 | 0.5 | 20 | 4E-03 |
| | | 1200 | 23 | 15 | 0.5 | 20 | 7E-03 |
| | | 1200 | 26 | 15 | 0.5 | 20 | 5E-03 |
| SSP3 | 12 | 1200 | 22 | 15 | 0.5 | 20 | 7E-03 |
| | | 1200 | 26 | 15 | 0.5 | 20 | 5E-03 |
| | | 1200 | 21 | 15 | 0.5 | 20 | 8E-03 |
| | | 1200 | 26 | 15 | 0.5 | 20 | 5E-03 |
| SSP4 | 19 | 1200 | 12 | 15 | 0.5 | 20 | 3E-02 |
| | | 1200 | 12 | 15 | 0.5 | 20 | 2E-02 |
| | | 1200 | 12 | 15 | 0.5 | 20 | 3E-02 |
| | | 1200 | 15 | 15 | 0.5 | 20 | 2E-02 |
| SSP5 | 14 | 1200 | 10 | 15 | 0.5 | 20 | 4E-02 |
| | | 1200 | 11 | 15 | 0.5 | 20 | 3E-02 |
| | | 1200 | 8.5 | 15 | 0.5 | 20 | 5E-02 |
| | | 1200 | 9.5 | 15 | 0.5 | 20 | 4E-02 |
| SSP6 | 17 | 1200 | 12 | 15 | 0.5 | 20 | 2E-02 |
| | | 1200 | 8.7 | 15 | 0.5 | 20 | 5E-02 |
| | | 1200 | 10 | 15 | 0.5 | 20 | 3E-02 |
| | | 1200 | 7.4 | 15 | 0.5 | 20 | 6E-02 |
| | | | | | | min | 4E-03 |
| | | | | | | max | 6E-02 |
| | | | | | | mean | 2E-02 |

The mean value for the calculated building-specific attenuation factor (0.02) was very close to the 95$^{th}$ percentile default recommended by the U.S EPA (0.03), which is consistent with observations that the material below the basement is highly permeable, and the $SF_6$ tracer test indicates the floor is relatively permeable, both of which would lead to increased susceptibility to vapor intrusion.

## 7.5 COST CONSIDERATIONS

With the land drain open, mass flux monitoring showed that a flow rate of 100 scfm would capture the maximum emission rate of TCE measured during building depressurization testing (0.3 g/day). The conventional system has a flow rate of 100 scfm and is therefore already optimally designed for the case with the Land Drain open. The optimization process would have been an unnecessary expense for the case with the land drain open (see Table 7-7). This is fairly common for single family dwellings, where a conventional radon-style mitigation system with one fan and one suction point is often adequate, and as a result, there are many radon mitigation contractors who perform no diagnostic testing at all, only verification testing via indoor air sampling after the system has been operating for long enough to reach stable conditions.

**Table 7-7: Sun Devil Manor Cost Summary (Land Drain Open)**

| Cost Components | Conventional | Optimized |
|---|---|---|
| Initiation | $ 4,660 | $ 4,660 |
| Reconnaissance | $ 3,580 | $ 4,280 |
| Pilot Test | $ 2,300 | $ 11,200 |
| Installation | $ 9,975 | $ 8,575 |
| Operation | $ 51,032 | $ 51,032 |
| Maintenance | $ 300 | $ 300 |
| Fan Replacement | $ 4,000 | $ 4,000 |
| Training | $ 5,000 | $ 6,000 |
| TOTALS | $ 80,847 | $ 90,047 |
| Total incremental cost of optimization activities | | $ 9,600 |
| Net Savings | | $ (9,200) |
| Return on Investment | | -1.0 |
| Ratio of Conventional Costs vs Optimized Costs | | 0.9 |

With the land drain closed, a flow rate of 60 scfm would capture the average TCE mass loading (0.0013 g/day), which is similar to the calculated upward diffusive flux and the maximum flux measured under ambient pressure condition. However, if the land drain were closed or did not exist, the mass loading to the building would be insufficient to sustain indoor air concentrations above the risk-based screening level, so no mitigation system would be required. Nevertheless, conventional practice would likely have resulted in a system installation regardless based on subsurface vapor concentrations above screening levels. The diagnostic testing would have been able to prove no system was needed and achieved a considerable savings. For the case with the land drain closed, the total net savings would be about $62,000 over a 30-year operating period, assuming the optimization testing was able to clearly demonstrate a mitigation system is not needed (Table 7.8).

**Table 7-8: Sun Devil Manor Cost Summary (Land Drain Closed)**

| Cost Components | Conventional | Optimized |
|---|---|---|
| Initiation | $ 4,660 | $ 4,660 |
| Reconnaissance | $ 3,580 | $ 4,280 |
| Pilot Test | $ 2,300 | $ 9,900 |
| Installation | $ 9,975 | $ - |
| Operation | $ 51,032 | $ - |
| Maintenance | $ 300 | $ - |
| Fan Replacement | $ 4,000 | $ - |
| Training | $ 5,000 | $ - |
| TOTALS | $ 80,847 | $ 18,840 |
| Total incremental cost of optimization activities | | $ 9,600 |
| Net Savings | | $ 62,007 |
| Return on Investment | | 6.5 |
| Ratio of Conventional Costs vs Optimized Costs | | 4.3 |

# 8.0 BUILDING 11193 VANDENBERG AFB

## 8.1 SITE LOCATION AND HISTORY

Building 11193 is an inactive former drycleaner with PCE and degradation products (TCE and cDCE) in the subsurface and indoor air at consistently detectable concentrations. The structure is single story, with a concrete slab-on-grade floor, sheet metal walls and single pane windows with a footprint of about 11,000 $ft^2$. A photograph of the building exterior is provided in Figure 8-1 and interior photos are included in Figure 8-2.



**Figure 8-1: Vandenberg Building 11193**



**Figure 8-2: Interior Photos of Building 11193**

The floor is uncovered in the woodshop area, and covered by tile or carpet in most other areas. There are expansion joints between sections of the floor slab that have a large aperture in places and are unsealed. Where the floor is uncovered, testing was performed before and after sealing the floor joints with Duct Tape. Some joints were positioned under walls and were not accessible. Other joints were covered by floor tiles or carpet and these floor coverings would be expected to restrict cross-slab air flow to varying degrees. There is a drop ceiling at a height of about 10 feet and a roof with a peak at about 15 feet down the centerline of the long axis of the building. Several penetrations through the roof for exhaust fans that are no longer existing were sealed prior to testing using plastic garbage bags and duct tape to minimize excessive leakage of the building envelope.

The building is currently vacant and therefore, was readily accessible for research. Research has previously been performed here under the AFCEC BAA Program (Contract # FA8903-10-C-8116) to compare High Volume Sampling (HVS) to multi-incremental sampling for subslab VOC vapor characterization. Research was also performed under ESTCP Project ER2015-03 to measure mass loadings via building pressure cycling (BPC) and vertical profiling.

### 8.1.1 Site Geology/Hydrogeology

The data collected through historical site investigation activities indicates the shallow geology in the vicinity of Building 11193 consists of unconsolidated alluvial terrace deposits comprised primarily of moist silty sand with some interbedded silty clay layers, based on boring logs for monitoring well 24-PMW-32 and 24-MW-32B located about 22 and 50 feet, respectively, to the north of the building. The depth to the water table in the vicinity of the building is approximately 11 feet below grade based on water level data from monitoring well 24-PMW-32. Detailed soil boring logs for 4 locations within the building will be included in the final report for ESTCP Project ER2015-03.

Monitoring well 24-PMW-32 has been sampled 29 times since April 2009 (Arcadis 2016). In general, the concentrations of PCE, TCE and cis-1,2-DCE have been at parts per million levels and have declined over that period (Figure 8-3). The soil vapor concentration of PCE, TCE and cis-1,2-DCE at equilibrium with the water based on Henry's Law partitioning generally would be above 1,000,000, 400,000 and 1,400,000 micrograms per cubic meter ($\mu g/m^3$), respectively, for most of the data shown on Figure 8-3.

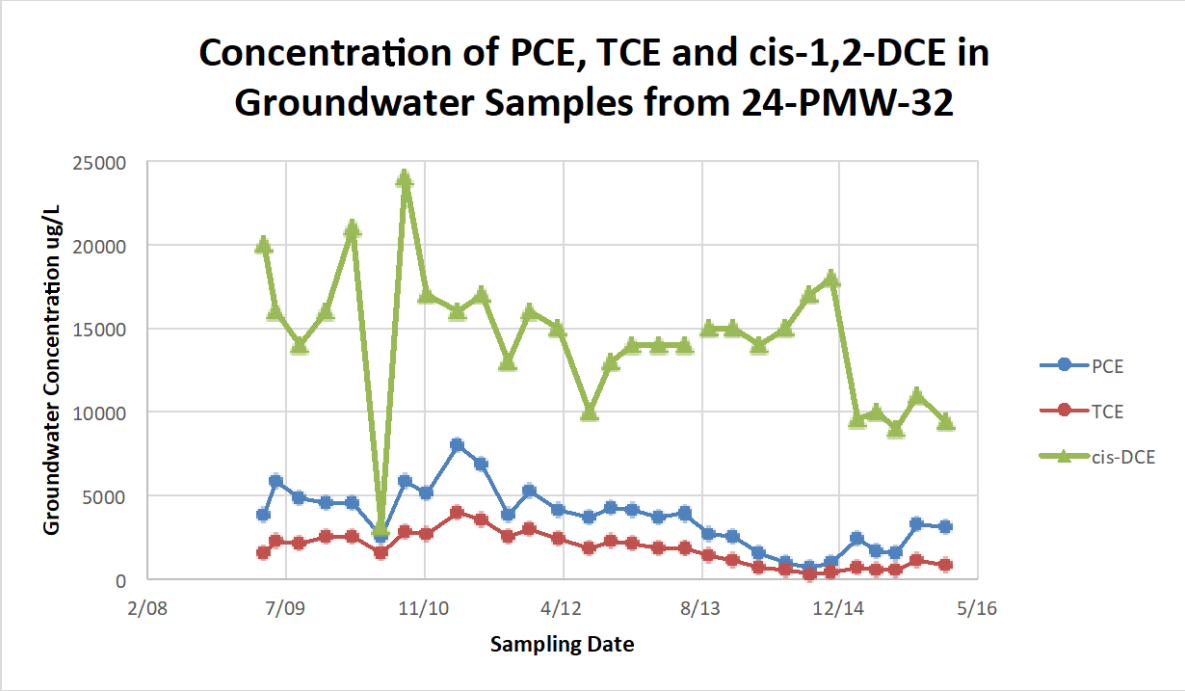



**Figure 8-3: PCE, TCE and cis-1,2-DCE concentration trends, monitoring well 24-PMW-32**

### 8.1.2 Contaminant Distribution

***Indoor and Outdoor Air Monitoring, January 2012***

The Air Force performed indoor air monitoring in Building 11193 on January 19 and 20, 2012, using a HAPSITE portable gas chromatograph/mass spectrometer (GC/MS) to measure vapor flux into the building and scan for background sources (USAF, 2012). The cross-building pressure differential was also monitored using a micromanometer with data-logging abilities. The cross-building differential pressure readings indicated that the building was under a slight negative pressure (~0.5 Pa) during most of the study, with periods of elevated depressurization (3 to 5 Pa) attributable to operation of an exhaust fan. The study concluded that PCE and other chlorinated alkanes were attributable to subsurface vapor intrusion and that 1,2-dichloroethane was likely due to an interior source. Confirmatory samples (4 indoor air samples and two outdoor air samples) were collected by Shaw Environmental and Infrastructure on January 30, 2012 and analyzed by Columbia Analytical Services of Simi Valley, California, using Summa canisters and EPA Method TO-15 SIM and full scan. It is not known whether exhaust fans or the HVAC system were operational during that sampling event. The measured PCE indoor air concentrations ranged from 21 to 47 µg/m$^3$, TCE concentrations ranged from1.4 to 6.9 µg/m$^3$, and cDCE concentrations ranged from 0.95 to 3.9 µg/m$^3$. Vinyl chloride was not detected. The indoor air monitoring data are provided in Table 8-1 and associated sampling locations are shown on Figure 8-4.

## Table 8-1: Indoor air data measured in January 2012

| Air Force HAPSITE Results | | | | | |
|---|---|---|---|---|---|
| **Day 1 Room by Room Sampling** | | | PCE | TCE | c-DCE |
| LOC | Description | Sample Date | µg/m³ | µg/m³ | µg/m³ |
| | Outside air blank | 1/19/12 3:30 PM | <1.36 | <0.64 | <0.24 |
| ER-1 | Embroidery room (3) | 1/19/12 3:44 PM | 8.48 | <0.64 | 0.63 |
| ER-2 | Embroidery room - inside wall | 1/19/12 4:14 PM | 21.4 | <0.64 | 1.39 |
| CR-1 | Ceramics shop (2) | 1/19/12 4:23 PM | 20.1 | <0.64 | 0.99 |
| KR-1 | Ceramics kiln room (1) | 1/19/12 4:31 PM | <1.36 | <0.64 | <0.24 |
| FR-1 | North furnace room (4) | 1/19/12 4:39 PM | <1.36 | <0.64 | <0.24 |
| FS-1 | Frame shop (5) | 1/19/12 4:47 PM | 2.24 | <0.64 | <0.24 |
| LR-1 | Lobby (6) | 1/19/12 4:56 PM | <1.36 | <0.64 | <0.24 |
| EG-1 | Engraving room (7) | 1/19/12 5:06 PM | 3.46 | <0.64 | <0.24 |
| MR-1 | Men's room (8) | 1/19/12 5:12 PM | 4.41 | <0.64 | <0.24 |
| WR- | Women's room (9) | 1/19/12 5:19 PM | 5.42 | <0.64 | 0.32 |
| CS-1 | Cleaning supply room (10) | 1/19/12 5:26 PM | 5.63 | <0.64 | 0.28 |
| WS-1 | Woodshop (11) | 1/19/12 5:36 PM | 22.0 | <0.64 | 0.87 |
| WF-1 | Wood finishing room (12) | 1/19/12 5:46 PM | 3.73 | <0.64 | 0.40 |
| ER-2 | ***Overnight sampling*** LTM - Embroidery Room (3) | 1/19/12 7:56 PM | 41.4 | 0.86 | 2.06 |
| ER-2 | LTM - Embroidery Room (3) | 1/19/12 9:57 PM | 31.5 | 0.70 | 1.51 |
| ER-2 | LTM - Embroidery Room (3) | 1/19/12 11:58 | 37.7 | <0.64 | 2.46 |
| ER-2 | LTM - Embroidery Room (3) | 1/20/12 1:59 AM | 39.5 | 0.64 | 2.85 |
| ER-2 | LTM - Embroidery Room (3) | 1/20/12 4:01 AM | 39.8 | 0.75 | 3.21 |
| ER-2 | LTM - Embroidery Room (3) | 1/20/12 6:02 AM | 42.2 | 1.07 | 3.49 |
| ER-2 | LTM - Embroidery Room (3) | 1/20/12 8:05 AM | 43.4 | 0.97 | 3.85 |
| CR-1 | Ceramics room (2) | 1/20/12 9:06 AM | 35.9 | <0.64 | 2.93 |
| | | | 21.9 | <0.64 | 2.30 |
| | ***Day 2 room-by-room sampling*** | | | | |
| ER-2 | Embroidery Room (3) | 1/20/12 8:37 AM | 47.8 | 1.29 | 3.81 |
| LR-1 | Lobby (6) | 1/20/12 8:48 AM | 27.8 | <0.64 | 2.82 |
| WS-1 | Woodshop (11) | 1/20/12 8:57 AM | 54.9 | 4.46 | 10.8 |
| **SHAW TO-15 Results** | | | | | |
| | SV-11193-JA01 | 1/30/2012 | 32 | 1 | 1.8 |
| | SV-11193-JA02 | 1/30/2012 | 21 | 1 | 1.6 |
| | SV-11193-JA03 | 1/30/2012 | 20 | 0.95 | 1.4 |
| | SV-11193-JA04 | 1/30/2012 | 47 | 3.9 | 6.9 |

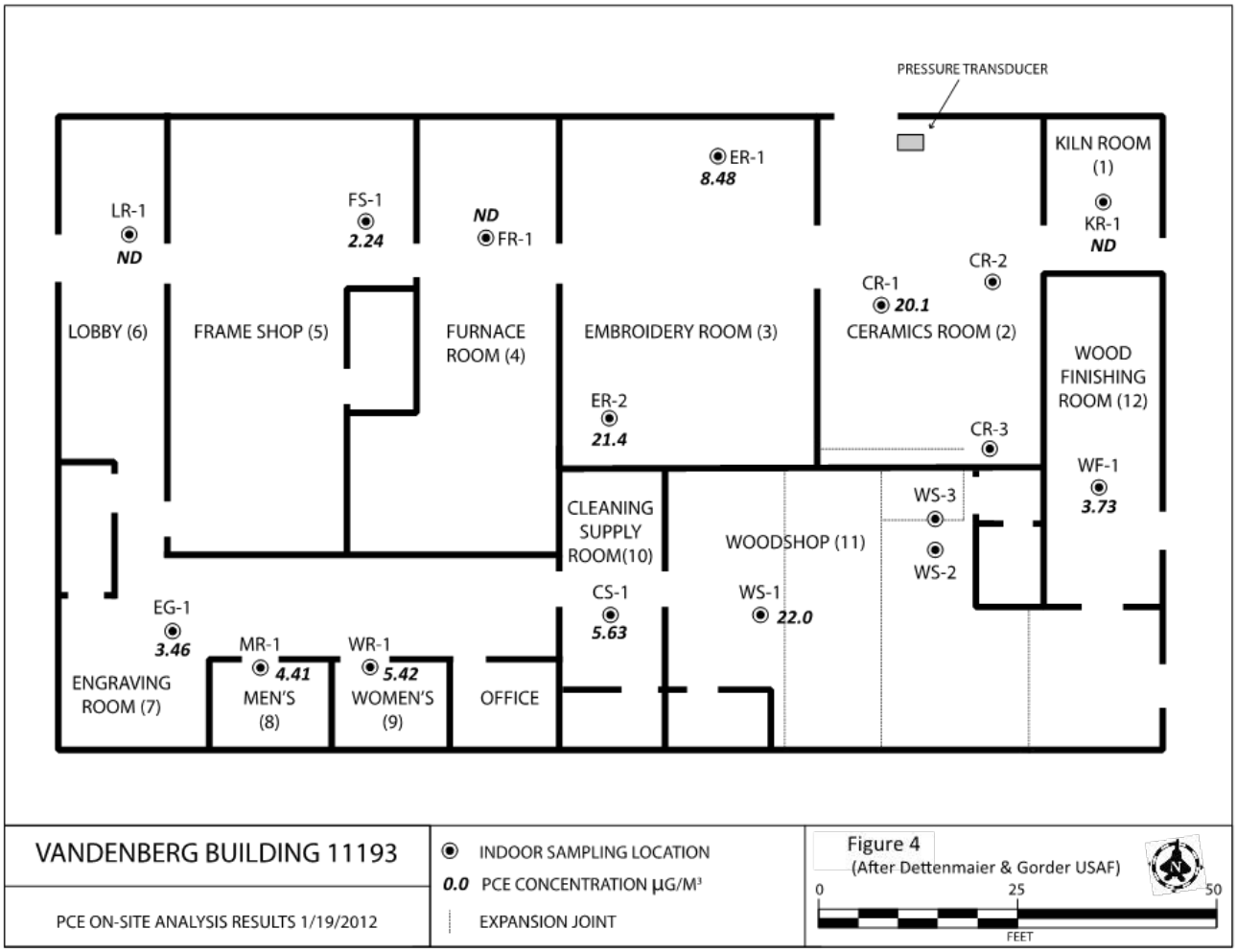



**Figure 8-4: Sampling locations for Hapsite Survey (USAF, 2012)**

***Subslab Monitoring, June 2012***

In June 2012, Geosyntec installed and sampled eleven temporary subslab vapor points as part of a comparative study of conventional, multi-interval and high volume sampling (HVS) characterization techniques for the Air Force under BAA contract #FA8903-10-C-8116 (Figure 8-5). Subslab samples were analysed using a HAPSITE and Summa canisters with TO-15 analysis (Table 8-2). The HAPSITE was operated by Dan Schenk of KD Analytical using the HAPSITE GC/MS from Inficon and an operating procedure provided by Eric Dettenmaier of the Air Force. The maximum concentrations of PCE and TCE in the subslab soil vapor samples were 1.2 million $\mu g/m^3$ and 41,000 $\mu g/m^3$, respectively. The PCE and TCE subslab concentrations varied more than two orders of magnitude with the highest concentrations measured in samples from C-1 and D-1, beneath the northeastern quadrant of the building (Figure 8-5).

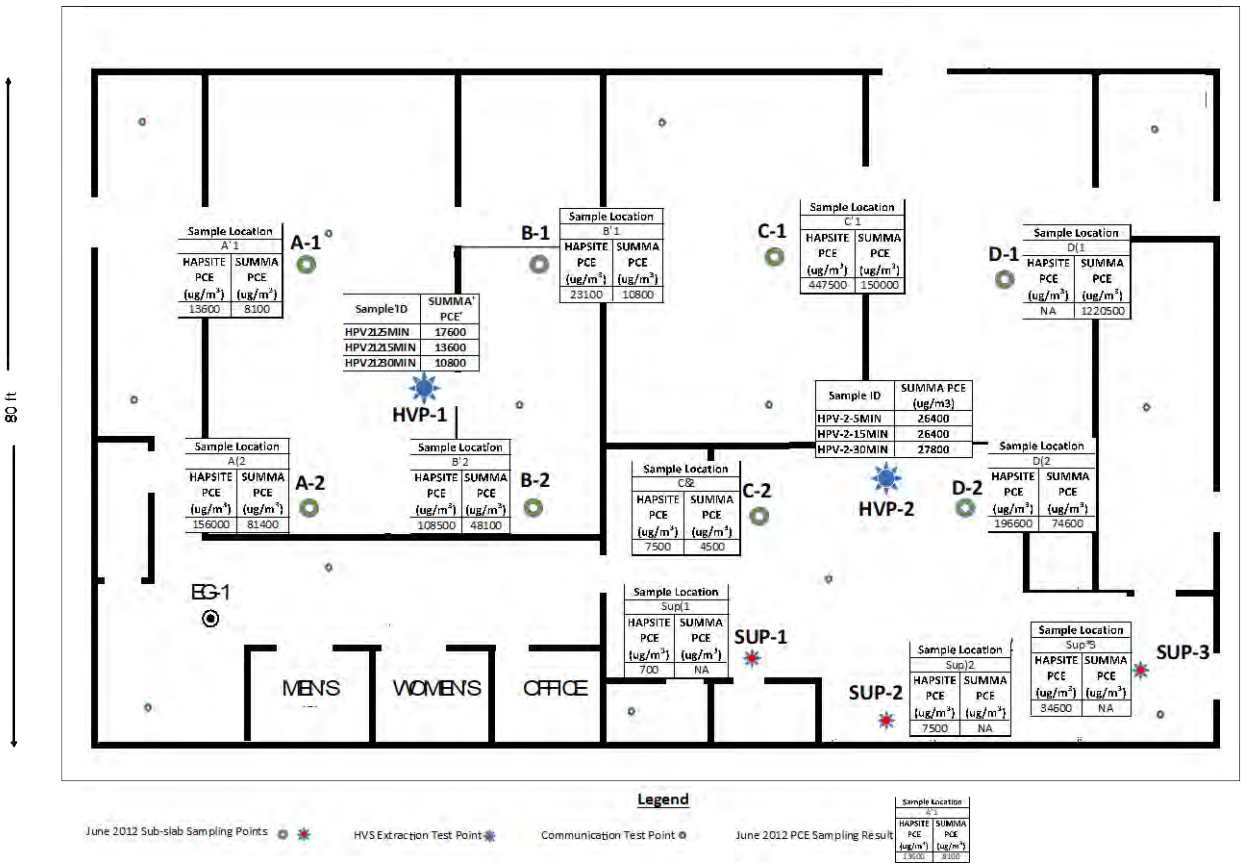



**Figure 8-5: PCE measured in subslab soil vapor, June 2012**

**Table 8-2: Subslab HAPSITE and Summa TO-15 Sampling Results June 2012**

| Vandenberg Air Force Base AFCEE Building 11193<br>Sub-slab Sampling Results Summary | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sample Location** | **Sample Date** | **HAPSITE PCE ($ug/m^3$)** | **HAPSITE TCE ($ug/m^3$)** | **HAPSITE cis-DCE ($\mu g/m^3$)** | **SUMMA PCE ($ug/m^3$)** | **SUMMA TCE ($ug/m^3$)** | **SUMMA cis-DCE ($\mu g/m^3$)** |
| A-1 | 6/4/12 | 1.36E+04 | 5.00E+02 | ND @79 | 8.10E+03 | 3.00E+02 | ND @19 |
| A-2 | 6/4/12 | 1.56E+05 | ND @ 537 | ND @ 396 | 8.14E+04 | ND(260) | ND @194 |
| B-1 | 6/4/12 | 2.31E+04 | 1.30E+03 | 87 | 1.08E+04 | 8.00E+02 | ND @27 |
| B-2 | 6/4/12 | 1.09E+05 | 8.00E+02 | ND @ 396 | 4.81E+04 | 5.00E+02 | ND @127 |
| C-1 | 6/4/12 | 4.48E+05 | 1.56E+04 | 30923 | 1.50E+05 | 4.14E+04 | 1.15E+04 |
| C-2 | 6/4/12 | 7.50E+03 | 1.50E+03 | 33 | 4.50E+03 | 1.20E+03 | ND @13 |
| D-1 | 6/4/12 | NA | NA | NA | 1.22E+06 | 9.10E+03 | 3.49E+04 |
| D-2 | 6/4/12 | 1.97E+05 | 7.00E+03 | 515 | 7.46E+04 | 4.10E+03 | 1.91E+03 |
| Sup-1 | 6/4/12 | 7.00E+02 | ND @ 107 | ND @79 | NA | NA | NA |
| Sup-2 | 6/4/12 | 7.50E+03 | ND @ 107 | ND @79 | NA | NA | NA |
| Sup-3 | 6/4/12 | 3.46E+04 | 1.00E+03 | ND @79 | NA | NA | NA |

### *High Volume Subslab Sampling, June 2012*

High Volume Sampling (HVS, after McAlary et al., 2010) tests were performed for durations of 30 minutes each at two locations shown on Figure 8-5 (HVP-1 and HVP-2). These tests involved extracting large volumes of subslab soil vapor (75,000 L from HPV-1 and 180,000 L from HPV-2) from temporary 2-inch diameter extraction points and measuring the VOC vapor concentrations (Table 8-3) at the beginning, middle and end of each test to infer the subsurface concentration at progressively larger distances from the extraction point. The Hantush-Jacob (1955) Leaky Aquifer Model analysis of the transient and steady-state vacuum data indicated much higher floor permeability near HVP-2, apparently attributable to a floor drain in the woodshop (Figure 8-6). Nevertheless, PCE concentrations increased slightly over 30 minutes of gas extraction at HPV-2, indicating the higher rate of indoor air leakage was more than compensated by migration of higher vapor concentrations from the northeast quadrant of the building.

**Table 8-3: Concentrations of PCE and TCE measured during June 2012 HVS testing**

| Vandenberg Air Force Base AFCEE Building 11193<br>HVS Summa Sampling Results Summary | | | | | | | |
|---|---|---|---|---|---|---|---|
| HPV-1 | | | | HPV-2 | | | |
| Sample ID | PCE ($\mu g/m^3$) | TCE ($\mu g/m^3$) | cis-DCE ($\mu g/m^3$) | Sample ID | PCE ($\mu g/m^3$) | TCE ($\mu g/m^3$) | cis-DCE ($\mu g/m^3$) |
| HPV-1-5MIN | 17600 | 200 | ND @75 | HPV-2-5MIN | 26400 | 1900 | 400 |
| HPV-1-15MIN | 13600 | 200 | 43 | HPV-2-15MIN | 26400 | 1600 | 400 |
| HPV-1-30MIN | 10800 | 200 | 59 | HPV-2-30MIN | 27800 | 1600 | 600 |

note: sample ID includes time after beginning of test when sample was collected



**Figure 8-6: Floor drain in the former woodshop area (6-inch diam. concrete core for scale)**

The mass removal rates achieved during the HVS tests were estimated from the product of the effluent concentrations and flow rates measured during the tests (Table 8-4). PCE mass removal rates ranged from 37 to 60 g/day at HPV-1 and 90 to 94 g/day at HVS-2. TCE mass removal rates were ~0.5 g/day at HVS-1 and ~6 g/day at HPV-2.

**Table 8-4: Building 11193 Mass Loading from 2012 HVS tests**

Building 11193 PCE and TCE Mass Loadings From HVS Tests

| Date | Location/Time | Stack PCE (pppv) | Stack PCE ($ug/m^3$) | Stack TCE (pppv) | Stack TCE ($ug/m^3$) | Flow Velocity (ft/min) | Stack Area ($ft^2$) | Flow Rate (cfm) | PCE Mass Rate (ug/min) | PCE Loading (g/day) | TCE Mass Rate (ug/min) | TCE Loading (g/day) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jun-12 | HPV-1-5MIN | 2.60E+03 | 1.76E+04 | 34 | 183 | 3822 | 0.022 | 83 | 4.2E+04 | 60 | 4.3E+02 | 0.6 |
| | HPV-1-15MIN | 2.00E+03 | 1.36E+04 | 31 | 167 | 3822 | 0.022 | 83 | 3.2E+04 | 46 | 3.9E+02 | 0.6 |
| | HPV-1-30MIN | 1.60E+03 | 1.08E+04 | 29 | 156 | 3822 | 0.022 | 83 | 2.6E+04 | 37 | 3.7E+02 | 0.5 |
| | HPV-2-5MIN | 3.90E+03 | 2.64E+04 | 350 | 1881 | 3822 | 0.022 | 83 | 6.2E+04 | 90 | 4.4E+03 | 6.4 |
| | HPV-2-15MIN | 3.90E+03 | 2.64E+04 | 300 | 1612 | 3822 | 0.022 | 83 | 6.2E+04 | 90 | 3.8E+03 | 5.5 |
| | HPV-2-30MIN | 4.10E+03 | 2.78E+04 | 300 | 1612 | 3822 | 0.022 | 83 | 6.6E+04 | 94 | 3.8E+03 | 5.5 |

conversions:

1 ug = 2.2E-09 lb
1440 min = 1 day
1 cf = 0.0283 m3
pipe diameter = 0.002 sq in
1 sq in = 0.00694444 sq ft

Building Characteristics

| Length (ft) | Width (ft) | Height (ft) | Build Vol ($ft^3$) | Assumed AER | Q building ($ft^3$/day) | Q building ($m^3$/day) |
|---|---|---|---|---|---|---|
| 140 | 80 | 10 | 1.12E+05 | 0.3 | 8.06E+05 | 2.28E+04 |
| 140 | 80 | 10 | 1.12E+05 | 4.1 | 1.10E+07 | 3.12E+05 |

## 8.2 BUILDING-SPECIFIC TESTING

### 8.2.1 Instrumentation

Building 11193 is vacant and slated for demolition, which provided an opportunity for extensive instrumentation. One suction point was installed as near as practical to the middle of the building with a 6-inch diameter cored hole through the floor and removal of one 5-gallon pail of fill from beneath the slab (i.e., a conventional suction pit). Twenty-six (26) subslab probes (SSPs) were installed to monitor subslab vapor concentrations and pressure, at locations intended to include near-field (r=3 ft from suction point), the far corners of the building, the middle of each of the far walls, and two or three locations in between the near and far locations along each of the compass directions and diagonals to provide good spatial coverage, and enable assessment of anisotropy. Nested probes (subslab, 5 and 10 ft deep soil gas probes and a shallow groundwater monitoring well) were installed central to each of the four quadrants of the building (SVP-1 to 4) by ESTCP Project 201503 and a nest of subslab, 5 ft and 10 ft probes without a well was installed a few feet beside the suction point (SSV-MP). Subslab probes were installed with Vapor Pins and deeper probes were ¼-inch Nylaflow tubing with 6-inch stainless steel screens. Both had Swagelok™ valves. A temporary SSD system was constructed using an Obar GBR 76UD fan, as shown in Figure 8-8.

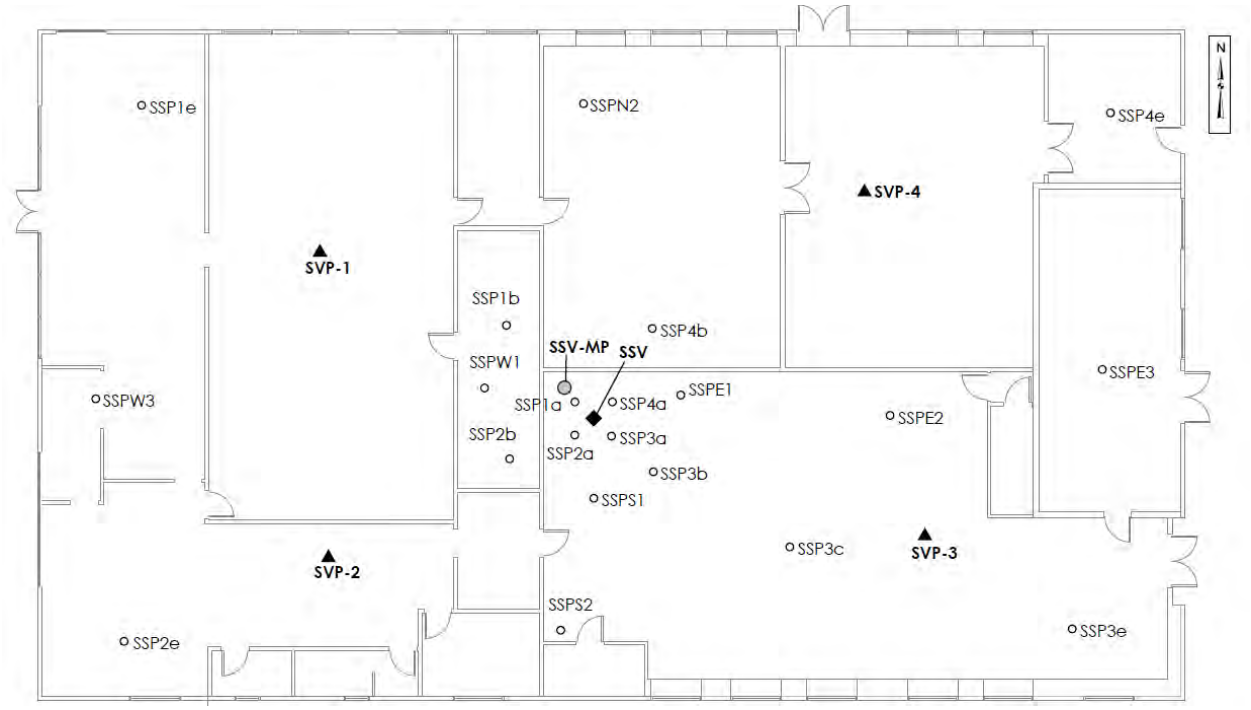



**Figure 8-7: Building 11193 Layout and instrumentation (reprinted with permission from McAlary et al., 2018, copyright American Chemical Society)**



**Figure 8-8: Temporary subslab venting system at Building 11193**

### 8.2.2 Differential Pressure Monitoring

The ambient cross-slab pressure differential was measured over a period of one month with a TEC DG-700 digital micromanometer in two locations (SSP-3E and SSP-W1).

### 8.2.3 Pneumatic Testing and Mathematical Modeling

Static vacuum was measured at all subslab probes with the OBAR fan running at full speed (~44 scfm) and half speed (~25 scfm). At 25 scfm, the static vacuum measurements were repeated after visible expansion joints in the workshop area (bare concrete floor) were sealed using duct-tape. Static vacuum was also measured in the 5 and 10 ft deep probes in the five nested locations.

Transient vacuum response to turning the fan on and off was measured using a TEC DG-700 data-logger to document the response at dozens of probes. Mathematical analysis with AQTESOLV was performed at probes selected after review of the static vacuum data to represent high (SSP-3B), low (SSP-W1) and mid-range (SSP-E1) values of the leakance parameter.

### 8.2.4 Subslab Tracer Testing

Inter-well tracer testing was performed at a flow rate of 44 scfm at 9 injection points: SSPs S1, S2 E1, E2, 1B, 2B, 3B, 3C and SVP4-SS. These include different distances to facilitate matching the profile of travel time versus distance calculated with Equations 5 and 6, as well as different directions to enable an assessment of anisotropy. An inter-well tracer test was attempted from the 5 ft deep soil gas probe located a radial distance of 5 feet from the suction point, but helium was never detected at the effluent of the SSV system, which indicates the active flow zone is shallow.

A helium flood test was performed at a flow rate of 8 scfm with monitoring at locations SSP-1B, 3B and 4B, which are at comparable radial distances, but different directions to assess anisotropy. The flow rate was reduced to allow the breakthrough curves to develop slowly enough to be well-characterized at each location.

### 8.2.5 Mass Flux Monitoring

The temporary SSV system was operated at a variety of flow rates and samples were collected to characterize the mass removal rate as a function of the system flow rate. A stress test was also conducted, where a blower door was used to impose a negative pressure inside the building to simulate conditions that might occur if a large exhaust fan was turned on. During the stress test, samples of indoor air at the face of the exhaust fan were also collected to characterize the mass removal rate of VOCs from the building. Tedlar bag samples were also collected from the temporary SSV system effluent at a variety of flow rates to assess the radon mass loading to the building.

### 8.2.6 Long-Term Operation

The temporary SSV system was operated for a period of about one month to assess changes in the vapor concentrations and mass removal rate over time. PID readings were recorded at the effluent and at selected subslab probes at the end of one month of operation. Two indoor air samples were also collected by Summa canister and analysed by U.S. EPA Method TO-15 SIM.

## 8.3 RESULTS AND DISCUSSION

### Differential Pressure Monitoring

Figure 8-9 shows the ambient cross-slab differential pressure data and wind speed. The differential pressure was negligible at SSP-W1 (near the middle of the building) and slightly larger at SSP-3E (near the southeast corner), which showed a slightly negative building pressures (<0.3 Pa on average) and fluctuations generally less than 1 Pa. The wind speed generally increased each afternoon and diminished at night, which was reflected in a response less than about 0.5 Pa at SSP-3E.

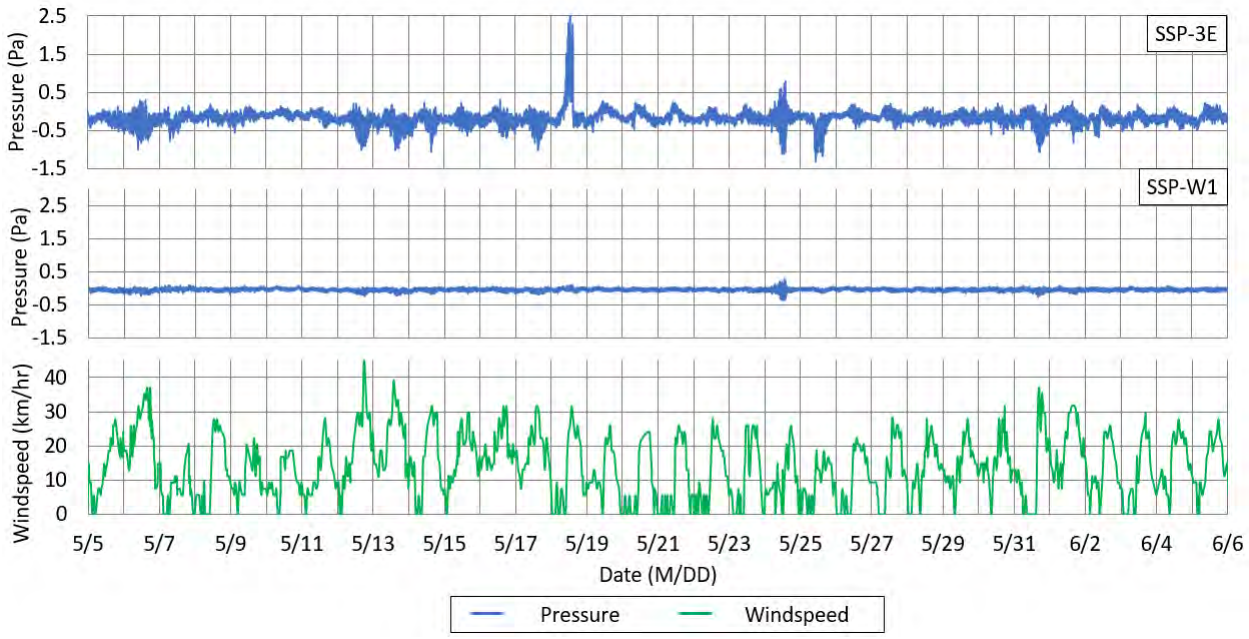



**Figure 8-9: Baseline Cross-Slab Pressure Data from SSP-3E and SSP-W1 with windspeed**

### 8.3.1 Spatial Distribution of VOC Concentrations

Subslab PID readings demonstrated that the highest vapor concentrations are located in the northeast quadrant. A contour map of the PID readings in subslab probes is shown in Figure 8-10 and a table of PID readings in the nested probes is provided in Table 8-5, including readings before (6/9/2-17) and after (6/2-/2017) one week of SSV testing. Results of Summa canister sampling and TO-15 analysis at the end of the week of SSV testing are provided in Table 8-6.

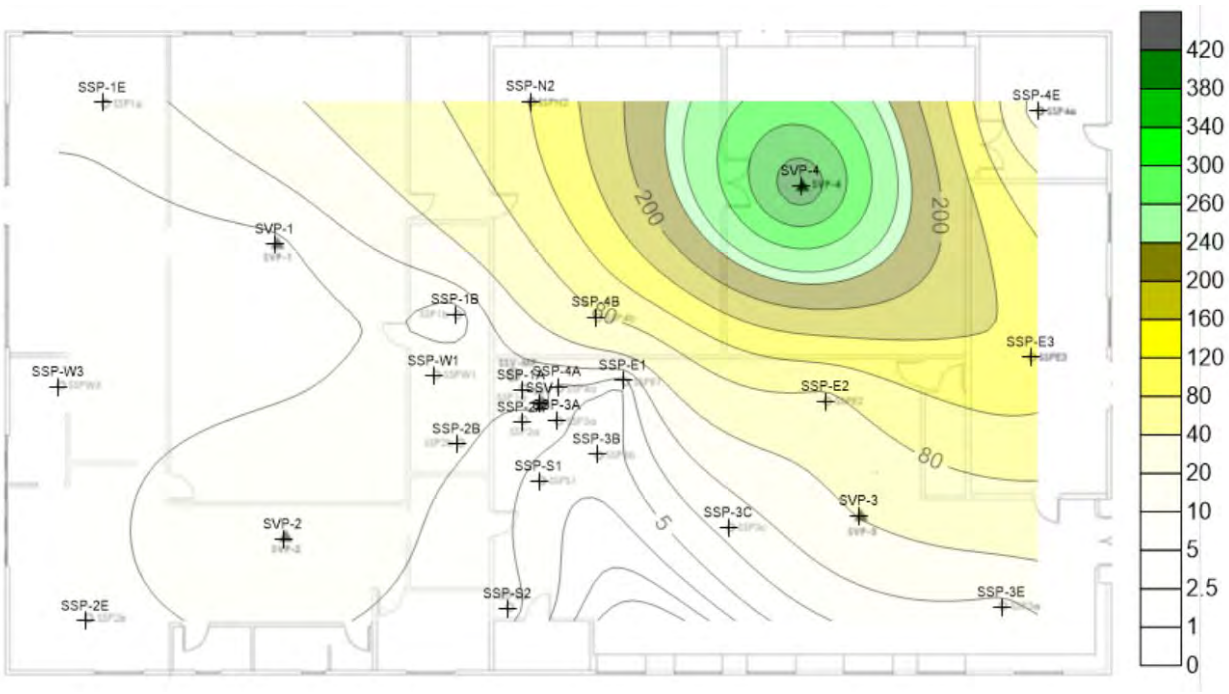



**Figure 8-10: Contour map of subslab PID readings (ppmv)**

**Table 8-5: PID readings in nested probes before and after 1 week of SSV testing**

| Location | Depth (ft) | Date | PID Reading (ppm) |
|---|---|---|---|
| SVP-1 | 5 | 6/9/2017 | 58.8 |
| | 5 | 6/20/2017 | 10.1 |
| | 10 | 6/9/2017 | 53.4 |
| | 10 | 6/20/2017 | 34.9 |
| SVP-2 | 5 | 6/9/2017 | 36.5 |
| | 5 | 6/20/2017 | 33.3 |
| | 10 | 6/9/2017 | 39.4 |
| | 10 | 6/20/2017 | 30.1 |
| SVP-3 | 5 | 6/9/2017 | 168.1 |
| | 5 | 6/20/2017 | 137.9 |
| | 10 | 6/9/2017 | 174 |
| | 10 | 6/20/2017 | 137.7 |
| SVP-4 | 5 | 6/10/2017 | 1360 |
| | 5 | 6/20/2017 | 83 |
| | 10 | 6/10/2017 | 1220 |
| | 10 | 6/20/2017 | 1831 |

| | | | |
|---|---|---|---|
| SSV-MP | 5 | 6/15/2017 | 103.1 |
| | 10 | 6/15/2017 | 160.5 |

**Table 8-6: TO-15 data for subslab probes after 1 week of SSV testing**

| Location | Date | PCE Concentration (µg/m$^3$) | TCE Concentration (µg/m3) |
|---|---|---|---|
| SVP1-SS | 6/22/2017 | 4,200 | 82 |
| SVP2-SS | 6/22/2017 | 12,000 | ND |
| SVP3-SS | 6/22/2017 | 190,000 | 3,600 |
| | 7/13/2017 | 50,000 | 790 |
| SVP4-SS | 6/22/2017 | 340,000 | 2,200 |

### 8.3.2 Steady Vacuum versus Radial Distance

Initial measurements of static vacuum indicated significant air leakage across the expansion joints in the workshop area, which had an aperture of up to about 2 cm. These were sealed with duct tape as shown in Figure 8-11.



**Figure 8-11: Expansion joint (left, scissors for scale) and application of duct-tape (right)**

The steady vacuum levels after floor sealing at flow rates of 25 and 44 scfm are provided in Table 8-7.

**Table 8-7: Static vacuum at probes with SSV system running at 25 scfm and 44 scfm**

| ID | r (ft) | 25 scfm Vacuum (Pa) | 44 scfm Vacuum (Pa) |
|---|---|---|---|
| SSP-1A | 3.0 | 508 | 747.5 |
| SSP-2A | 3.0 | 508 | 1495 |
| SSP-3A | 3.0 | 474 | 1625 |
| SSP-4A | 3.0 | 643 | 1137.5 |
| SSV-MP-5ft | 5.0 | 10.3 | 30.2 |
| SSV-MP-10ft | 5.0 | 11.1 | 21.8 |
| SSP-1B | 15.3 | 23 | 67.7 |
| SSP-4B | 12.9 | 53.4 | 147.8 |
| SSP-E1 | 10.9 | 144 | 397 |
| SSP-3B | 10.0 | 207 | 574 |
| SSP-S1 | 10.0 | 159 | 447 |
| SSP-2B | 11.2 | 41.7 | 113.7 |
| SSP-W1 | 13.6 | 18.1 | 51.8 |
| SSP-N2 | 37.7 | 12.7 | 33.9 |
| SVP-4-SS | 43.1 | 12.3 | 33.6 |
| SVP-4-5ft | 43.1 | 4 | |
| SVP-4-10ft | 43.1 | 5.9 | |
| SSP-E2 | 35.5 | 1.4 | 4.3 |
| SSP-3C | 28.0 | 31 | 79.6 |
| SVP-3-SS | 43.3 | 2.3 | 6.3 |
| SVP-3-5ft | 43.3 | 5 | |
| SVP-3-10ft | 43.3 | 10 | |
| SSP-S2 | 25.7 | 35 | 92.6 |
| SVP-2-SS | 36.7 | 12 | 30 |
| SVP-2-5Ft | 36.7 | 13 | 11.3 |
| SVP-2-10Ft | 36.7 | 4.3 | 5.2 |
| SVP-1-SS | 39.1 | 5 | 14.5 |
| SVP-1-5ft | 39.1 | 9 | 2.9 |
| SVP-1-10ft | 39.1 | 6.5 | 1.2 |
| SSP-1E | 65.9 | 2.3 | 4.8 |
| SSP-4E | 71.9 | 4.5 | 10.3 |
| SSP-E3 | 61.2 | 0.2 | 2.1 |
| SSP-3E | 62.5 | 0.1 | 0.5 |
| SSP-2E | 62.5 | 4.9 | 7.9 |
| SSP-W3 | 59.7 | 1.6 | 6.4 |

Figure 8-12 shows the effect of sealing the floor: red boxes encompass measurements made before and after sealing the joints. Note the flow rate was throttled back to 25 scfm, roughly half of the system maximum, and the vacuum was greater than the ambient cross-slab differential in all but one probe.

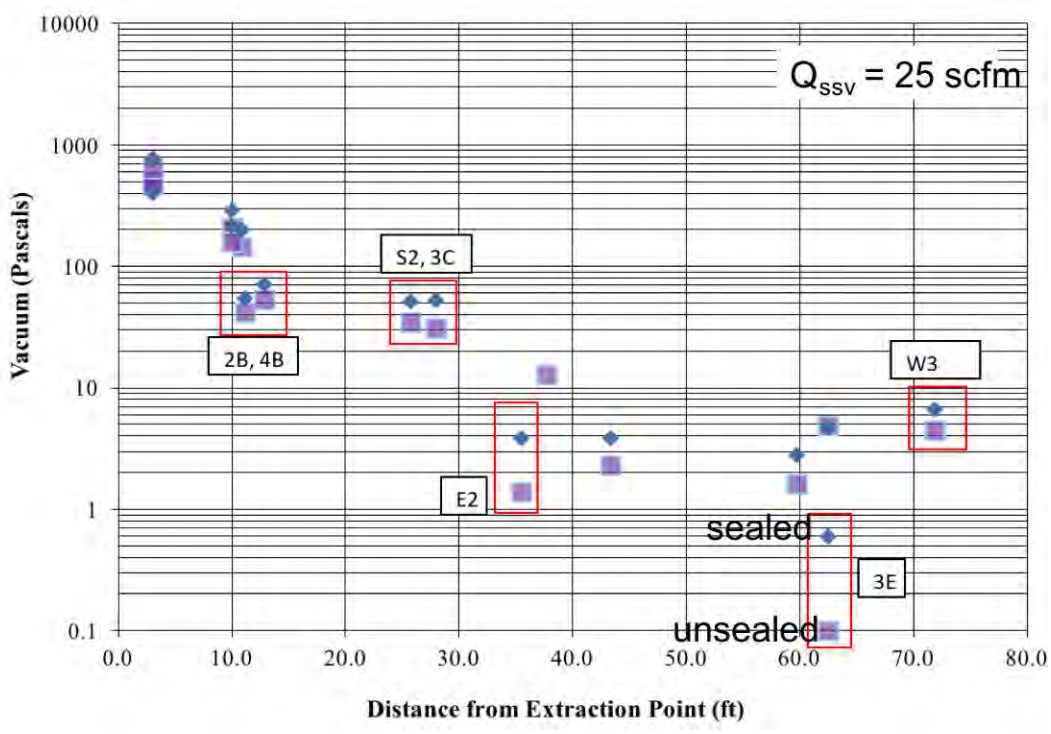



**Figure 8-12: Effect of floor sealing on vacuum measurements at 25 scfm**

Figure 8-13 shows the profile of steady vacuum versus radial distance from the suction point as well as three curves calculated using Equation 4 and a transmissivity value of 54 $ft^2$/day, with high (17.5 ft), low (5.5 ft) and mid-range (13.5 ft) values for the leakance parameter (B). From inspection of the data and model curves shown on Figure 8-13, it is evident that a single suction point running at about 44 scfm can induce a vacuum greater than the typical cross-slab differential to a radius in the range of about 40 to >80 feet. The whole building is <80 ft from the suction point.

Anisotropy was evaluated by color-coding the data along each of eight transects: along the compass directions (north, south, east and west), plus diagonals with numbers 1 (northwest), 2 (southwest), 3 (southeast), and 4 (northeast). The highest vacuum levels were along row 4, which is in the direction of the highest subslab concentrations. The model curve corresponding to the lowest vacuum levels (B=5.5 ft) matches points on three different transects at r<15 ft, but measurements at r>60 ft along all three transects show vacuum levels higher than the model curve for B = 13.5 ft. This indicates the data showing greatest leakage (lowest B value) is localized, and likely attributable to leakage of indoor air across the floor slab through an expansion joint under the wall to the west of the suction point, which could not be accesses for sealing.

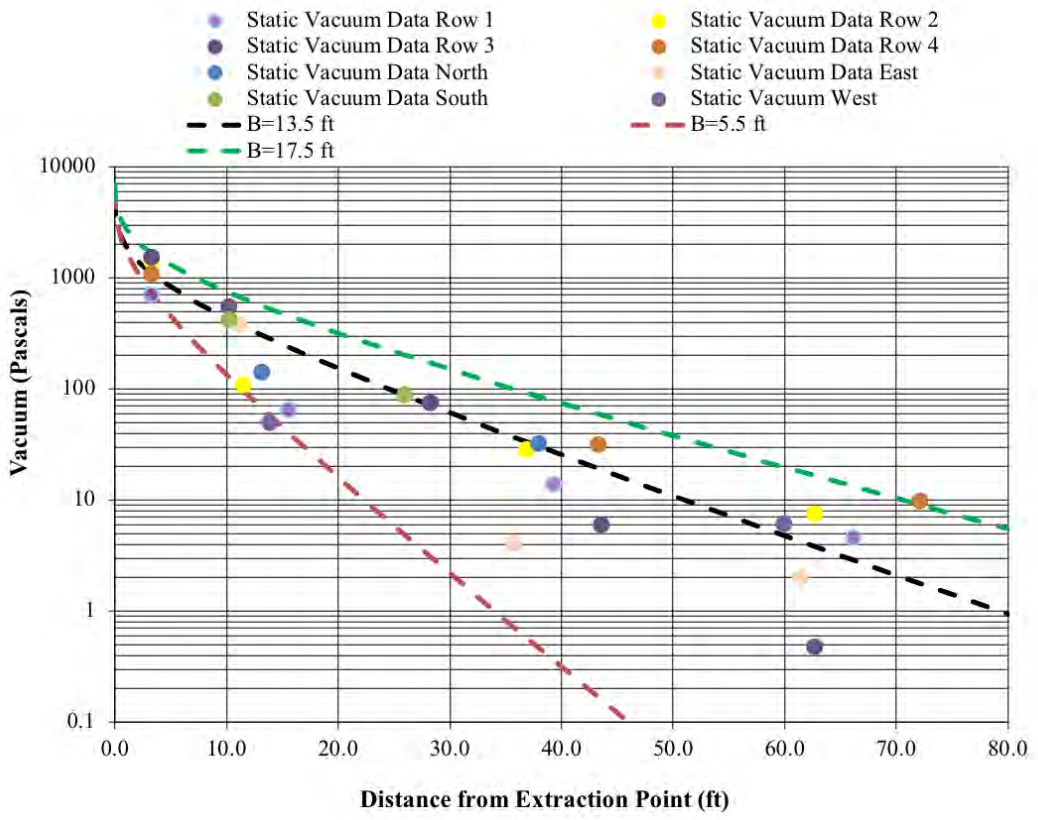



**Figure 8-13: Vacuum vs radial distance and direction from the suction point at Building 11193, measured at an extraction flow rate of 44 scfm, and showing Hantush-Jacob Model curves for T = 54 ft2/day and three different B values (5.5 ft, 13.5 ft and 17.5 ft) (adapted with permission from McAlary et al., 2018, copyright American Chemical Society)**

### 8.3.3 Transient Vacuum Response Testing

The transient vacuum response tests all showed trends consistent with expectations and relatively rapid response (roughly 20 seconds), the main difference was the magnitude of the response. To illustrate this point, Figures 8-14, 8-15 and 8-16 show the raw transient data collected at three probes, which are all at comparable radial distance from the suction point, but in different directions. The magnitude of the induced vacuum was over 150 feet of air head at SSP-3B, and as low as 16 feet of air head at SSP-W1. The floor slab is bare concrete between the suction point and SSP-3B, and was observed to be in excellent condition. There was an expansion joint between the suction point and SSP-W1, which could not be sealed with duct tape because it was located directly under an internal wall (which was evident because the expansion joint was visible at the doorway crossing the wall). The low magnitude of vacuum at SSP-W1 was attributable to leakage of air across the expansion joint.

AQTESOLV curves fit to these three data sets are shown on Figures 8-17, 8-18 and 8-19, respectively. These fits were achieved with a T of 54 $ft^2$/day and B values shown on Figure 8-13.

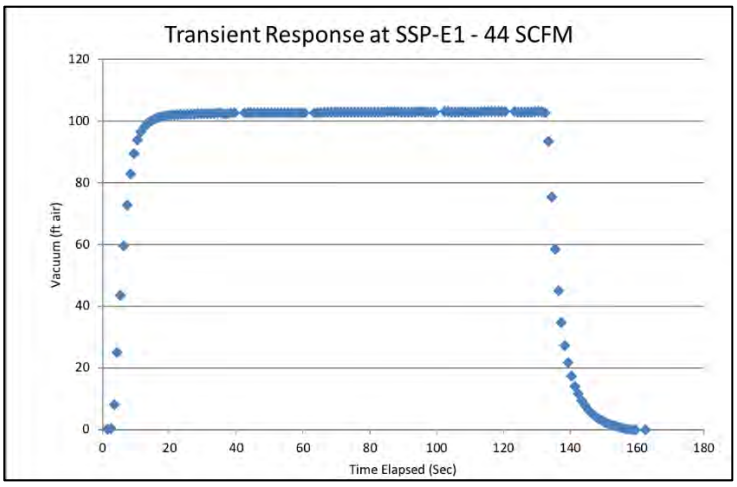



**Figure 8-14: Transient vacuum response at SSP-E1 (r=10.9 ft) to gas extraction at 44 scfm**

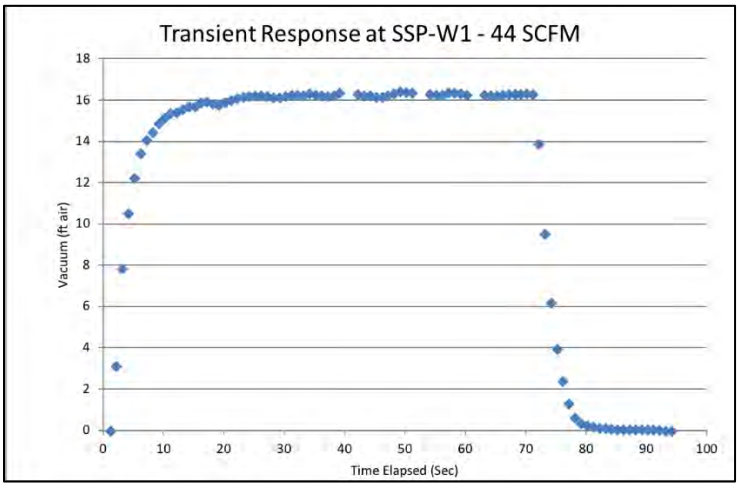



**Figure 8-15: Transient vacuum response at SSP-W1 (r=13.6 ft) to gas extraction at 44 scfm**

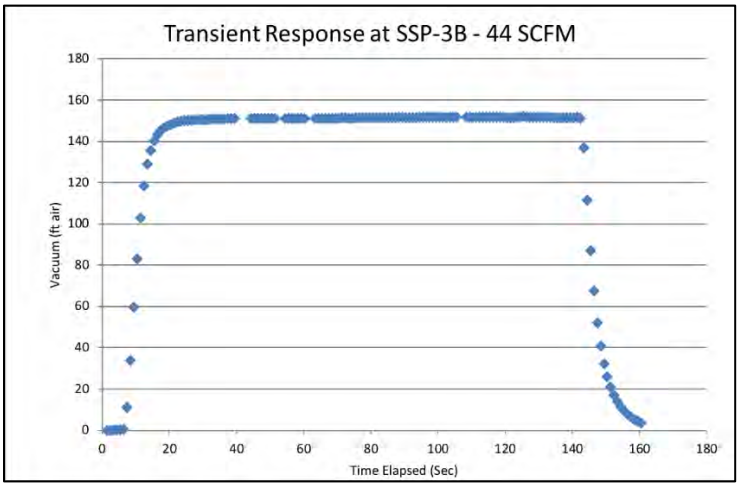



**Figure 8-16: Transient vacuum response at SSP-3B (r=10 ft) to gas extraction at 44 scfm**

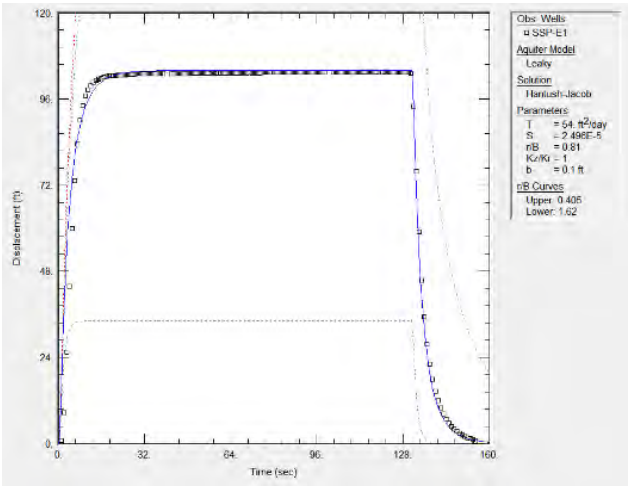



**Figure 8-17: Hantush Jacob Model fit to the transient vacuum response data at SSP-E1**

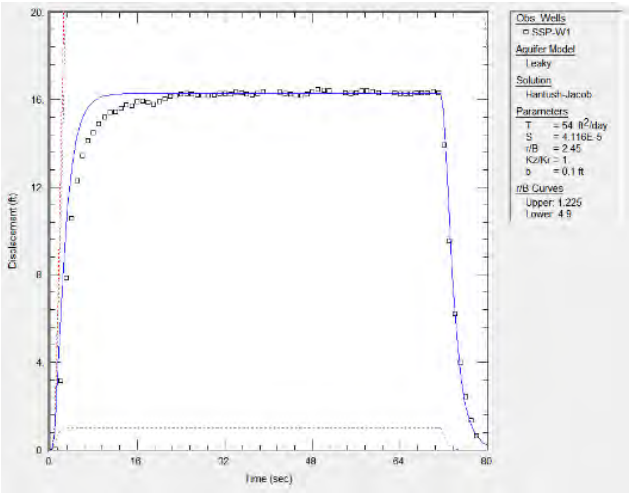



**Figure 8-18: Hantush Jacob Model fit to the transient vacuum response data at SSP-W1**

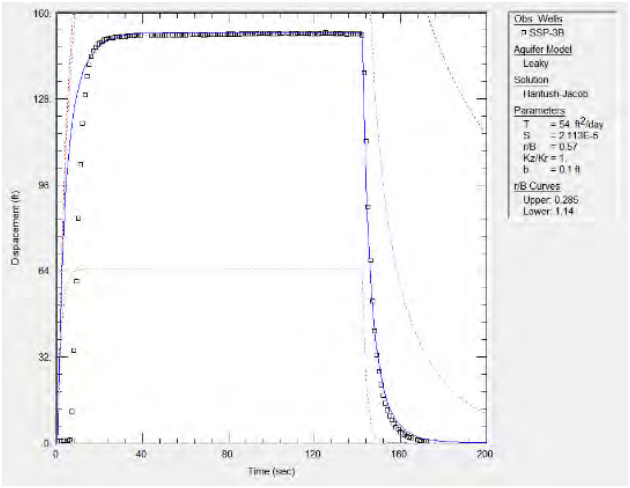



**Figure 8-19: Hantush Jacob Model fit to the transient vacuum response data at SSP-3B**

### 8.3.4 Subslab Tracer Test Results

The inter-well tests at 44 scfm are shown on Figure 8-20. The locations at a nominal 10 ft radius (SSPs S1, E1, 3B and 2B) showed average travel times of 17, 19, 19 and 29 seconds, respectively. Note that the direction (row 2) with the slowest travel time was also the direction with the lowest vacuum at that radius (Figure 8-13) and that location is on the far side of an expansion joint that could not be sealed because it is below an interior wall. The other three locations were within the workshop area where the floor is bare concrete and there were no expansion joints between the suction point and the monitored probes. The travel times were progressively longer for probes at greater radial distances (55 seconds at 15 ft, 115 seconds at 26 ft, 150 seconds at 28 ft and 820 seconds at 43 ft). Note that the shape of the breakthrough curve is sharp for the shorter tests and becomes broader for the longer tests, and as the peak becomes broader, it becomes more difficult to discern the moment when the helium concentration in the SSV effluent reaches a maximum value. This is attributable to the fact that helium has a high diffusion coefficient, and is dispersing as the test progresses. Longitudinal dispersion also occurs as a consequence of advective transport. Collectively, this imposes a limit to the range of distances or travel times that can be measured using the inter-well test method.

The helium flood test data at a flow rate of 8 scfm are shown on Figure 8-21. The arrival time was much faster for location SSP-3B (about 36 seconds) across intact concrete than at SSP-4B (about 115 seconds) or SSP-1B (about 152 seconds), which are both located on the opposite sides of different expansion joints that lie beneath walls and could not be sealed.

The travel time measured with the inter-well tracer tests at a flow rate of 44 scfm and calculated using Equation 5 and 6 with T = 54 $ft^2$/day and B = 13 ft is shown on Figure 8-22, assuming the thickness of the zone through which flow occurs is approximately 0.1 ft with a gas-filled porosity of about 20%. Note that one curve reasonably matches all the inter-well tracer test data and yields an estimated travel time of about 200 minutes from the far corners of the building.

The helium flood test was performed at a slower flow rate (8scfm) and the comparison between the model and the field measurements is shown in Figure 8-23. The model curve in Figure 8-23

was calculated using Equation 5 and the same inputs as used for Figure 8-22 (T= 54 $ft^2$/day, B = 13.5 ft, b = 0.1 ft and n = 20%). This curve also reasonably matches the helium flood tracer data. The fit between the model and the tracer data at two different flow rates is satisfactory, and this provides value because the calibrated model can be used to perform a sensitivity analysis on the flow rate, which can help with design decisions such as fan selection.

Figure 8-24 shows the velocity profile calculated using Equation 5 and the same inputs as used for Figure 8-22 (Q=44 scfm, T= 54 $ft^2$/day, B = 13.5 ft, b = 0.1 ft and n = 20%). Note that the velocity is very high, even at large radial distances, relative to the design criteria of 3 ft/day.

The calibrated model can also be used to calculate the proportion of gas flow originating in the sub-surface as a function of radial distance. For a B value of 13 feet, the contribution from the subsurface is 5% of the total flow to a distance of 55 feet from the extraction point, which approaches the far edges of the building, as shown on Figure 8-25.

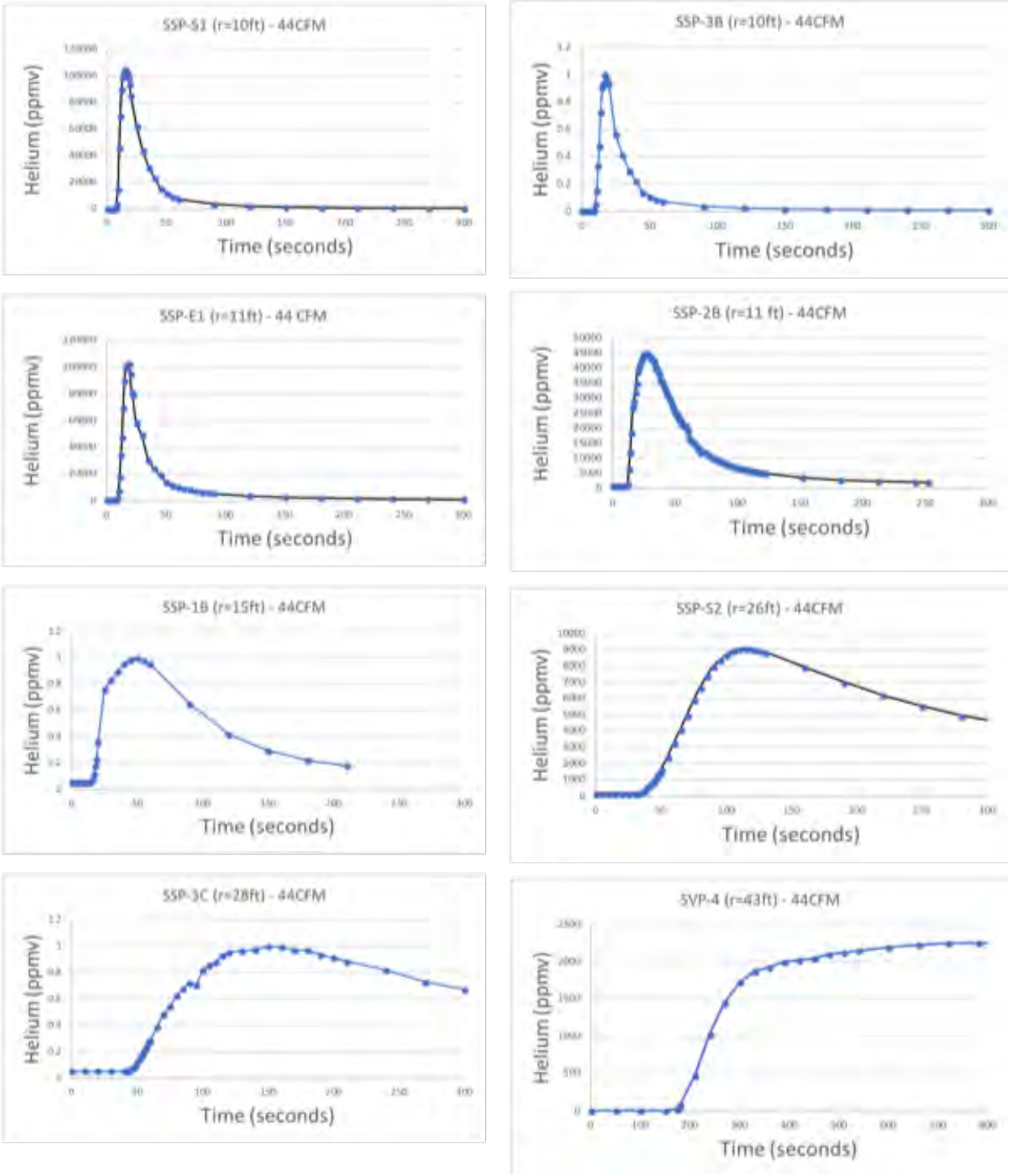



**Figure 8-20: Results of helium inter-well tracer testing**

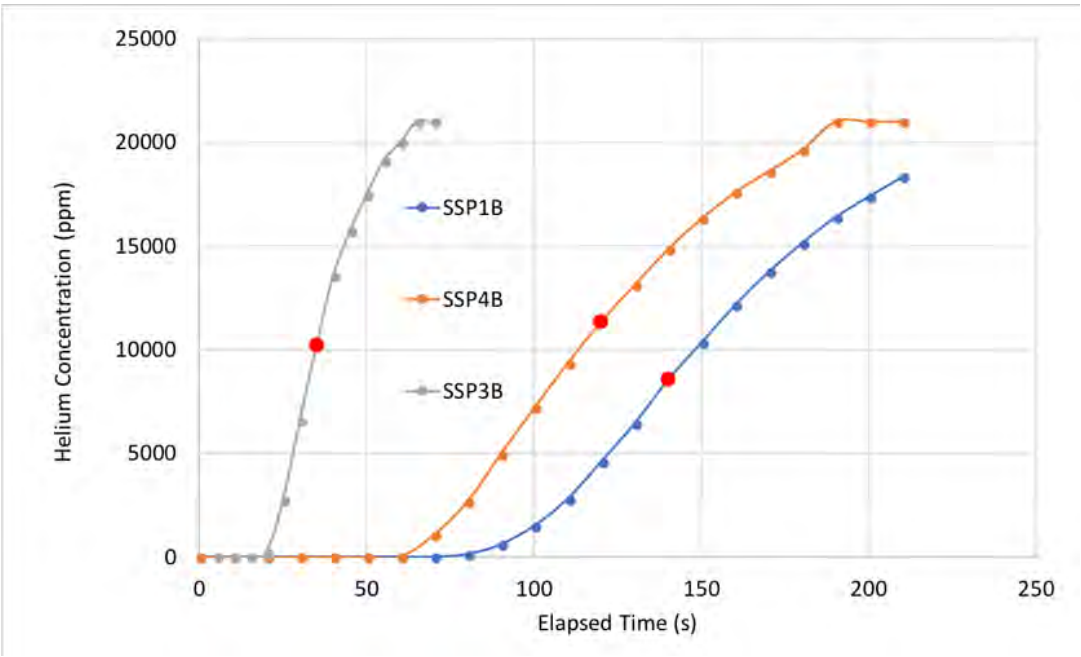



**Figure 8-21: Helium Flood data at 8 scfm for SSP1B (r=15.3 ft), SSP4B (r =12.9 ft) and SSP3B (r=10 ft)**

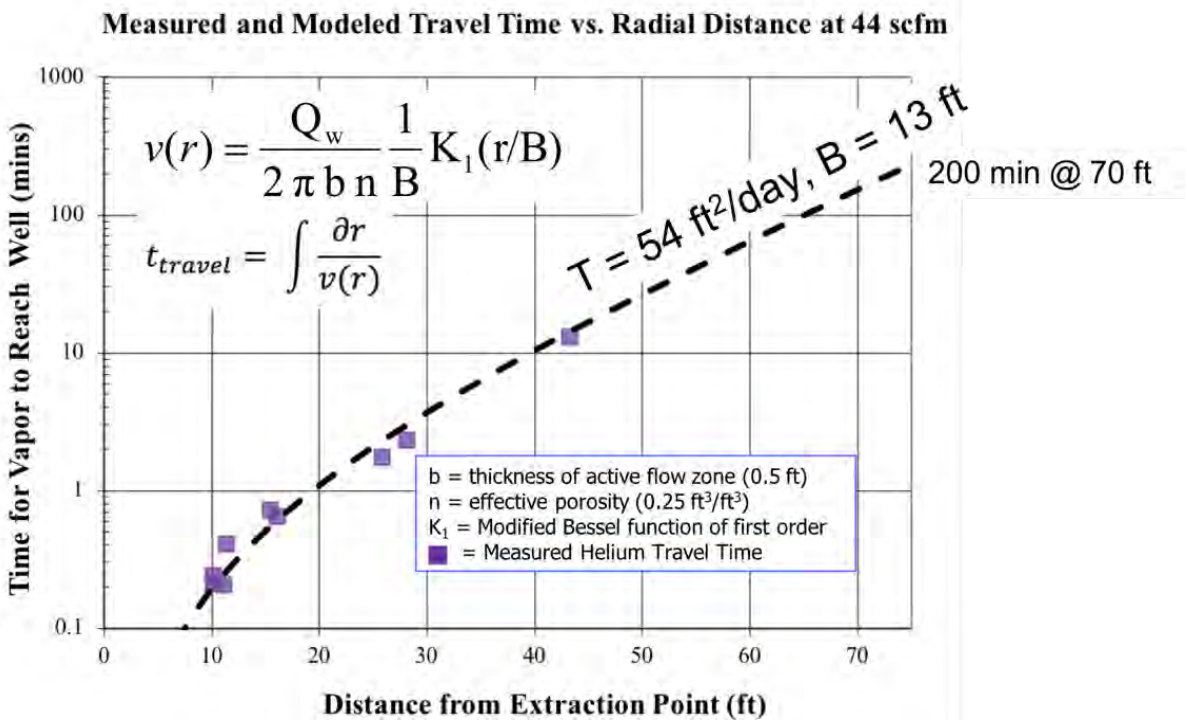



**Figure 8-22: Travel time vs distance at 44 scfm with inter-well tracer test data**

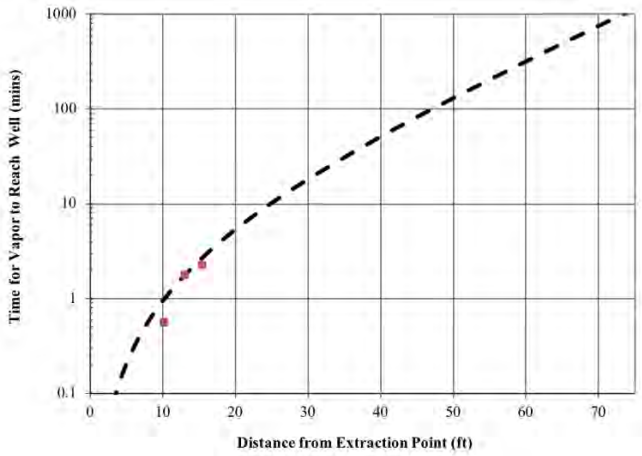



**Figure 8-23: Travel time vs distance at 8 scfm with flood tracer test data**

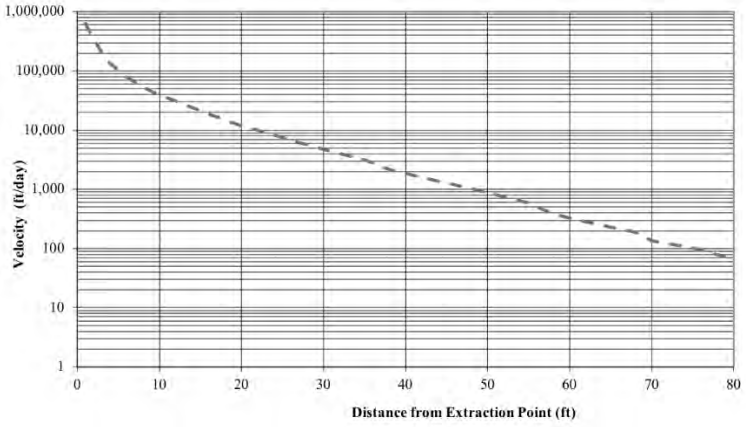



**Figure 8-24: Velocity vs radial distance for a flow rate of 44 scfm**

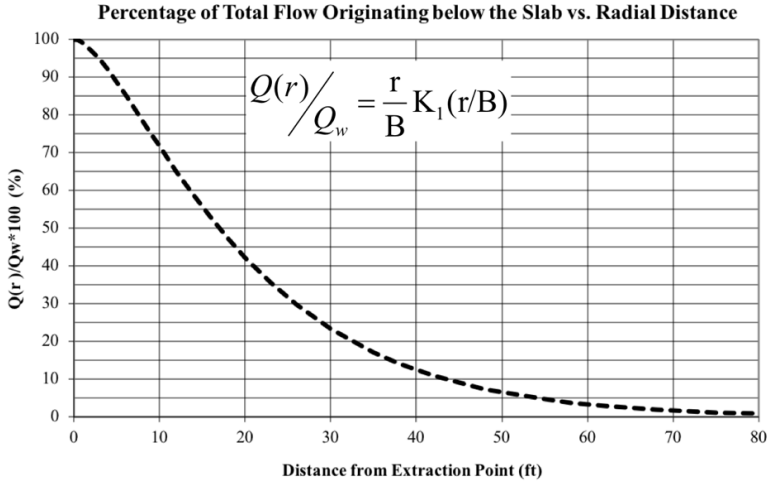



**Figure 8-25: Proportion of flow originating from below the floor slab vs radial distance from the point of suction**

Equation 7 can also be used to calculated the downward flow across the slab at various radial distances, and these can be used to calculate the flow per unit area for concentric rings around the suction point. Figure 8-26 shows the chart for the same parameters as Figure 8-26, and the default recommended by EPA (5 L/min for a 1000 $ft^2$ building) would be equalled or exceeded to a radius of 70 ft.

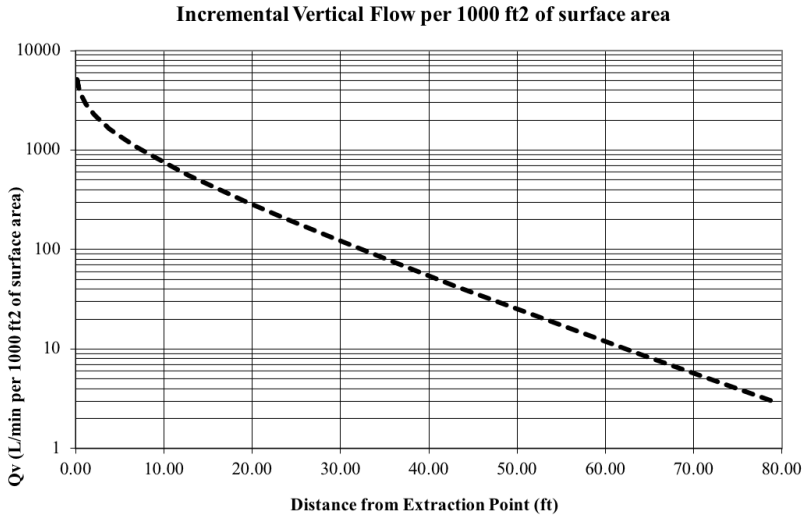



**Figure 8-26: Vertical flow 1000 $ft^2$ of floor area for Q = 44 scfm**

### 8.3.5 Mass Flux Analysis

The mass removal rate from the subsurface from the temporary SSV system and the mass removal rate from the blower door during the stress test components are presented in Table 8-8. For reference, Building Pressure Cycling (BPC) tests conducted as part of ESTCP Project ER-2015-03 showed mass loadings to the building under negative pressure similar to the SSV system performance at 25 scfm. The BPC tests conducted as part of ESTCP Project ER-2015-03 included testing under positive building pressure and showed mass loadings similar to the building mass loadings during the stress test (Table 8-8), which appears to be attributable to causes other than subslab advection into the building, which may include diffusion across the concrete floor, desorption from sorptive building surfaces, or possibly sources inside the building. The mass loading through the building under negative pressure during the stress test were all similar to the BPC loadings under positive building pressure, which would appear to be both caused by the same mechanism, which is not subsurface vapor advection to indoor air.

**Table 8-8: Mass loading calculations for various combinations of flow from door fan and SSV system**

| SSV Flow Rate (scfm) | Blower Door Flow (scfm) | Building Pressure (Pa) | Duration (hr) | PCE | | TCE | |
|---|---|---|---|---|---|---|---|
| | | | | SSV Mass Loading (g/day) | Building Mass Loading (g/day) | SSV Mass Loading (g/day) | Building Mass Loading (g/day) |
| 50 | | neutral | 1 | 45 | | 1 | |
| | | neutral | 5 | 50 | | 0.79 | |
| 25 | | neutral | 1 | 24 | | 0.38 | |
| | | neutral | 16 | 22 | | 0.3 | |
| 25 | 5100 | -10 | 1 | 27 | 2 | 0.3 | 0.15 |
| 60 | 5100 | -10 | 1 | 67 | 1.9 | 0.74 | 0.18 |
| | | -10 | 17 | 50 | 1.3 | 0.52 | 0.1 |
| 65 | 5100 | -10 | 3 | 55 | 4.2 | 0.55 | 0.14 |
| 65 | 3800 | -5 | 1.5 | 52 | 5.7 | 0.55 | 0.13 |
| 60 | 3800 | -5 | 4.5 | 37 | 3.6 | 0.42 | 0.085 |
| 60 | | neutral | 22 days | 10 | | 0.26 | |

The PCE mass removal rates were 40 to 100 times higher than the TCE mass removal rates, so the discussion will focus on PCE. The initial rate of mass removal with the SSV flow at 50 scfm was 45 g/day for PCE, and slightly higher (50) after 5 hours, indicating vapor migration from the northeast quadrant where concentrations were highest. Reducing the flow rate by half reduced the mass removal rate by half, and still maintained a level of mass removal comparable to the mass loading to the building during building depressurization and this was sustained overnight.

The first step in the stress test (-10Pa applied to the building) actually increased the rate of PCE mass removal from the sub-surface from 22 to 27 g/day, apparently because of less dilution from downward flow across the floor. The rate of PCE mass removal from the building (2 g/day) was much smaller than the rate of mass removal from the subsurface, indicating that SSV extraction at 25 scfm was capturing more than 90% of the available flux to the building. The SSV flow was progressively increased to 60 scfm, which yielded a slight decrease in the loading to the building (1.3 g/day). However, at an even higher SSV flow of 65 scfm, the mass loading to the building actually increased to 4.2 g/day, which is inconsistent with expectations from the conceptualization of advective vapor intrusion. Furthermore, decreasing the building depressurization to -5Pa further increased the PCE mass loading to the building to 5.7 g/day, also inconsistent with expectations.

A possible explanation for the mass loading of VOCs to the inside of the building during the stress-test is vertical diffusion through the floor slab. Using an effective diffusion coefficient ($D_{eff}$) of $2x10^{-4}$ $cm^2/s$, a weighted average upward diffusive flux of 4 g/day PCE and 0.1 g/day TCE was calculated (see Table 8-9), which matches very closely to the mass loading to the building during the stress test and positive pressure component of the BPC testing. Virtually identical results were obtained using June 2017 subslab concentrations measured as part of ESTCP project ER2015-03. This $D_{eff}$ value is within the range of published values for diffusion coefficient in concrete of VOCs (Patterson and Davis, 2009, De Biase et al., 2014), radon (Daoud and Renken, 1999, Gadd

and Borak, 1995, Klink et al., 1999 and McCarter et al., 2000) and water (Yi et al., 2016). Therefore, this appears to be a likely explanation. Other possibilities include counter-diffusion from sorptive building surfaces, such as rubber-backed carpet. This has implications for mitigation system design, because diffusion can apparently contribute sufficient mass loading to the building to sustain indoor air concentrations of potential concern even with an effective subslab venting system if the subslab concentrations are high enough, and it may be necessary to employ supplemental technologies such as increased building ventilation or indoor air filtration as interim measures until the subslab concentrations are reduced and the mass stored in the concrete diminishes.

**Table 8-9: Calculated diffusive flux across the concrete floor slab**

| Sample Location | Sample Date | PCE ($ug/m^3$) | TCE ($ug/m^3$) | Area (m2) | Slab thickness (m) | Deff (m2/s) | PCE Mass Loading (g/day) | TCE Mass Loading (g/day) |
|---|---|---|---|---|---|---|---|---|
| A-1 | 2012-06-04 | 8,100 | 300 | 128 | 0.1 | 2E-08 | 2E-02 | 7E-04 |
| A-2 | 2012-06-04 | 81,400 | 130 | 128 | 0.1 | 2E-08 | 2E-01 | 3E-04 |
| B-1 | 2012-06-04 | 10,800 | 800 | 128 | 0.1 | 2E-08 | 2E-02 | 2E-03 |
| B-2 | 2012-06-04 | 48,100 | 500 | 128 | 0.1 | 2E-08 | 1E-01 | 1E-03 |
| C-1 | 2012-06-04 | 150,000 | 41,400 | 128 | 0.1 | 2E-08 | 3E-01 | 9E-02 |
| C-2 | 2012-06-04 | 4,500 | 1,200 | 128 | 0.1 | 2E-08 | 1E-02 | 3E-03 |
| D-1 | 2012-06-04 | 1,220,500 | 9,100 | 128 | 0.1 | 2E-08 | 3E+00 | 2E-02 |
| D-2 | 2012-06-04 | 74,600 | 4,100 | 128 | 0.1 | 2E-08 | 2E-01 | 9E-03 |
| | | | | | | Total | 4E+00 | 1E-01 |

Note that Table 8-8 clearly shows that increasing the SSV system flow rate was not effective at reducing the mass loading through the building during the stress test. This is an important finding because increasing the fan size or number of suction points would commonly be the first choice in modifications to the system if verification testing indicated unacceptable indoor air concentrations persisted after the commissioning of a mitigation system.

### 8.3.6 Long-Term SSV Operation

Figure 8-26 shows subslab PID readings over a period of a few weeks of operation of the subslab venting system at a range of flow rates and again after one month of operation at a flow rate of 29 scfm. The SSV system effluent and six subslab probes are shown. PID readings were reduced from 400 ppm to 2 ppm in the area of highest initial PID readings. The slope of the semi-log plot is very similar for five of the seven data sets and much steeper for subslab probe SSP-N2, which is located nearest a wall of the building, indicating that outdoor air is being drawn into the region below the building, and that the system influence extends to the outer wall of the building. SVP-3-SS shows slightly less reduction in the PID reading, and also shows less vacuum than other probes at a similar radius from the suction point.

SVP-3SS had soil vapor concentration in 2012 of 120,000 and 9,000 μg/m$^3$ of PCE and TCE, respectively. After a month of SSV operation, the soil vapor concentration dropped to 50,000 and 790 μg/m$^3$ of PCE and TCE, respectively.

Indoor air concentrations measured in two Summa canister samples analyzed by EPA Method TO-15 at end of 1 month of SSV operations had 6.8 and 7.5 μg/m$^3$ PCE and 0.21 and 0.15 μg/m$^3$ TCE. These are lower by almost an order of magnitude than concentrations measured in indoor air before the SSV operations (Table 8-1), which averaged 30 μg/m$^3$ for PCE and 1.7 μg/m$^3$ for TCE. This is similar to the magnitude of the reduction in concentrations in the SSV effluent during that time (Table 8-9). For an ambient building air exchange rate of about 0.8/hr (U.S. EPA, 2011), the indoor air PCE concentration could be sustained by a mass loading of 0.64 g/day, which is almost an order of magnitude lower than the diffusive flux calculated in Table 8-8. Therefore, it is reasonable to suspect that there is a lingering contribution to PCE in indoor air from either diffusion through the concrete floor or perhaps counter-diffusion from sorptive building materials.

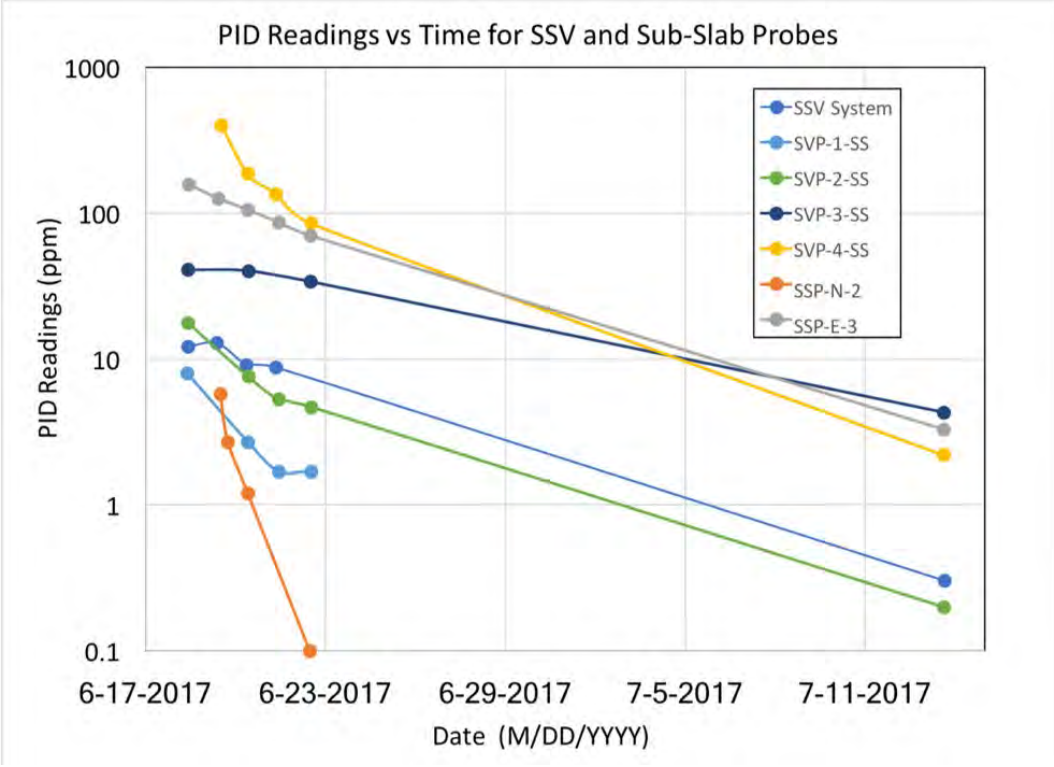



**Figure 8-27: PID reading vs time during operation of the SSV system at Q = 29 scfm**

**Table 8-10: PCE and TCE Concentrations by Method TO-15 in SSV Effluent**

| Date | Sample ID | PCE Conc (µg/m3) | TCE Conc (µg/m3) |
|---|---|---|---|
| SSV System | | | |
| 6/19/2017 | B11193-061917-SSV-COMB-1 | 23,000 | 520 |
| 6/19/2017 | B11193-061917-SSV-2-22 | 25,000 | 390 |
| 6/20/2017 | B11193-062017-SSV-1-44 | 26,000 | 410 |
| 6/20/2017 | B11193-062017-SSV-3-22 | 22,000 | 300 |
| 6/20/2017 | B11193-062017-SSV-4-22 | 27,000 | 310 |
| 6/20/2017 | B11193-062017-SSV-4-22-DUP | 27,000 | 310 |
| 6/20/2017 | B11193-062017-SSV-5-59 | 28,000 | 310 |
| 6/21/2017 | B11193-062117-SSV-6-59 | 21,000 | 220 |
| 6/21/2017 | B11193-062117-SSV-7-65 | 21,000 | 210 |
| 6/21/2017 | B11193-062117-SSV-8-65 | 20,000 | 210 |
| 6/21/2017 | B11193-062117-SSV-9-58 | 16,000 | 180 |
| 7/13/2017 | 1707242B-03A | 4,400 | 110 |

### 8.3.7 Radon

The results of analysis of radon samples collected from the effluent of the temporary SSV system are shown in Table 8-10. The source strength is moderate beneath building 11193, and as a result the radon activity in the extracted gas was 31 pCi/L or less. The product of the radon activity and the system flow rate (MF-Rn) dividied by the ambient building ventilation rate (Qbuild) yields an estimate of the radon concentrations that might be expected in indoor air if the SSV system was not operating (RN-ia), all of which are within a factor of about 2 which shows internal consistency and all of which are far below the indoor air target level of 4 pCi/L.

**Table 8-11: Radon activity and flux data for Building 11193**

| Qssv (scfm) | Qssv (L/day) | Rn-ssv (pCi/L) | MFRN (pCi/day) | Qbuild (L/day) | Rn-ia (pCi/L) |
|---|---|---|---|---|---|
| 44 | 1793088 | 31.1 | 5.6E+07 | 9.0E+07 | 0.62 |
| 22 | 896544 | 30.2 | 2.7E+07 | 9.0E+07 | 0.30 |
| 54 | 2200608 | 18.3 | 4.0E+07 | 9.0E+07 | 0.45 |
| 54 | 2200608 | 18.3 | 4.0E+07 | 9.0E+07 | 0.45 |
| 65 | 2648880 | 18.4 | 4.9E+07 | 9.0E+07 | 0.54 |
| 65 | 2648880 | 18.5 | 4.9E+07 | 9.0E+07 | 0.55 |
| 60 | 2445120 | 16.5 | 4.0E+07 | 9.0E+07 | 0.45 |

### 8.3.8 Building-Specific Attenuation Factor

Material in this section is also the subject of a journal article (McAlary et al., 2018) and is reproduced here with the expressed written consent of ACS Publishers. Attenuation factors for Building 11193 calculated using Equation 17 are shown in Table 8-11. Upper and lower estimates were calculated using the range of parameter values listed in Table 8-11 and a best estimate was calculated using approximate midpoint parameter values. The mean air exchange rate of 0.8 /hr for a naturally-ventilated commercial building (U.S. EPA, 2011) was used. The data indicate average differential pressures of 0.2 pascals (0.05 ft-air or 0.0008 inch-$H_2O$) or less and maximum differential pressures of 2 pascals (0.5 ft-air or 0.008 inch-$H_2O$) or less. The calculated AF values are at least 10 and up to 1,000 times lower than the default AF of 0.03 recommended in regulatory guidance (U.S.EPA, 2012). The uncertainty of +/- one order of magnitude is comparable to the uncertainty in the empirical AFs in Table 8-12.

**Table 8-12: AFs calculated from flow and vacuum analysis at Building 11193 (reprinted with permission from McAlary et al., 2018, copyright American Chemical Society)**

| Basis for Input Selection | T ($ft^2$/day) | ΔP | | B (ft) | h (ft) | AER (/hr) | Building-Specific AF |
|---|---|---|---|---|---|---|---|
| | | Pa | (ft-air) | | | | |
| Low estimate of AF | 54 | 0.17 | 0.05 | 18 | 15 | 0.8 | 2.9E-5 |
| Best estimate of AF | 54 | 0.85 | 0.25 | 13 | 15 | 0.8 | 2.8E-4 |
| High estimate of AF | 54 | 1.7 | 0.5 | 5.5 | 15 | 0.8 | 3.1E-3 |

Empirical AFs were calculated as the ratio of the average indoor air concentration divided by the average subslab concentration for PCE and degradation products trichloroethene (TCE) and cis-1,2-dichloroethene (cDCE), as shown in Table 8-12.

**Table 8-13: Empirical AFs calculated from indoor air and subslab concentrations (reprinted with permission from McAlary et al., 2018, copyright American Chemical Society)**

| Media | PCE | TCE | cDCE |
|---|---|---|---|
| | $\mu g/m^3$ | $\mu g/m^3$ | $\mu g/m^3$ |
| indoor air | 32 | 1 | 1.8 |
| | 21 | 1 | 1.6 |
| | 20 | 0.95 | 1.4 |
| | 47 | 3.9 | 6.9 |
| Minimum | 20 | 0.95 | 1.4 |
| Maximum | 47 | 3.9 | 6.9 |
| Average | 30 | 1.7 | 2.9 |
| subslab | 8,100 | 300 | ***19*** |
| | 81,400 | ***260*** | ***194*** |
| | 10,800 | 800 | ***27*** |
| | 48,100 | 500 | ***127*** |
| | 150,000 | 41,400 | 11,500 |
| | 4,500 | 1,200 | ***13*** |
| | 1,220,000 | 9,100 | 34,900 |
| | 74,600 | 4,100 | 1,910 |
| Minimum | 8,100 | ***260*** | ***13*** |
| Maximum | 1,220,000 | 41,400 | 34,900 |
| Average | 199,700 | 7,208 | 6,086 |
| Minimum AF | 1.6E-05 | 2.3E-05 | 4.0E-05 |
| Maximum AF | 5.8E-03 | <1.5E-2 | <0.53 |
| Average AF | 1.5E-04 | 2.4E-04 | 4.8E-04 |

Note: values in ***bold italics*** are reporting limits and represent upper estimates of concentrations where results were less than the reporting limit.

Minimum and maximum AFs are also included in Table 8-12, which were calculated using the high and low ends of the ranges of measured concentrations. The average empirical AFs in Table 8-12 were all within a factor of 2 of the best estimate AF in Table 8-11, which provides further support for the validity of Equation 17 for calculating AFs from flow and vacuum data. The range of AF values in Table 8-11 and Table 8-12 are also similar, roughly one order of magnitude in either direction from the mean value. The subslab samples show considerably more spatial variability than the indoor air data, and the average subslab concentration would therefore be potentially highly sensitive to the selection of subslab sample locations, so the agreement between AFs in Tables 8-11 and 8-12 may be somewhat fortuitous, but the close comparison between the empirical AFs and those calculated using Equation 17 is nevertheless encouraging. Table 8-11 and Table 8-12 both indicate that the U.S. EPA default AF of 0.03 is about 100-fold greater (overly protective) than the building-specific (empirical and calculated from pneumatic testing) AFs for Building 11193.

## 8.4 COST CONSIDERATIONS

The optimal system design for Building 11193 consists of a single suction point and a single fan operating at approximately 25 scfm with an interim supplement of either enhanced building ventilation or indoor air filtration for the period of time required for diffusive emissions through the concrete or counter-diffusion from sorptive building surfaces to diminish to acceptable levels. Conventional analysis of the radius of influence based only on static vacuum measurements could have had a wide range of results, depending on whether the communication test points were on the opposite side of an unsealed expansion joint or not, as shown dramatically in Figures 8-15 and 8-16, where there was almost a 10-fold difference in the static vacuum for two probes at almost the same radial distance from the suction point. A conventional analysis could have resulted in a radius of influence as small as 20 feet, in which case the number of suction points would likely be about 8. If the radius of influence used to design the system at Building 205 had been adopted instead (Building 205 had 27 suction points to cover 64,000 $ft^2$, or 2,370 $ft^2$ per suction point), then 5 suction points would have been specified. Comparisons to both possible conventional systems are made here.

Tables 8-14 and 8-15 provide a summary of the cost comparison for the conventional vs optimized mitigation system for Building 11193. The incremental cost of the optimization testing and analysis service (assuming a production level of detail and not a research level of detail) would be about $9,800, but would result in a net savings of $84,000 to $170,000 over a 30 year lifecycle, which is a return on investment of 8.5 to 18 times. The cost differential between the conventional and optimized system is shown as a factor of 1.9 to 2.9.

**Table 8-14: Building 11193 Cost Summary (5 fan conventional system)**

| Cost Components | Conventional | Optimized |
|---|---|---|
| Initiation | $ 6,175 | $ 6,175 |
| Reconnaissance | $ 5,600 | $ 6,300 |
| Pilot Test | $ 3,575 | $ 11,490 |
| Installation | $ 49,875 | $ 8,575 |
| Operation | $ 84,951 | $ 50,261 |
| Maintenance | $ 1,500 | $ 300 |
| Fan Replacement | $ 20,000 | $ 4,000 |
| Training | $ 5,000 | $ 6,000 |
| TOTALS | $ 176,676 | $ 93,101 |
| Total incremental cost of optimization activities | | $ 9,815 |
| Net Savings | | $ 83,575 |
| Return on Investment | | 8.5 |
| Ratio of Conventional Costs vs Optimized Costs | | 1.9 |

**Table 8-15: Building 11193 Cost Summary (8 fan conventional system)**

| Cost Components | Conventional | Optimized |
|---|---|---|
| Initiation | $ 6,175 | $ 6,175 |
| Reconnaissance | $ 5,600 | $ 6,300 |
| Pilot Test | $ 4,475 | $ 11,490 |
| Installation | $ 79,800 | $ 8,575 |
| Operation | $ 131,861 | $ 50,261 |
| Maintenance | $ 2,400 | $ 300 |
| Fan Replacement | $ 32,000 | $ 4,000 |
| Training | $ 5,000 | $ 6,000 |
| TOTALS | $ 267,311 | $ 93,101 |
| Total incremental cost of optimization activities | | $ 9,815 |
| Net Savings | | $ 174,209 |
| Return on Investment | | 17.7 |
| Ratio of Conventional Costs vs Optimized Costs | | 2.9 |

# 9.0 PERFORMANCE ASSESSMENT

## 9.1 REDUCE LIFECYCLE COST

At Building 205, the existing system was designed with 27 suction points and 9 high suction fans. The data collected in this study demonstrated that the mass loading to the building under depressurized conditions was insufficient to pose a potential health risk, and the mass loading from the combined flow of 500 scfm from 9 fans was also too low to pose a potential health risk, so a strong argument could be made to decommission the system altogether. Fan 3 alone was able to remove a similar TCE mass as all 9 fans together, and was considered an appropriate action while maintaining a protective system. Fan 8 was added to provide additional reduction of indoor air radon concentrations, even though they did not exceed the criteria of 4 pCi/L. A reduction in the system from 9 fans to 2 fans exceeds the success criteria of a 4x reduction in cost.

At Building 200, the initial system (two vent pipes: V-1 and V-2) was inadequate because V-2 was drawing gas from somewhere other than the typical radial flow pattern. If the methods developed in this research were available and employed by the contractor, that fact would have been obvious during the initial diagnostics testing with minimal effort, and an additional vent pipe like V-3 would have been installed at that time, which would have resulted in an effective system in the first attempt. This would have reduced the burden of indoor and subslab monitoring over time, eliminated the cost of an expensive blower and variable frequency drive, eliminated the cost of a second mobilization for the installation of V-3, reduced the cost of electricity to drive the blower and reduce the energy penalty of conditioned air being drawn across the slab. Not all of the costs incurred are available to the study team, so it is difficult to quantify, but it seems likely that the savings would have been substantial.

At Sun Devil Manor, no system would be needed if the land drain had not been present and with the land drain present, the system as installed was appropriately sized. This is encouraging because the AF was calculated to be 0.02, so the building appears to be very susceptible to vapor intrusion, and yet is still easily mitigated.

At Building 11193, the data collected in this study demonstrated that a single suction point was sufficient to achieve performance objectives for vacuum, velocity, travel time and mass removal rates with a flow rate as low as about 25 scfm with interim supplements such as enhanced ventilation and/or carbon filtration. A conventional design process may have resulted in an estimated radius of influence as small as about 15 ft, which could have resulted in as many as 15 suction points, depending on the locations of the pilot test installations relative to the unsealed expansion joints below the floor. If a system was built using the same number of suction point per unit area as Building 205 (one suction point per 2,370 $ft^2$ of building footprint), it would have employed 5 suction points. Therefore, the success criteria of a 4x reduction in cost appears to have been achieved.

A summary of the comparison between the typical costs of conventional systems and the optimal systems for all four test buildings is presented in Table 9-1. Details of how the costs in Table 9-1 were derived are presented in Sections 5.4, 6.4, 7.4, and 8.4 and Appendix E. The potential savings are appreciable compared to the costs for all buildings except SDM for the case with the Land Drain open, which was already optimally designed. The performance goal (reduction in net

present value of lifecycle cost) was less than the goal of 4X in most cases, but the return on investment (savings divided by incremental cost of optimization) was in the range of 5X to 10X, which is encouraging.

**Table 9-1: Summary of Potential Savings Compared to Optimization Costs**

| | | Mitigation System Capital and OM&M Costs ($000s) | | | |
|---|---|---|---|---|---|
| | | **Building 205** | **Building 200** | **Sun Devil Manor (land drain closed)** | **Building 11193 (5 vent pipe system)** |
| Conventional | Capital/Startup | $232 | $32 | $21 | $66 |
| | 30 yr OM&M | $175 | $125 | $61 | $112 |
| | Total [A] | $407 | $157 | $82 | $178 |
| Optimal | Capital/Startup | $76 | $38 | $19 | $33 |
| | 30 yr OM&M | $84 | $66 | $0 | $61 |
| | Total [B] | $160 | $104 | $19 | $94 |
| Ratio of Costs | [A/B] | 2.5 | 1.5 | 4.3 | 1.9 |
| Incremental Optimization Costs | [C] | $22 | $10 | $10 | $10 |
| Net Savings | [A-B-C] | $225 | $43 | $53 | $74 |
| Return on Investment | [(A-B-C)/C] | 10.2 | 4.5 | 5.3 | 7.4 |

## 9.2 MAINTAIN PROTECTIVENESS OF INDOOR AIR QUALITY

At Building 205, indoor air quality did not exceed screening levels for TCE even under building depressurization and radon concentrations did not exceed 4 pCi/L in any indoor air samples. Therefore, protectiveness could likely have been maintained with no system at all, however, two of the fans were maintained in service in the abundance of caution. TCE indoor air concentrations are consistently below the limit of detection which is more than an order of magnitude lower than the health-based screening level, and radon concentrations are consistently below 4 pCi/L so the system is more than protective of indoor air quality.

At Building 200, indoor air quality data collected after vent-pipe V-3 was installed has been protective for TCE and the optimized system meets or exceed the performance of the previous system in terms of applied vacuum, flow rates, mass removal rates and induced subslab velocity and travel times. Routine monitoring by Avatar also demonstrates that indoor air concentrations are below screening levels, so the system is protective of indoor air quality.

At Sun Devil Manor, the system was not modified because it was already optimally designed in the case with the land-drain open. With the land drain closed, no system would be needed.

At Building 11193, the indoor air concentrations after a month of SSV system operation at 29 scfm were about 7 $\mu g/m^3$ for PCE, which is marginally above the screening level in California (2 $\mu g/m^3$),

but below the U.S. EPA residential indoor air screening level of 11 $\mu g/m^3$. At an ambient building ventilation rate of about 90,000 $m^3$/day, 7 $\mu g/m^3$ represents a mass loading of only 0.6 g/day. Mass loadings of up to about 5 g/day were observed under positive building pressure (ESTCP ER-201503) and this is reasonably likely to be attributable to upward diffusion through the concrete floor slab (see Table 8-9), or desorption from sorptive building surface, as described in Chapter 8. The SSV system reduced subslab concentrations during the month of operation, and maintained a mass removal of 10 g/day or more, which is comparable to or greater than the mass loading to the building under modestly depressurized conditions (see ESTCP ER201503), so the indoor air concentrations measured after a month of SSV operation may still be attributable to either a diffusive flux through the concrete or potentially counter-diffusion from sorptive surfaces (such as the rubber-backed carpet) inside the building. This criteria cannot be determined unambiguously for this building as a result, but the mass removal rate was maintained at a protective level.

This yields an important lesson: where subslab concentrations are very high (hundreds of ppmv or above for VOCs), indoor air quality may not meet targets until the system has been operating for long enough to reduce the subslab concentrations to lower levels and long enough for VOC mass stored in the concrete and other building materials to permeate out and be flushed from the building. During this period, supplemental systems such as increased building ventilation or carbon filtration could be necessary or appropriate as an interim supplemental measure for either conventionally designed or optimized systems. This is an important finding because many practitioners would interpret elevated indoor air concentrations in confirmatory samples collected after a system is commissioned as an indication that additional suction points and fans or larger fans are needed, and if diffusion through the floor slab or counter-diffusion from building materials is the root cause, this will be inefficient and likely ineffective, at least in the short-term, and add to OM&M costs in the long-term.

## 9.3 MAINTAIN PROTECTIVE MASS REMOVAL RATE

For Building 205, the TCE mass removal rate with 9 fans running was 0.45 g/day, and it was maintained at 0.42 g/day with one fan running, which meets the criteria (especially considering that about 2.7 g/day of TCE would be required to pose a LICR risk of 1E-6). Radon was assessed each time after modifications to the system were made. With only Fan 3 running indoor air radon levels increased, although they never exceeded the criteria of 4 pCI/L. With both Fan 3 and Fan 8 running, indoor air radon concentrations decreased to similar levels as when all 9 fans operating.

At Building 200, the Rotron blower was significantly oversized for the needs, and the replacement fan was able to achieve the same or higher levels of flow (15 to 20 scfm) and vacuum (4 to 5 in-$H_2O$ in the vent-pipes) and mass removal (~0.2 g/day), which were protective. Radon was removed at a rate of about $6x10^6$ pCi/day, which was protective.

At Sun Devil Manor, the system was not modified. This study did demonstrate that the system as designed achieved a flow rate of 100 scfm and was sufficient to remove 0.3 g/day of TCE, which was the upper range value for the building depressurization testing (Holton et al, 2015, Guo et al., 2015). Radon concentrations under ambient conditions (Holton, 2015) showed an average of 0.45 pCi/L of radon under ambient conditions, which is about an order of magnitude lower than the target level of 4 pCi/L, so despite some uncertainties in the mass loading measurements for radon, it does not appear that radon mitigation is needed for SDM.

For Building 11193, the BPC testing (ESTCP 201503) showed a potential mass loading to the building under moderate depressurization of about 10 to 20 g/day for PCE. The SSV system was able to achieve a comparable or higher mass removal rate at a flow rate of 25 scfm. In the short term (at least 30 days from SSV system commissioning), this level of mass removal would have also needed to be supplemented with an enhanced indoor air ventilation rate or purifying filters or similar options to reduce indoor air concentrations attributable to diffusion through the concrete floor and/or desorption from interior surfaces. Indoor air concentrations of radon were not of concern without a SSV system, so any removal at all would be protective.

## 9.4 DATA ADEQUACY FOR PEER REVIEW

For all four buildings, the data collected include multiple lines of evidence, which facilitates peer-review because any one line of evidence may have limitations, but independent lines of evidence seldom have the same limitations, so where multiple lines of evidence are mutually supportive, the limitations of any particular line of evidence as offset by the capabilities of the others. For all four buildings, the vacuum versus time and vacuum versus distance data resulted in an internally consistent calibration to a unique pair of T and B values, except at vent pipe V-2 at Building 200, which is clearly drawing gas from some subsurface pathway that is not a conventional granular fill layer below the slab. The helium inter-well and flood tracer tests resulted in calibration of the values for the thickness and effective porosity of the active flow layer that were within reasonable ranges. The mass loading data are consistent with mass loadings measured by building depressurization. The lines of evidence and suggested performance metrics are summarized in Table 9-2, and collectively, these provide a considerable breadth of information for peer review.

The results of this research have been shared with several hundred audience members in presentations listed in the abstract of this report, a team of experts listed in Appendix A, twenty-six members of the American Association of Radon Scientists and Technologists (AARST) Consortium on National Radon Standards Mitigation Committee, and the ESTCP review panel for the final report, and all comments have been addressed. One journal article was published and a proceedings paper in the 2018 AWMA specialty conference on vapor intrusion is forthcoming. Therefore, the criteria for success on this topic were met.

**Table 9-2: Summary of lines of evidence and performance metrics for all four buildings**

| Performance Metrics | Building 205 | Building 200 | Sun Devil Manor | Building 11193 |
|---|---|---|---|---|
| Vacuum > Ambient ΔP | >100 ft | >>16 ft | >20 ft | >60 ft |
| Velocity >3 ft/day | ~150 ft | >>16 ft | >>>20 ft | >80 ft |
| Travel Time <3 to 4 hours | ~60 ft | >16 ft | >>20 ft | ~70 ft |
| Q/Qw >5L/min/1000ft$^2$ | ~90 ft | >16 ft | >>20 ft | ~50 ft |
| MFssv>MFbpc | yes, with Fan 3 | yes with Obar fan | yes, at 100scfm | yes, at ~25 scfm |
| Additional Comments | May not need a system at all, but 2 fans are more than sufficient | Vent-pipe V-2 draws similar flow as the other vent pipes, but not much mass. A small fan is sufficiently protective and less costly than a blower | System design was already optimal for TCE. Radon mass removal rates are potentially biased | It appears that diffusion through the floor or counter-diffusion from sorptive surfaces may require additional interm actions |

One journal article was produced through this study (McAlary et al., 2018).

## 9.5 TECHNOLOGY TRANSFER

The study methods are described in detail in chapters 4 through 8 of this document. The technology has been widely disseminated to the industry through a series of presentations listed in the Abstract of this document. A training video was planned but was not completed; however, the number of conference presentations was considerably more than planned, so the success criteria for this objective is considered met.

## 9.6 REGULATORY APPROVAL

For Building 205, the U.S. EPA reviewed the data collection, analysis and interpretation and accepted the modification to the system. Design modifications at Building 200 were documented in letters and reports submitted to the New Jersey Department of Environmental Protection. For Building 11193, the workplan was distributed to the Department of Toxic Substances Control and the Regional Water Quality Control Board for review and comment and a group of regulators made a visit to the building during the field program for a tour and demonstration. Comments have been positive to date; therefore, the success criteria for this objective was met..

While not strictly a regulatory agency, the AARST mitigation committee feedback was supportive.

# 10.0 COST ASSESSMENT

The cost of this technology includes costs that would commonly be incurred during conventional diagnostic testing, so the focus of this section is on the incremental costs. In conventional diagnostics, it is common to use a Shop-Vac or similar fan to draw gas from below the floor slab and to drill a few communication test points at selected locations nearby to monitor the static vacuum that develops in response. For this technology, the additional efforts include:

1. measuring vacuum versus time in response to cycling the fan on and off. For 3 of the 4 sites tested, the transient response was less than 1 minute in duration and the datalogger can be purchased for <$1,000, so the costs are minimal;
2. Iteratively calibrating the T and B values to Equations 1 and 4, using ATESOLV and a spreadsheet, which can be done in about 15 minutes or less per tests after familiarization;
3. Injecting helium in at least one nearby probe to measure the travel time for a given radial distance to calibrate the model to the thickness and effective porosity of the active flow zone using Equations 5 and 6. The recommended duration of these tests is no more than 2 minutes to maintain an appropriately sharp peak in the breakthrough curve, so the professional time costs are minimal. A helium cylinder can be purchased from a party supply store that will be sufficient for dozens of tests (one balloon per test), and a helium meter can be rented for less than $100 per day.
4. Measuring flow and concentration in the effluent of the system. Flow measurements can be performed in a minute or less with a thermal anemometer that can be purchased for <$1000. Sampling and analysis of the vent pipe for VOCs adds about $150 to $200 and radon adds about $50. Fitting the data to the model equations can be done within a few minutes once Equations 5 and 6 have been programmed into a spreadsheet.

## 10.1 COST MODEL

Components of the cost of this technology are summarized in detail for each building in Appendix E and in summary level in the tables at the end of Sections 5 through 8, plus the roll-up in Table 9-1. Capital costs include equipment, installation, electrical wiring, commissioning, performance verification monitoring and regulatory reporting. Operation, maintenance and monitoring (OM&M) costs include regulatory reporting, periodic inspection, periodic indoor air quality sampling and analysis, energy loss due to exhausting conditioned air that leaks downward across the floor, electrical cost to run the system and maintenance costs to replace worn out fans. In this report, fan replacement has been assumed to be required every 10 years and mitigation system lifespan has been assumed to be 30 years. Costs vary according to a number of factors too numerous to list so, these values should be considered to be within a range of about -20% to +50% of the most probable values. Cost values are generally rounded to 2 significant digits. The costs of the optimization testing and analysis are estimated for a level of effort that would likely occur in standard practice moving forward, not in the research level of detail conducted during this study. Assumptions for the costing are listed in the comments column of the tables in Appendix E. Estimates are based on current market pricing (neglecting inflation and discounting). If future expenditures are discounted for inflation, the costs beyond 30 years are typically small compared

to the total for the first 30 years, so a lifecycle of 30-years was assumed in the cost model. Laboratory and rental prices were cross-referenced against typical suppliers in the U.S.

For all of these comparisons, the following general approach applies. Capital costs include equipment, installation, electrical wiring, commissioning, performance verification monitoring and regulatory reporting. Operation, maintenance and monitoring (OM&M) costs include regulatory reporting, periodic inspection, periodic indoor air quality sampling and analysis, energy loss due to exhausting conditioned air that leaks downward across the floor, electrical cost to run the system and maintenance costs to replace worn out fans. In this report, fan replacement has been assumed to be required every 10 years and mitigation system lifespan has been assumed to be 30 years. Costs vary according to a number of factors too numerous to list so, these values should be considered to be within a range of about -20% to +50% of the most probable values. Cost values are generally rounded to 2 significant digits. The costs of the optimization testing and analysis are estimated for a level of effort that would likely occur in standard practice moving forward, not in the research level of detail conducted during this study.

The electrical cost to run the fans was calculated using the average U.S. electrical cost of $0.13/kWhr in June 2018 (https://www.eia.gov/electricity/). The HS-2000 fans costs approximately $2,500 to purchase and install. Heating, ventilation and air conditioning costs for Building 205 are approximately $60,000 per year according to the Facilities Engineer. The air exchange rate is about 1.8 per hour, so the typical air flow rate through the building is about 1,200,000 $m^3$/day (30,000 scfm), therefore the cost of HVAC is about $0.08/10,000$ft^3$. The original SSD system flow rate was 20,000 $m^3$/day (500 scfm), which is about 2% of the total flow through the building, so the energy cost associated with conditioned indoor air drawn across the floor slab was about $1,000 per year, or about $32,000 over a 30-year operation. Reducing the system to 2 fans would reduce the loss to $6,300 over a 30-year operation for a savings of $25,000.

## 10.2 COST DRIVERS

Costs for vapor intrusion mitigation systems include capital and annual operating, maintenance and monitoring (OM&M) activities. The capital costs include fees for labor in the design, installation, testing and reporting activities and disbursements for equipment, travel expenses, shipping, laboratory analysis, and associated items. The primary driver of the capital cost is the number of suction points and fans included in the mitigation system design. This depends on the radius of influence of each suction point and the area of the building. The radius of influence has traditionally been established as the distance to which the induced vacuum below the floor slab exceeds some target value (e.g. 6 to 9 pascals in ASTM E2121), but this research has shown that where highly permeable materials are present below the floor slab, vacuum levels too low to reliably measure can result in a protective system as indicated by the subslab velocity, travel times, proportion of flow from below the floor (see Equations 5, 6 and 7 and Appendix B) and mass loadings. Capital costs can also be affected by subsurface features such as footers, old pits, or tunnels that can impact the flow of vapors in the subsurface. This would require some focused investigation to evaluate the best way to mitigate that area effectively. In a large building this could be a significant cost.

The costs of OM&M includes fees for labor in the monitoring, maintenance and reporting activities and disbursements for electricity to run the fans, equipment replacement, laboratory analyses,

travel, shipping, etc. The primary cost driver is likely to be the duration of operation. Virtually all radon mitigation systems are designed for perpetual operation. VOCs may eventually be removed to a degree where the remaining mass and flux in the vadose zone toward the building is insufficient to pose a potential VI concern, but the systems are generally designed for containment, not mass removal, so a 30-year life-cycle or more is typically expected. Some accounting practices allow for a discounting of future expenses in a net present value (NPV) calculation, but interest and inflation rates are currently low, so this report has used a 30 year lifecycle with no discounting as a rangefinder for OM&M total costs. The OM&M cost driver will also depend on the size of the system. For a small system (e.g., one fan attached to one suction point, like the system at Sun Devil Manor), the average cost of electricity is only about $100/yr, and labor costs to simply verify the system remains operating are likely to be the dominant cost. For a larger system like Building 205, where 9 high suction fans were initially installed, the annual cost of electricity was about $4,000 per year prior to optimization, which would be a much more significant proportion of the total.

## 10.3 COST ANALYSIS

The cost analysis is based on the detailed spreadsheets in Appendix E, the narratives in Sections 5.4, 6.4, 7.4 and 8.4 and the reduction in lifecycle cost and return on investment for the incremental cost of the optimization activities. In general, the analysis shows that the potential benefit increases with building size. For a single family residence, a single suction point and a single fan is often more than adequate, especially where there is a reasonably competent floor slab and a capillary break (granular fill) below the floor slab, as typically specified in building codes. In this case, additional effort beyond conventional practice is unlikely to be needed or cost effective. However, in the case of very highly permeable granular fill, reliance on static vacuum measurements alone can be misleading because there can be a high rate of gas flow below the slab even at vacuum levels too low to reliably measure (see Appendix B for details). In this case, an inter-well tracer test can be added with minimal extra cost, and this may demonstrate that no additional fans or vent-pipes are required, with a considerable savings.

For larger buildings, the potential savings increase because the area treated by each suction point is proportional to the square of the radius of influence. For example, if a building has a footprint of 100,000 $ft^2$, it would require 80 suction points if the radius of influence is estimated at 20 ft, but only 6 suction points if the radius of influence is actually 75 ft. The additional lines of evidence developed in this research provide a more comprehensive way to assess the radius of influence compared to the conventional method of a linear interpolation of static vacuum measurements plotted on a chart of linear vacuum versus logarithmic radial distance. For Building 205 and Building 11193, the optimization testing demonstrated radii of influence greater than 75 ft. For smaller buildings like Building 200 and SDM, this is not necessary.

Practical experience has shown that there are certain buildings where mitigation system performance testing yields results that are difficult to explain because of complexities in the subsurface. The additional lines of evidence developed in this research can provide clues regarding the presence and general location of preferential pathways, which have been shown in certain circumstances to have an important influence on the potential for vapor intrusion, but have limited techniques currently available for assessment and characterization.

For all the buildings tested in this study (except SDM with the land drain open), the incremental cost of optimization testing was small compared to the potential saving, so the cost analysis indicates this technology is potentially valuable in most cases.

# 11.0 IMPLEMENTATION ISSUES

Implementation issues will be minimal for most DoD buildings. For rare cases where the floor slab rests on very low permeability native soil, subslab venting systems may not achieve sufficient flow or mass removal to be protective of indoor air and alternatives such as aerated floor, increased building ventilation and/or barriers may be needed. For new construction, it may be preferable to use aerated floors or other options, in which case the analysis developed here would not be needed. The conventional mitigation methods are written in standards that may be slow to change. In addition:

- No environmental regulations or permits are required to implement the technology.
- End-users may initially find the use of unfamiliar equations to be intimidating, but the equations are easily programmed into a spreadsheet and once verified, the application is relatively simple.
- All of the equipment required for implementation is standard commercial off-the-shelf [COTS], and much of it can also be rented to reduce capital outlays.

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# APPENDIX A. POINTS OF CONTACT

| Point of Contact Name | Organization Name Address | Phone Fax Email | Role in Project |
|---|---|---|---|
| Todd McAlary | Geosyntec Consultants, Inc.<br>3250 Bloor street west, Suite 600<br>Toronto, ON M8X 2X9, Canada | (416) 637.8747<br>tmcalary@geosyntec.com | Lead Principal Investigator |
| Paul Johnson | Colorado School of Mines<br>1500 Illinois Street, Golden, CO 80401 | (303) 273.3280<br>pcjohnson@mines.edu | Technical Reviewer |
| Bill Brodhead | WPB Enterprises<br>2844 Slifer Valley Road<br>Riegelsville, PA 18077 | (610) 346.8004<br>bill@wpb-radon.com | Technical Reviewer |
| Henry Schuver | US Environmental Protection Agency<br>1200 Pennsylvania Avenue, N.W.<br>Washington, DC 20460 | (703) 308.8656<br>schuver.henry@epa.gov | Technical Reviewer |
| William Angell | University of Minnesota<br>1985 Buford Ave, St Paul MN | (612) 624.6786<br>wangell@umn.edu | Technical Reviewer |
| Bruce Snead | Kansas State University<br>133 Ward Hall 1200 N 17th St,<br>Manhattan, KS 66506 | (785) 532.6705<br>bsnead@ksu.edu | Technical Reviewer |
| Andrea Leeson | Deputy Director & Environmental Restoration Program Manager<br>SERDP & ESTCP | (571) 372.6398<br>Andrea.leeson.civ@mail.mil | COR |
| Robert Ettinger | Geosyntec Consultants, Inc.<br>924 Anacapa Street, Suite 4A<br>Santa Barbara, CA | (805) 979.9138<br>rettinger@geosyntec.com | Technical Reviewer |
| William Wertz | Geosyntec Consultants, Inc.<br>130 Stone road west<br>Guelph, ON N1G 3Z2, Canada | (518) 779.3582<br>wwertz@geosyntec.com | Project Manager |
| Paul Nicholson | Geosyntec Consultants, Inc.<br>130 Stone road west<br>Guelph, ON N1G 3Z2, Canada | (61) 399.352988<br>pnicholson@geosyntec.com | Field Study Leader |

# APPENDIX B. WORKED EXAMPLE OF HIGH AND LOW T AND B VALUES

Consider two cases: one with coarse sand below a concrete slab (T = 10 $ft^2$/day, hereafter referred to as LowT) and one with gravel (T = 1,000 $ft^2$/day, hereafter HighT). For both cases, assume the leakance factor (B) is the same at 15 ft (the influence of high and low leakance is described further below). In both cases, assume a fan with a power of about 100 watts is used to draw gas from the subsurface. The flow from the gravel would be higher than the flow from the sand, for the sake of this example, assume 100 standard cubic feet per minute (scfm) from the gravel and 10 scfm from the sand. These values are all consistent with observations made by Geosyntec at over 120 pneumatic tests of subslab gas extraction (McAlary et al., 2018). The profile of vacuum vs radial distance calculated using Equation 4 would be as shown in Figure B-1. If the radius of influence (ROI) was based on the minimum vacuum recommended by ASTM E2121 (6 Pa), the ROI would be about 67 ft for the LowT case and about 36 ft for the HighT case. This corresponds to an area of influence (3.14 x $ROI^2$) of 4,100 $ft^2$ for the HighT case and 14,000 $ft^2$ for the LowT case. If the building of interest had a footprint of 100,000 $ft^2$, the LowT case would likely employ about 7 suction point, whereas the HighT case would likely employ about 25 suction points. The total flow from the LowT system would be about 70 scfm, and the total flow from the HighT system would be about 2,500 scfm to achieve a vacuum below the floor greater than or equal to 6 pascals everywhere.

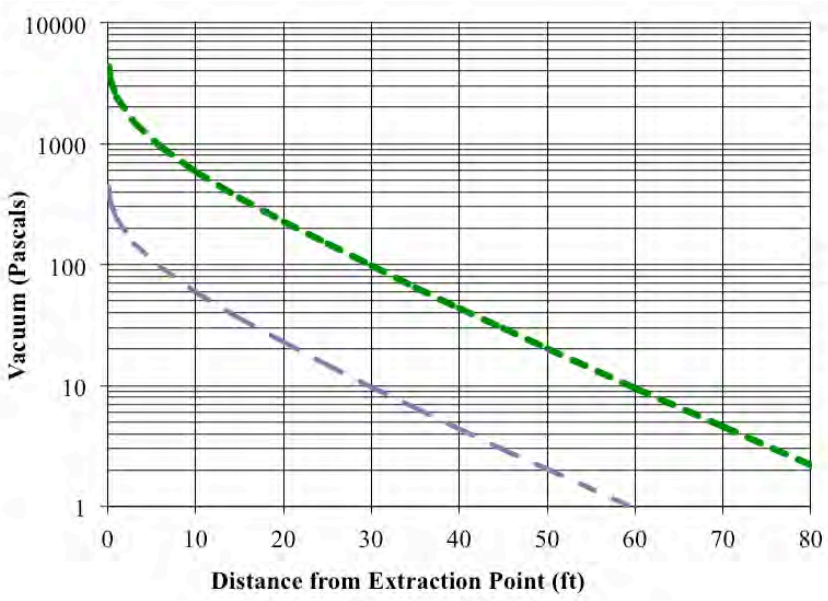



**Figure B- 1: Vacuum vs distance calculated using Equation 4 and a B value of 15 ft for the LowT (green) and HighT (purple) cases described in the text above**

The subslab velocities for the same two cases described above can be calculated with Equation 5, and are shown in Figure B-2. The HighT case has velocities about an order of magnitude higher than the LowT case because of the difference in the gas extraction rates (100 scfm vs 10 scfm).

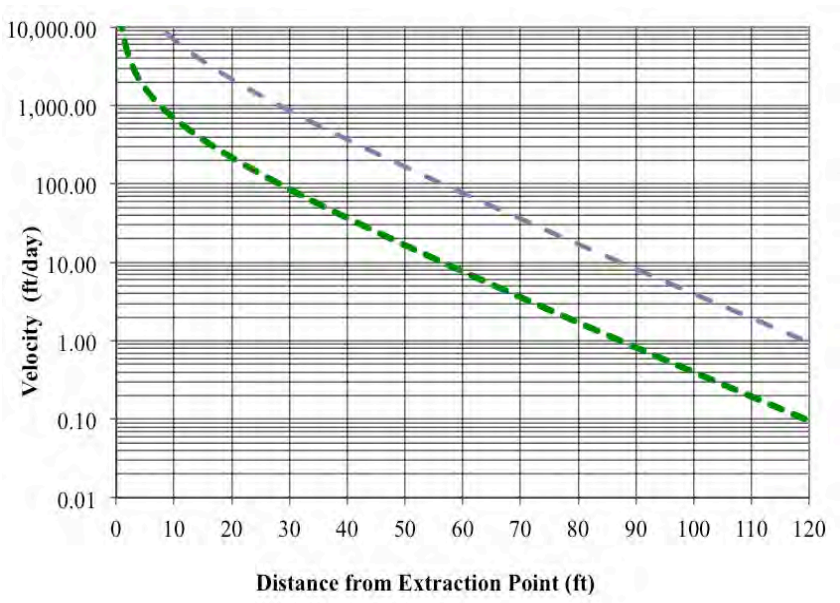



**Figure B- 2: Velocity vs distance calculated using Equation 3 and a B value of 15 ft for the LowT (green) and HighT (purple) cases described in the text above**

Figure B-2 shows that at the radii corresponding to 6 pascals vacuum, the induced flow velocities are about 6 ft/day for the LowK case and about 600 ft/day for the HighK case. If a goal of 3 ft/day induced velocity was used for a performance criteria, the radius of influence would be about 70 ft for the LowK case (very similar to the radius where vacuum = 6 Pa). But for the high T case, the ROI would be over 100 ft and at that radius, the applied vacuum would be much less than 0.1 pascal (inferred from extrapolation of the trend on Figure B-1), which is below the lower limit of sensitivity of most micromanometers and usually not distinguishable from fluctuations in the baseline pressure differential (and is more than 100 times lower than the target vacuum specified in ASTM E2121). This demonstrates the reason that vacuum alone is not an ideal performance metric and the permeability of the material below the floor is very important.

The travel times from different radial distances can be calculated using Equation 6, as shown in Figure B-3.

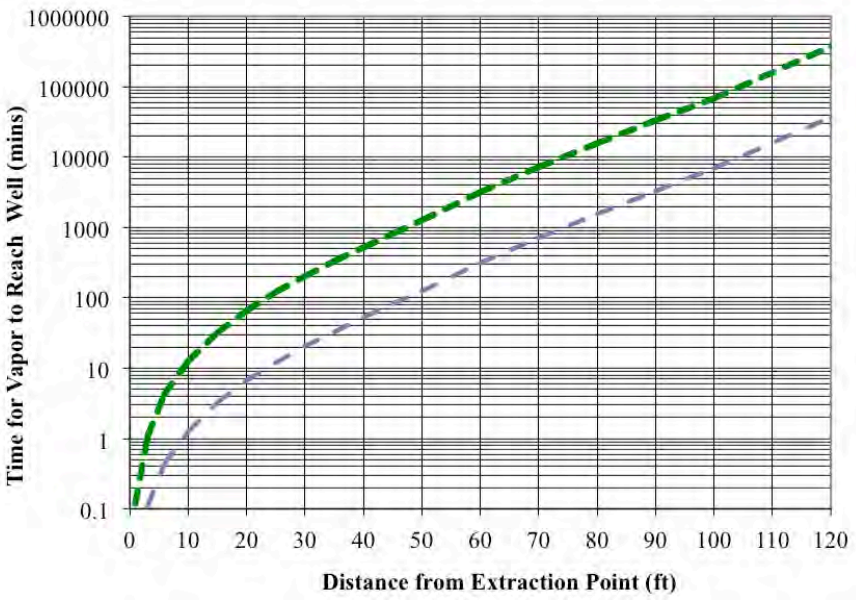



**Figure B- 3: Travel time vs distance calculated using Equation 4 and a B value of 15 ft for the LowT (green) and HighT (purple) cases described in the text above**

For the LowT case, where ROI based on 6 pascals of vacuum was 67 ft, the corresponding travel time is about 3.5 days. For the HighT case, where the ROI based on 6 Pa of vacuum was 37 ft, the corresponding travel times is about 30 minutes (170 times faster). This provides an insight into the rate of subslab ventilation (not just depressurization). For the hypothetical building of 100,000 $ft^2$ described above, the HighK system of 25 suction points and a total flow rate of 2,500 scfm would ventilate the region below the floor with an air exchange rate 170 times higher than the LowT system with 7 suction points and a total flow of 70 scfm. Note that this is not intuitive because the ratio of the system flow rates (2500/70) is 35x, not 170x. The reason for the difference is the system with larger suction-point spacing draws more air from leakage across the floor slab, and less from the subsurface, as described further below.

If the venting system was designed to remove gas from the granular fill at least once every 0.1 day, Figure B-3 shows the LowT case would be effective to a radius of about 25 ft and the HighT case would be effective to a radius of about 50 ft. For the hypothetical 100,000 $ft^2$ building, this would result in a system in the HighT case of 13 suction points and a total flow of 1300 scfm, and a system for the LowT case with 51 suction points and a total flow of 510 scfm. Not all cases are as bad as the $95^{th}$ percentile of the AF distribution, so these designs may be excessive in many cases, in which case, the building-specific attenuation factor may be useful to consider. Monitoring subslab concentrations and mass removal rates could be used to optimize the total extraction flow rate over time to maintain subslab vapor and radon concentrations at a level that poses no unacceptable risk.

The proportion of flow originating below the floor as a function of the radial distance from the point of suction can be calculated using Equation 7 and is shown on Figure B-4 for the HighT and LowT cases. Note that Equation 7 depends only on the leakage factor (B), and not on T, so the two cases result in the same relation. This chart provides information regarding the distance to which the venting system draws a significant flow from the subsurface. For the HighT case, the

radius corresponding to 6 pascals vacuum is about 36 feet, and at that radius about 20% of the flow from that distance originates in the subsurface vs 80% from leakage across the floor slab. The flow in the high T case is 100 scfm, and 20% of 100 scfm is 20 scfm. For the LowT case, the radius corresponding to 6 pascals vacuum is about 67 feet, where about 3% of the flow originates from the subsurface. The flow in the LowT case is 10 scfm and 3% of 10 scfm is 0.3 scfm (67x lower than the HighT case). For reference, EQM (2004) recommended a value of 5 L/min (0.18 scfm) as a conservative default Qsoil value for use in the U.S EPA spreadsheet implementation of the Johnson and Ettinger (1991) Model (this is for a residence with an assumed 10m x 10 m footprint).

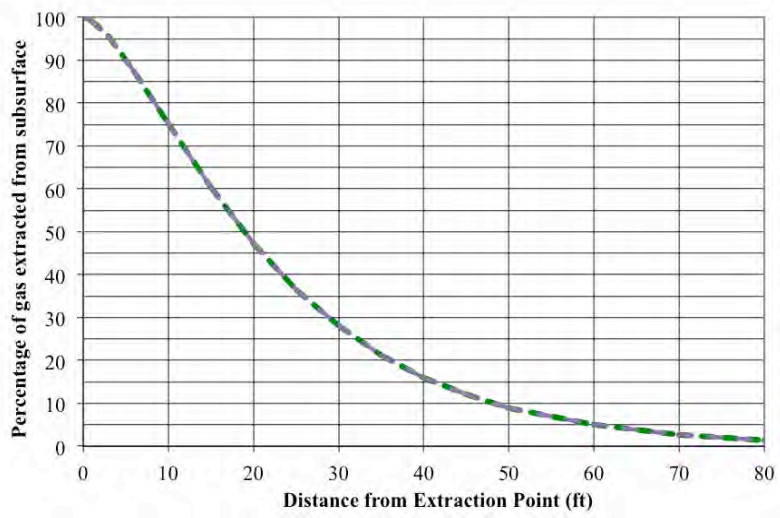



**Figure B- 4: Proportion of flow originating below the floor vs distance using Equation 5 and a B value of 15 ft for the LowT (green) and HighT (purple) cases described in the text above**

Figure B-5 shows the downward vertical flow across the floor for the two cases, expressed in units of L/min per 1000 $ft^2$ of floorspace. For the 10 scfm flow rate in the LowT case, the threshold of 5 L/min per 1000 $ft^2$ corresponds to a radius of about 53 ft. For the 100 scfm flow rate of the HighT case, the radius corresponding to 5 L/min per 1000 $ft^2$ of floor space would extend to approximately 90 ft.

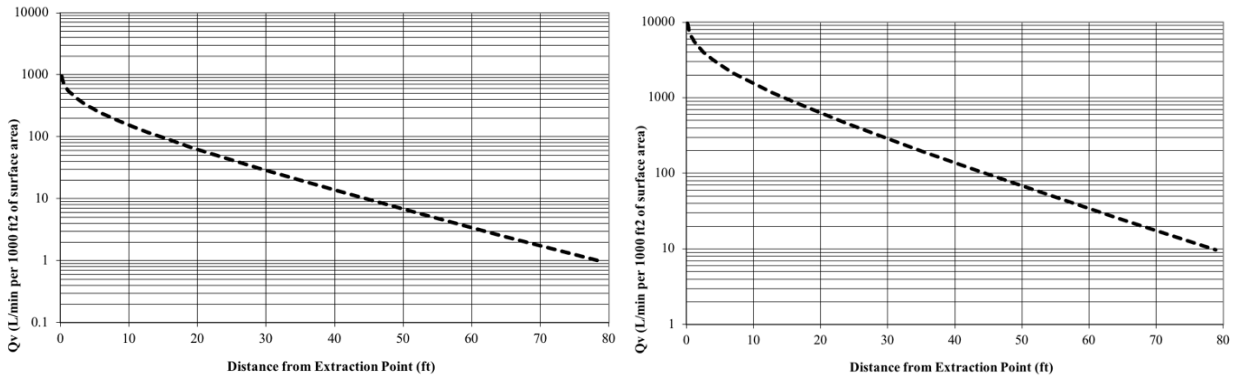



**Figure B- 5: Vertical flow per 1000 ft2 of floor area for 10 scfm (left) and 100 scfm (right)**

Equation 7 can also be used to estimate the energy cost of loss of conditioned air. For the HighT case, at the ROI corresponding to a vacuum of 6 Pa (36 ft), 80% of the extracted gas originates from leakage of indoor air (or 80 scfm). For the LowT case, at the ROI of 67 ft corresponding to a vacuum of 6 Pa (67 ft), the loss of conditioned air would only be 9.7 scfm. This yields almost an order of magnitude difference in the energy costs between the two cases.

The HighT and LowT cases used the same B value for simplicity. The sensitivity of the B value for these relations can also be explored. Consider a scenario with an intermediate transmissivity of 100 $ft^2$/day and flow rate of 50 scfm from a suction point. A HighB case might have a B value of 25 ft (this corresponds to a relatively competent floor slab) and a LowB case might have a B value of 7 ft (corresponding to a relatively leaky slab). Figure B-6 shows the four plots from Equations 4, 5, 6, and 7. The vacuum vs distance chart shows that the profile of vacuum extends much farther when the floor is less leaky. Many mitigation practitioners already measure applied vacuum at more than one radial distance as part of performance testing, and these data can be used to calibrate the vacuum vs distance profile to the B value using the model, which can be done in real time using a spreadsheet very quickly and at low cost. Note that the two curves converge at radius = 0, this is because the vacuum at the point of suction depends primarily on T and not B. Therefore, if vacuum is also measured at a small radial distance, the T value can also be calibrated by fitting the vacuum versus distance data to Equation 4.

Once the T and B values are calibrated to the vacuum vs time and vacuum vs distance data, the plot of travel time versus distance is easily generated using Equations 5 and 6. The travel time versus distance plot can be used to select a radial distance for an inter-well tracer test (for this plot, a travel time of a few minutes would correspond to a radial distance of about 10 feet for either leakage value). The tracer test can be used to verify the thickness of the zone through which the majority of gas flow occurs (b), which is a parameter in Equation 5 (but not in Equation 1 or 4, so the b value does not influence the profiles of vacuum vs time or vacuum vs distance). Once the T, B and b values have been calibrated, the model can be used to calculate the relative proportion of flow from below the floor vs distance using Equation 7.

For the leaky case (B = 7 ft, shown as the blue dashed line), the ROI corresponding to 6 pascals of vacuum is about 26 ft, but if the performance criteria included <0.1-day travel time, >3 ft/day velocity or >5L/min flow from the subsurface per 1000 $ft^2$ of area, the radius of influence would be 30 feet or more. For the competent slab (B = 25 ft, shown as the red dashed line), the radius of influence would be 60 feet for a travel time of 0.1 day and greater for all the other lines of evidence. The radius of influence has a direct impact on the number of suction points required to provide protection for a given footprint of building. The area of influence is simply $\pi$ multiplied by the square of the radius of influence. The target treatment area divided by the area of influence provides a minimum number of suction points. Additional suction points may be appropriate if there are subsurface barriers such as bearing wall footers or preferential pathways such as subfloor utilities.

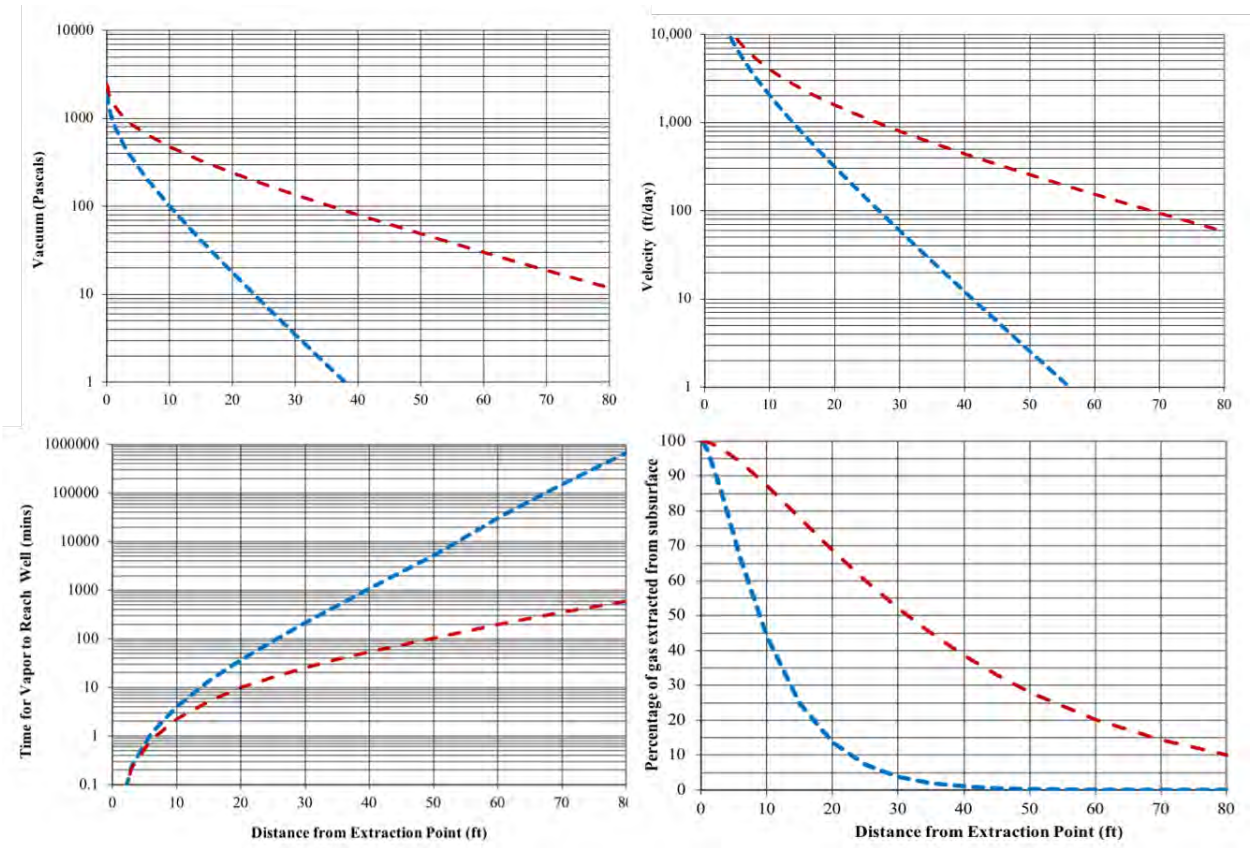



**Figure B- 6: Plots of vacuum, velocity, travel time and proportion of flow from beneath the floor slab vs distance for the HighB (red) and LowB (blue) cases described in the text above**

# APPENDIX C. FIELD FORMS

C1.0

Site #1: Building 205

C1.1

Site #1: Building 205

Former Raritan Arsenal

| DAILY FIELD REPORT | Geosyntec Consultants<br>7 Graphics Drive, Suite 106<br>Ewing, NJ 08628<br>(609) 895-1400 Fax (609) 895-1401 | Geosyntec consultants<br>engineers \| scientists \| innovators |
|---|---|---|

**Project Name:** ESTCP
**Project Number:** TR0479-02-01
**Field Personnel:** M. Maw (MM)
**Recorded By:** MM
**Weather:** Sunny 70's

**Date:** 9/10/14 **Page** 1 **of** 1
**Primary Activities:** Deploy Passive Reader Samplers & WMS

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 0755 | MM arrive onsite check in with Security and gather supplies |
| 0810 | Deploy Radian IA-01 C-175, SGT397 |
| 0815 | Deploy Radian IA-02 C-124, SGT348 |
| 0820 | IA-03 C-29, SGV857 |
| 0825 | IA-04 C-189, SGV543 ; DUP-01 IA C-110, SGI896 |
| 0830 | IA-05 C-37, SGI903 |
| 0833 | IA-06 C-25, SGT337 |
| 0838 | IA-07 C-220, SGT335 |
| 0841 | IA-08 C-58, SGI710 |
| 0850 | IA-09 C-205, SGI764 |
| 0900 | VP-1 1411-AN-R-021 |
| 0915 | VP-3 + DUP-02 VP |
| | VP-3 1411-AN-R-018 |
| | DUP-02 1411-AW-R-001 |
| 0925 | VP-6 1411-AN-R-19 |
| 0940 | OA-01 C47, SFN832 |
| 0950 | OA-02 / OA DUP-03 OA |
| | OA-02 C-198, SGI690 |
| | DUP C-72 SGT430 |
| 1005 | OA-03 C-132 SGQ641 |
| 1015 | HVAC-01 1411-AN-R-020 |
| 1020 | HVAC-02 C-177 SGQ579 |

10:27 OA-2 / HVAC-02

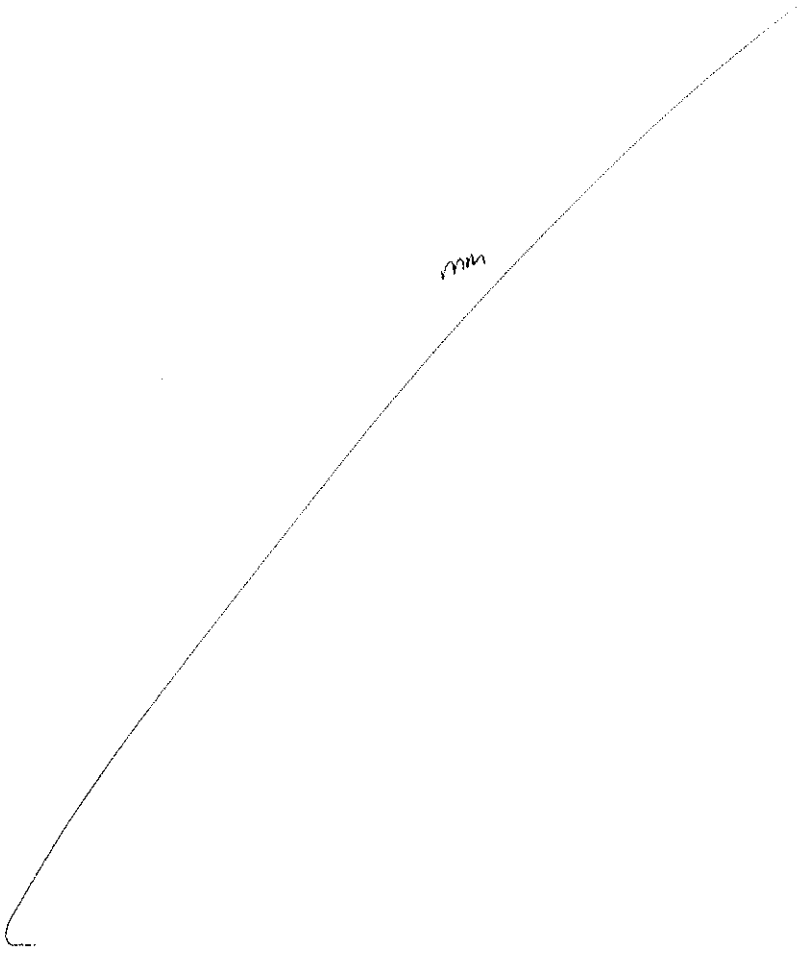
1411-AN-R-022

10:35 HVAC-03
C-106 SGQ636

10:40 OA-03 / HVAC-03

1411-AN-R-002

11:00 MMm offsite check out with Kwang



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**Project Name:** ESTCP
**Project Number:** M. Mraw (MM) TR0479
**Field Personnel:** MM
**Recorded By:** MM
**Weather:** Sunny

**Date:** 10/14/14 **Page** 1 **of** 2
**Primary Activities:** Collect Radon & WIMS Samplers

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 0800 | MM onsite check in with site security |
| 0805 | Check in with Kwong |
| 0810 | Collect IA-205-01 SGT397 |
| 0814 | Collect IA-205-02 SGT348 |
| 0815 | Collect IA-205-03 SGY543 |
| 0821 | Collect Dup-01 SGI896 |
| 0820 | Collect IA-205-04 SGV543 |
| 0823 | Collect IA-205-05 SGI903 |
| 0825 | Collect IA-205-06 SGT337 |
| 0827 | Collect IA-205-07 SGT335 |
| 0830 | Collect IA-205-08 SGI710 |
| 0834 | Collect IA-205-01 SGI764 |
| 0846 | Collect OA-205-01 SFN832 |
| 0845 | Collect OA-205-02 SGI690 |
| | Collect Dup-02 SGT430 |
| 0850 | Collect HVAC-205-01 SGQ641 |
| 0900 | Collect VP-1 1411-AN-R-021 |
| 0905 | Collect VP-3 1411-AN-R-018 |
| ~~0910~~ | Collect ~~VP-~~ Dup-02 1411-AN-R-001 |
| 0910 | Collect VP-6 1411-AN-R-019 |
| 0915 | Collect HVAC-205-02 SGQ579 |
| | Collect HVAC-02 1411-AN-R-022 |
| | |

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|---|---|---|

**Project Name:** ESTCP
**Project Number:** Millsaw (mm)
**Field Personnel:** MM
**Recorded By:** MM
**Weather:** Sunny
**Date:** 6/14/14
**Page** 2 **of** 2
**Primary Activities:** Collect Rean + wipe

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 0925 | Collect HVAC - 205 - 03 SGQ36 |
| 0950 | Collect IA - 6 - 03 1411 AN-R- 029 |
| 0955 | collect IA - 6-01 1411 - AN-R - 025 |
| 1000 | collect IA - 6-02 1411-AN-R-030 |
| 1010 | Collect ASDS - 6-03 1411-AN-R-031 |
| | Dup at this location shattered while trying to |
| | Collect sample from vent pipe |
| 1025 | Collect ASDS - 6-02 1411 - AN-R-027 |
| 1035 | collect ASDS - 6-01 1411 - AN-R-026 |
| 1130 | Mobile to build 200 call Paul N |
| 1150 | offsite |

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|---|---|---|

**Project Name:** Landfill Addition **Date:** 7/24/15 **Page** 2 **of** 3
**Project Number:** _____ **Primary Activities:** _____
**Field Personnel:** M. Nam _____
_____
**Recorded By:** NMM
**Weather:** Sunny 80s

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1100 | Mobile to building 207 meet with Kevin |
| | to retrieve vanes |
| 1130 | 2 in PVC does not fit on coupling run to |
| | Home depot |
| 1200 | |
| ~~Time~~ | Vent Pipe Velocity Range (FPM) |
| 1205 | HSF01 ~~180 - 195~~ |
| 1212 | HSF02 ~~224 - 232~~ |
| 1218 | HSF03 ~~227 - 237~~ |
| 1222 | HSF04 ~~270 - 278~~ |
| 1233 | HSF05 2841 - 2873 |
| 1234 | HSF06 2790 - 2804 |
| 1236 | HSF07 2609 - 2614 |
| 1243 | HSF08 2935 - 2967 |
| 1245 | HSF09 2675 - 2705 |
| 1253 | HSF04 2444 - 2461 |
| 1256 | HSF03 2022 - 2031 |
| 1258 | HSF02 1821 - 1834 |
| 1301 | HSF01 1827 - 1853 |
| | |
| | |
| | |
| | |

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**Project Name:** Raritan Arsenal **Date:** 7/24/15 **Page** 3 **of** 3
**Project Number:** —
**Field Personnel:** M Mann
**Recorded By:** MM
**Weather:** Sunny 80s
**Primary Activities:**

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1305 | Deploy WMS at HSF01 1506-AN-R-064 |
| 1315 | Deploy WMS at HSF02 1506-AN-R-055 |
| 1324 | Deploy WMS at HSF03 1506-AN-R-065 |
| 1330 | Deploy WMS AT DUP-01 (HSF-03) 1506-AN-R-057 |
| 1336 | Deploy WMS at HSF04 1506-AN-R-056 |
| 1343 | Deploy WMS at HSF05 1506-AN-R-059 |
| 1350 | Deploy WMS at HSF06 1506-AN-R-060 |
| 1400 | Deploy WMS at HSF07 1506-AN-R-061 |
| 1403 | Deploy WMS at HSF08 1506-AN-R-067 |
| 1410 | Deploy WMS at HSF09 1506-AN-R-054 |
| 1430 | offsite |
| | |
| | |
| |

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# DAILY FIELD REPORT

Project Name: EGTCP

Project Number: TR0979

Field Personnel: DM & PN TA

Recorded By: DM / PN

Weather:

Date: Aug 9th

Page 1 of 1

Primary Activities: Vent Pipe Vacuums and velocities

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 4258 | HSF-03-B Velocity: 81 Vac 10.5 |
| 1 | HSF-01-A Vel: 85 Vac 11.75 |
| 4 | HSF-02-A Vel: 228 Vac 11.0 |
| 7 | HSF-03-A Vel: 83 Vac 10.5 |
| 10 | HSF-04-A Vel: 77 Vac 8.5 |
| 13 | HSF-05-A Vel: 772 Vac 5.0 |
| 16 | HSF-06-A Vel: 365 Vac 6.0 |
| 22 | HSF-08-A Vel: 525 Vac 5.0 |
| 25 | HSF-09-A Vel: 485 Vac: 6.0 |
| 19 | HSF-07-A Vel: 485 Vac: 6.0 |
| 26 | HSF09-B Vel: 435 Vac 6.0 |
| 27 | HSF-09-C Vel: 555 Vac 6.0 |
| 24 | HSF-08-C Vel: 899 Vac: 4.9 |
| 21 | HSF-07-C Vel=475 vac =6.0 |
| 20 | HSF-07-B Vel 495 vac 6.0 |
| 18 | HSF-06-C Vel 596 Vac =6.0 |
| 15 | HSF-05-C Vel 327 Vac 5.25 |
| 12 | HSF-04-C Vel 766 Vac 8.5 |
| 9 | HSF-3-C Vel 457 Vac =10.75 |
| 6 | HSF-2-C Vel 187 Vac 10.75 |
| 3 | HSF-1-C Vel 431 Vac 12.5 |
| 2 | HSF-1-B Vel 105 Vac 11 |
| 14 | HSF-5B vel 175 VAC 5.0 |
| 5 | HSF 2B vel 125 VAC 10.0 |
| 11 | HSF 4B vel 97 VAC 8.5 |
| 17 | HSF 6B NO FLOW |
| 23 | HSF 8B Vel 41 VAC 5.25 |
| | |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM, TM, PN
Recorded By: DM
Weather:

Date: Aug 9th
Page 1 of 1
Primary Activities: $CO_2$ test

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 11:20 | Calibration of MultiRAE |
| | Model # 02485 |
| | Oxy CO LEL $H_2S$ |
| | (18.0) (50ppm) (50%) (10ppm) |
| | All Pass |
| | Voc Bump test |
| | 100ppm Iso |
| | |
| | Model 21907 |
| | Mixed gas test |
| | All Pass |
| | Voc Bump test |
| | 100ppm Iso |
| | All Pass |
| | |
| | All low level alarms for $CO_2$ set at 19.5%. |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DMoh, M Marrow, T. McAlary, PN
Recorded By: DMoh
Weather: Sunny 25°C

Date: Aug 9 / Aug 10 Page 1 of
Primary Activities: He tests, Communication tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| Aug 9 | |
| 9:00 | Transient test @ Fan AB & B |
| 9:30 | Bring CO2 onto Roof |
| 10:00 | Transient test at Fan ) @ AB & B |
| | |
| | |
| | |
| | |
| Aug 10 | |
| 820 | took Blackout off WS 03 |
| | - Retrieved WMS and formaldehyde |
| 845 | He push/pull test |
| | - Dose for 20 sec |
| | - Wait [redacted] min |
| | To Fill a 1L tedlar bag at roof |
| 9:00 | 3BS - 57 sec |
| | 3BN - 52 sec |
| | Atmosphere - 47 sec |
| | Atmosphere 107 sec |
| | - 2.311 "wc @ 3BS |
| | - 2.794 "wc @ 3BN |
| 920 | 3BN sucked 1L tedlar bag in 24.4 sec |
| | |

Daily Field Report

923.16 [redacted]

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# DAILY FIELD REPORT

Project Name: ESTCP
Project Number: TR04 79
Field Personnel: DM MM + MM PN
Recorded By: DM
Weather: Sunny 25°C

Date: Aug 10 Page 2 of ___
Primary Activities: He tests, Communication tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| ~~0950~~ | He push/pull @ 3BN |
| 0950 | 10 sec Dose |
| | 1 min Delay |
| | |
| ~~1010~~ | Inter well test @ 3BN |
| | |
| 1000 | 3BS sucked a 1L tedlar bag in 1 min |
| | He push/pull @ 3BS |
| | 10 sec Dose |
| | 1 min Delay |
| | |
| 1026 | 3BS Interwell + push pull test |
| | He push/pull |
| | 10 sec Dose |
| | 1.5 min Delay |
| | |
| 1100 | 3BS2 sucked a 2/3L tedlar bag in 14 min |
| | Vac @ 3BS2 is 0.193 |
| | 3BS2 is 37 ft from VP3 |
| | 30 sec Dose |
| | 5 min Delay |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ETEP
Project Number: TR0499
Field Personnel: DM, PN, TM
Recorded By: DM / PN
Weather:

Date: Aug 9th
Page 1 of 1
Primary Activities: Vent Pipe Pressures and velocities

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 4258 | HSF-03-B Velocity 81 Vac 10.5 |
| 1 | HSF-01-A Vel: 85 Vac 11.75 |
| 4 | HSF-02-A Vel: 228 Vac 11.0 |
| 7 | HSF-03-A Vel: 83 Vac 10.5 |
| 10 | HSF-04-A Vel: 77 Vac 8.5 |
| 13 | HSF-05-A Vel: 772 Vac 5.0 |
| 16 | HSF-06-A Vel: 365 Vac 6.0 |
| 22 | HSF-08-A Vel: 525 Vac 5.0 |
| 25 | HSF-09-A Vel: 485 Vac: 6.0 |
| 19 | HSF-07-A Vel: 485 Vac: 6.0 |
| 26 | HSF09-B Vel: 435 Vac 6.0 |
| 27 | HSF-09-C Vel: 555 Vac 6.0 |
| 24 | HSF-08-C Vel: 899 Vac: 4.9 |
| 21 | HSF-07-C Vel = 475 Vac = 6.0 |
| 20 | HSF-07-B Vel 495 Vac 6.0 |
| 18 | HSF-06-C Vel 596 Vac = 6.0 |
| 15 | HSF-05-C Vel 327 Vac 5.25 |
| 12 | HSF-04-C Vel 766 Vac 8.5 |
| 9 | HSF-3-C Vel 457 Vac = 10.75 |
| 6 | HSF-2-C Vel 187 Vac 10.75 |
| 3 | HSF-1-C Vel 431 Vac 12.5 |
| 2 | HSF-1-B Vel 105 Vac 11 |
| 14 | HSF-5B Vel 175 VAC 5.0 |
| 5 | HSF 2B Vel 125 VAC 10.0 |
| 11 | HSF 4B Vel 97 VAC 8.5 |
| 17 | HSF 6B NonAccess |
| 23 | HSF 8B Vel 41 VAC 5.25 |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM, TM, PN
Recorded By: DM
Weather:

Date: Aug 9th
Page 1 of 1
Primary Activities: $CO_2$ test

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 11 20 | Calibration of MultiRAE |
| | Model # 022485 |
| | Oxy CO LEL $H_2S$ |
| | (18.8) (50ppm) (50%) (10ppm) |
| | All Pass |
| | VOC Bump test |
| | 100ppm Iso |
| | |
| | Model 21907 |
| | Mixed Gas test |
| | All Pass |
| | VOC Bump test |
| | 100ppm Iso |
| | All Pass |
| | |
| | All low level alarms for $CO_2$ set at |
| | 19.5% |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DNAPL, M Marcus, T. McHugh, PN
Recorded By: DNAPL
Weather: Sunny 25°C

Date: Aug 9 / Aug 10 Page 1 of
Primary Activities: He tests, Communication tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| Aug 9 | |
| 9:00 | Transient test @ Fan AB & B |
| 9:30 | Bring CO2 onto Roof |
| 10:00 | Transient test at Fan ) @ AB & B |
| | |
| | |
| | |
| | |
| Aug 10 | |
| 820 | took Bucket off VB 05 |
| | - Retrieved WMS and formaldehyde |
| | |
| 845 | He ~~push/pull~~ test |
| | - Dose ~~Set~~ 20 sec |
| | - Weight ~~187~~ gm |
| | |
| | To fill a 1L tedlar it took |
| 9:00 | 3BS - 57 sec |
| | 3BN - 52 sec |
| | Atmosphere - 47 sec |
| | Atmosphere 107 sec |
| | |
| | - 2.311 "wc @ 3BS |
| | - 2.794 "wc @ 3BN |
| 920 | 3BN sucked 1L tedlar bag in 24.4 sec |
| | |

Daily Field Report

923.16 117.8

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM MA + TM PN
Recorded By: DM
Weather: Sunny 25°C

Date: Aug 10
Page 2 of ___
Primary Activities: He tests, Communication tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| ~~0900~~ | He push/Pull @ 3BN |
| 950 | 10 sec Dose |
| | 1 min Delay |
| | |
| ~~1010~~ | Inter well test @ 3BN |
| | |
| 1000P | 3BS sucked a 1L tedlar bag in 1min |
| | He push/pull @ 3BS |
| | 10 sec Dose |
| | 1 min Delay |
| | |
| 1026 | 3BS Interwell + Push pull test |
| | He push/Pull |
| | 10 sec Dose |
| | 1.5 min Delay |
| | |
| 1100 | 3BS2 sucked a 2/3L tedlar bag in 14min |
| | Vac @ 3BS2 is 0.193 |
| | 3BS2 is 37ft from VP3 |
| | 30 sec Dose |
| | 5 min Delay |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP - MVS
Project Number: TR0479
Field Personnel: DMah, DWerts, Eckert
Recorded By: DMah
Weather: Hot, Humid

Date: 08/16/15 Page 1 of 1
Primary Activities: Velocity measurements and Dimensions of Ducts

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | | |
|---|---|---|---|---|
| facing | Duct | Section | Vel | Dim |
| West | ~~Supply~~ | ~~South~~ | 85 fpm | 116 x 38 |
| East | Exhaust | South | 430 FPM | 116 x 38 |
| | | | | |
| East | Exhaust | Middle | 75 FPM | 72 x 24 |
| West | Supply | Middle | 52 FPM | 36 x 36 |
| | | | | |
| West | Exhaust | North | 450 FPM | 116 x 45 |
| East | Supply | North | 45 FPM | 116 x 45 |

Vac inlet
0.12
0.15

Daily Field Report

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|---|---|---|

| | | | |
|---|---|---|---|
| **Project Name:** | ESTCP - Raritan Arsenal | **Date:** | 9/15/15 |
| **Project Number:** | | **Primary Activities:** | |
| **Field Personnel:** | | | |
| **Recorded By:** | Jared Brisman | | |
| **Weather:** | | | |

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 0800 | Arrive onsite and met with Kwong |
| 0815 | Obtained access to the roof of building 205 |
| 0825 | Noted radon sampler OA-01 rolled off of initial location by approximately 25' |
| [illegible] | Moved sampler back to initial location |
| 0827 | Removed WMS sampler 205-V3-PO |
| 0845 | Arrive at building 205 to retrieve radon samplers |
| 0850 | close / retrieve sample C-77 / SIE 619 |
| 0853 | close / retrieve sample C-5 / SIE 574 |
| 0906 | close / retrieve sample C-69 / SIE 366 |
| 0911 | close / retrieve sample C-204 / SIE 454 |
| 0914 | close / retrieve sample C-123 / SIE 437 |
| 0916 | close / retrieve sample C-211 / SIE 416 |
| 1015 | filled out chain of custodys and shipped samples at fedex |
| 1030 | JB offsite |

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(609) 895-1400 Fax (609) 895-1401

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**Project Name:** Raritan Arsenal
**Project Number:**
**Field Personnel:** M.Mraw
**Recorded By:** MM
**Weather:** Sunny 70's

**Date:** 10/26/15 **Page** 1 **of** 1
**Primary Activities:** Pick up WMS

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1345 | MM Arrive onsite check in with Site Security and Kenny to gain access to Roof of Building 205 |
| 1353 | Collect WMS from HSF-03 |
| 1357 | Collect SF-01 |
| 1402 | Collect SF-02 |
| 1405 | Collect SF-03 |
| 1430 | offsite |

MM

# DAILY FIELD REPORT

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**Project Name:** Raritan Arsenal
**Project Number:**
**Field Personnel:** M. Mian
**Recorded By:** NM
**Weather:** Fog, 50's

**Date:** 12/14/15 **Page** 1 **of** 3
**Primary Activities:**
ESTCP Bldg 205
System OMM

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 0815 | NM ~~Check~~ MR onsite Check in with Kuong |
| 0830 | 205-S6-11 Vacuum 0.280 in $H_2O$ |
| 0844 | HSF-03-A Vacuum 9.0 in $H_2O$ (HVAC-A green) New |
| 854 | HSF-03-B Vacuum 9.0 in $H_2O$ |
| 0854 | HSF-03 C Vacuum 10.2 in $H_2O$ (UTube) |
| 0856 | HSF-03c Vacuum 8.0 in $H_2O$ (Vacuum gauge) |
| 0922 | 205-S6-12 B/B Allen key size use Facility for allen key |
| 0925 | 205-S6-12 Vacuum 0.727 in $H_2O$ |
| 0945 | Cont D. Mian unable to locate 205-S6-15 and 205-S6-14 |
| 1020 | 205-S6-15 ~~0.045~~ 0.075 in $H_2O$ positive pressure |
| 1030 | 205-S6-14 0.005 in $H_2O$ positive pressure |
| 1108 | 1,951 fpm at ~~HF3~~ HSF-03 |
| 1110 | Collect grab Samp HSF-03 Summa canister 723 |
| 1115 | collect Radon grab sample HSF-03 |
| 1120 | Deploy WMS at HSF-03 1511-AN-R-018 |
| 1131 | Turn on Fan HSF |
| 1133 | Velocity 2,593 fpm at HSF-03 |
| 1141 | Collect Summa grab sample from HSF-03 |
| 1145 | collect Radon grab sample |
| 1151 | Deploy HSF-03 WMS at HSF-03 1511-AN-R-017 |

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|---|---|---|

**Project Name:** Rurita Arsenal
**Project Number:**
**Field Personnel:** M. Mraw
**Recorded By:** MM
**Weather:** 60's

**Date:** 12/14/15 **Page** 2 **of** 3
**Primary Activities:** ESTP Bldg 205 OMM

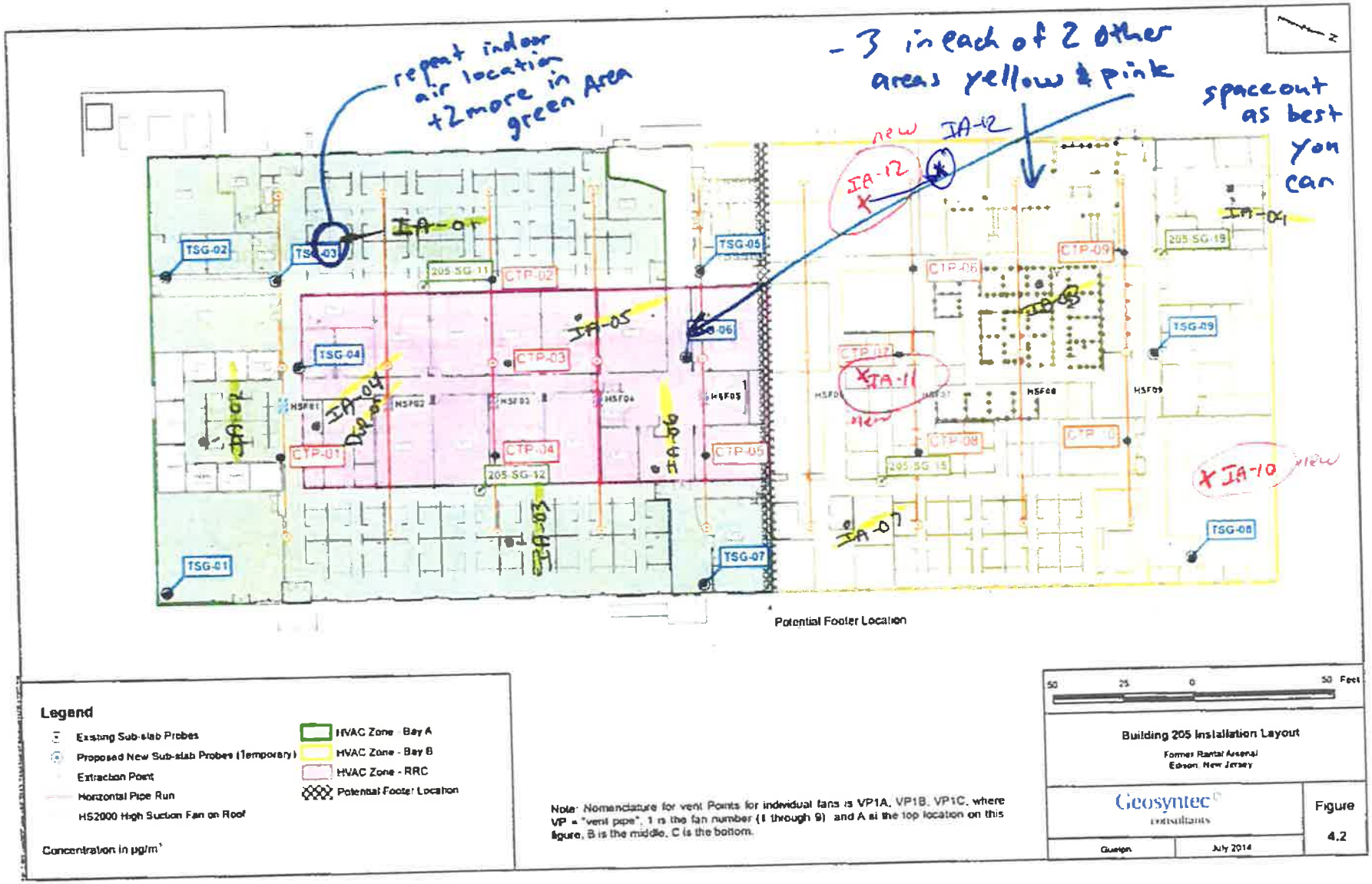
| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| ~~1205~~ | offsite for lunch |
| 1245 | onsite |
| 1247 | Deploy OA-02, C115, LR7913 |
| | Dup-0, C75, LR7812 |
| 1250 | Deploy OA-01, C106, LR3136 |
| 1300 | Deploy HVAC-01, C21, LS3892 |
| 1305 | Deploy HVAC-02, C52, LS3770 |
| 1308 | Deploy HVAC-03, C196, LR3277 |
| ~~1314~~ 1314 | 205-S6-15 Vacuum 0.074 $mH_2O$ |
| 1320 | HSF-08-C Vacuum 3.8 $in H_2O$ (V-706 |
| 1320 | HSF-06-C 3.911 $in H_2O$ (Zephyr) |
| 1333 | 205-S6-14 Vacuum 0.030 $in H_2O$ |
| 1337 | HSF-08B Vacuum 4.221 $mH_2O$ |
| 1345 | HSF-08A Vacuum ~~4.082~~ 4.105 $in H_2O$ |
| 1348 | 205-S6-11 Vacuum 0.239 $in H_2O$ |
| 1351 | HSF-03-A Vacuum 9.867 |
| 1354 | HSF-03B Vacuum 9.885 |
| 1358 | 205-S6-12 Vacuum 0.697 |
| 1400 | HSF-03C Vacuum 9.859 |
| 1425 | Deploy IA-01 C-44, LR3459 |
| 1427 | Deploy IA-02 C-13, LR7717 |
| 1428 | Deploy IA-03 C-134, LR3329 |
| | |

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|---|---|---|

**Project Name:** Raritan Arsenal **Date:** 12/14/15 **Page** 3 **of** 5
**Project Number:** **Primary Activities:**
**Field Personnel:** M. Maw RSTP Building 205
**Recorded By:** MM
**Weather:** 40's

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1435 | Deploy IA-04 C108 LR3471 |
| | Dup C76 LR3496 |
| 1437 | Deploy IA-05 C-98 LR3133 |
| | Deploy IA-06 C-70 LR7940 |
| 1441 | Deploy IA-07 C-17 LR3142 |
| 1442 | Deploy IA-11 C-34 LR8007 |
| 1445 | Deploy IA-01 C50 LR3321 |
| 1446 | Deploy IA-08 C-73 LR3105 |
| 1444 | Deploy IA-12 C176 LR3148 |
| 1454 | Deploy IA-10 C198 LS3680 (Behind TV) |
| 1500 | offsite |

MM


repeat indoor air location +2 more in green Area
- 3 in each of 2 other areas yellow & pink
spaceout as best you can
new IA-12
IA-12
IA-11
new
IA-10
new
IA-01
IA-02
IA-03
IA-04
IA-05
IA-06
IA-07
IA-08
TSG-01
TSG-02
TSG-03
TSG-04
TSG-05
TSG-06
TSG-07
TSG-08
TSG-09
205-SG-11
205-SG-12
205-SG-13
205-SG-15
205-SG-16
CTP-01
CTP-02
CTP-03
CTP-04
CTP-05
CTP-06
CTP-07
CTP-08
CTP-09
HSF01
HSF02
HSF03
HSF04
HSF08
HSF09
Potential Footer Location
Legend
Existing Sub-slab Probes
Proposed New Sub-slab Probes (Temporary)
Extraction Point
Horizontal Pipe Run
HS2000 High Suction Fan on Roof
Concentration in µg/m³
HVAC Zone - Bay A
HVAC Zone - Bay B
HVAC Zone - RRC
Potential Footer Location
Note: Nomenclature for vent Points for individual fans is VP1A, VP1B, VP1C, where VP = "vent pipe", 1 is the fan number (1 through 9) and A at the top location on this figure, B is the middle, C is the bottom.
50 25 0 50 Feet
Building 205 Installation Layout
Former Raritan Arsenal
Edison, New Jersey
Geosyntec consultants
Figure
4.2
Guelph
July 2014

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0779
Field Personnel: DM BW EC
Recorded By: BW
Weather:

Date: 08/16/15 Page 1 of 1
Primary Activities: IA Samples

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | CAN | PE | INI | TIME FIN |
|---|---|---|---|---|---|
| | 205-IA-01-GS | #1053 | 0523 | 29.75 | 13:19 |
| | 205-IA-02-GW | #1856 | 0540 | 29.77 | 13:19 |
| 12:59 | 205-IA-03-GS | #1984 | 0527 | 29.62 | 13:26 |
| 12:59 | 205-IA-04-GW | #1553 | 0611 | 29.63 | 13:26 |
| 12:56 | 205-IA-05-PS | #1554 | 0508 | 29.66 | 13:22 |
| 12:56 | 205-IA-06-PS-1 | #1611 | 0705 | 29.77 | 13:22 |
| 12:56 | 205-IA-07-PW | 1704 | 0672 | 29.71 | 13:22 |

WMS Deployment at VP-03 B205

| Sample ID | ~~Sampler~~ Canister ID |
|---|---|
| 205-V3-P.O. | 1506-AN-R-078 |

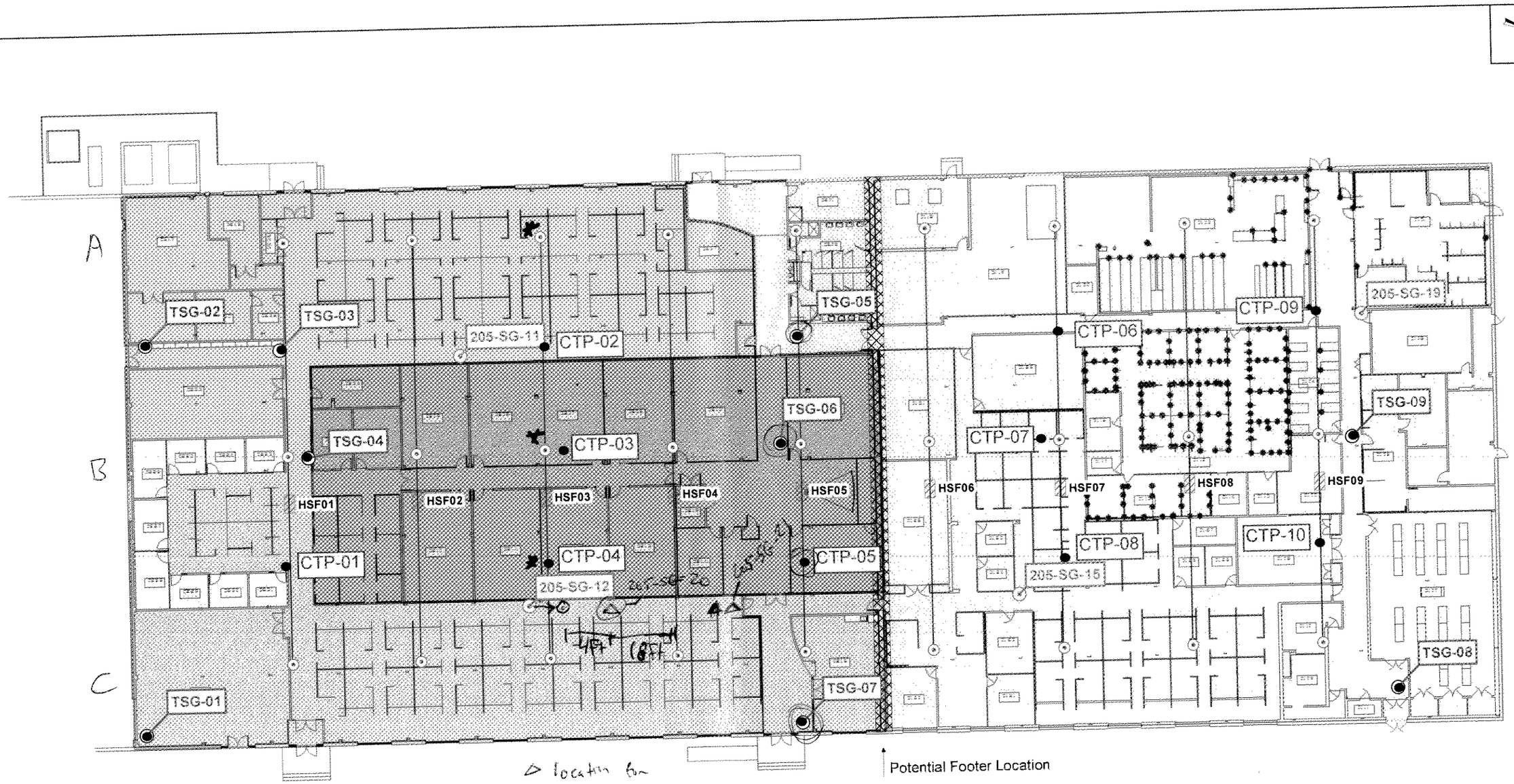
| Time | Date | Method |
|---|---|---|
| 15:40 | 08/16/15 | TO-17 |

Daily Field Report

C1.2

Site #1: Building 205

Tracer Tests




## Legend

- Existing Sub-slab Probes
- Proposed New Sub-slab Probes (Temporary)
- Extraction Point
- Horizontal Pipe Run
- HS2000 High Suction Fan on Roof

- HVAC Zone - Bay A
- HVAC Zone - Bay B
- HVAC Zone - RRC
- Potential Footer Location

Concentration in $\mu g/m^3$

Note: Nomenclature for vent Points for individual fans is VP1A, VP1B, VP1C, where VP = "vent pipe", 1 is the fan number (1 through 9) and A si the top location on this figure, B is the middle, C is the bottom.

50 25 0 50 Feet

**Building 205 Installation Layout**

Former Raritan Arsenal
Edison, New Jersey

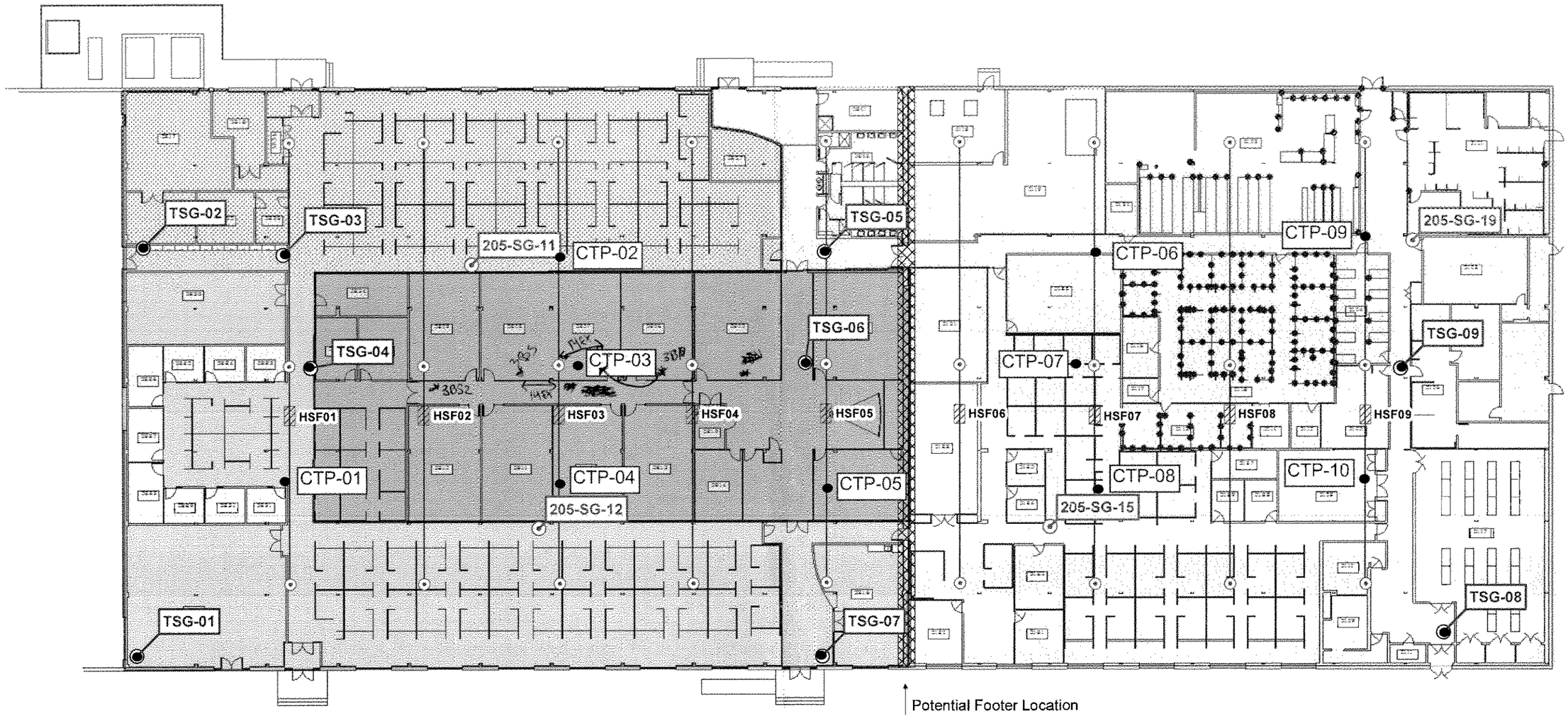
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Figure 4.2

path: C:\GIS_Local\GIS\Projects_Local\TR0479 - Raritan Arsenal\Projects\building205\mxd\HVAC.mxd

He Push Roll / Interwell locations




## Legend

- Existing Sub-slab Probes
- Proposed New Sub-slab Probes (Temporary)
- Extraction Point
- Horizontal Pipe Run
- HS2000 High Suction Fan on Roof
- HVAC Zone - Bay A
- HVAC Zone - Bay B
- HVAC Zone - RRC
- Potential Footer Location

Concentration in µg/m$^3$

Note: Nomenclature for vent Points for individual fans is VP1A, VP1B, VP1C, where VP = "vent pipe", 1 is the fan number (1 through 9) and A si the top location on this figure, B is the middle, C is the bottom.

50 25 0 50 Feet

**Building 205 Installation Layout**

Former Rarital Arsenal
Edison, New Jersey

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Guelph | July 2014

Figure **4.2**

# SAB

| Time | He ppm |
|---|---|
| 42:45 | 0 |
| 44:45 | 0 ppm |
| 50:00 | 0 ppm |
| 52:00 | 0 ppm |
| 55:00 | 0 ppm |
| ~~60:00~~ 62.00 | 0 ppm |

| Time | Loc | Helium |
|---|---|---|
| 1:06:17 | TS6-03 | 275 |
| 1:09:29 | TS6-03 | 300-275 |
| 1:11:00 | TS6-03 | 300 |
| 1:14:43 | TS6-03 | 300-325 |

pressure 0.167 at TS6-03

| | | |
|---|---|---|
| 1:19:19 | 205-36-11 | 0 |
| 1:19:39 | TS6-03 | 0 |

drill holes

take sample(s)

vacuum holes

5 - ~~MW~~ BC

# DAILY FIELD REPORT

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**Project Name:** _____ **Date:** _____ **Page** ___ **of** ___

**Project Number:** _____ **Primary Activities:** _____

**Field Personnel:** _____

_____

**Recorded By:** _____

**Weather:** _____

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | |
|---|---|---|---|
| | Location | He Conc | Description |
| 11:30 | 5 ~~MW~~ BC | 0 | |
| 17:00 | 5 ~~MW~~ BC | 0 | |
| 30:40 | 5 ~~MW~~ BC | 0 | |
| 32:30 | 5 BC | 0 | |
| 45:35 | 5 BC | 0 | |
| 47:00 | 5 BC | 0 | |
| 49:30 | 5 BC | 0 | |
| 57:00 | | 0 | |
| 60:00 | | 0 | * started FAN 9 |
| 1:20:00 | | 0 | |
| 1:22:00 | | 0 | |
| 1:25:00 | Vent 5C | 900 ppm | |
| 1:40:00 | Probe 5 B | 1800 | |

Daily Field Report

# Helium Flood 205-SG-21

| elapsed time | He (ppm) |
|---|---|
| 30:00 | 75 |
| 32:00 | 150 |
| 34:00 | 225 |
| 36:00 | 275 |
| 41:12 | 475 |
| 42:30 | 500 |
| 44:0 | 575 |
| 46:30 | 650 |
| 53:30 | 900 |
| 1:02:00 | 1325 |
| 1:21:30 | 2325 |
| 1:31:00 | 2650 |

Location 205-SG-20 (New Drilled hole)

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# DAILY FIELD REPORT

Project Name: _____ Date: _____ Page ___ of ___

Project Number: _____ Primary Activities: _____

Field Personnel: _____

_____

Recorded By: _____

Weather: _____

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| | Location Helium Description |
| 634 | 75 |
| 650 | 175 |
| 750 | 200 |
| 756 | 225 |
| 802 | 250 |
| 813 | 275 |
| 847 | 350 |
| 912 | 400 |
| 938 | 475 |
| 1000 | 525 |
| 1020 | 575 |
| 1258 | ~~1100~~ 1050 |
| 1350 | 1175 |
| 1425 | 1300 |
| 1450 | 1375 |
| 1530 | 1500 |
| 1745 | ~~2000~~ 1950 |
| 1930 | 2250 Adjusting He to 2.2% |
| 2010 | 2350 |
| 2105 | 2475 |
| 2200 | 2600 |
| 23:30 | 2950 |
| 24:30 | 3125 |
| 25:30 | 3275 |
| 26:30 | 3450 |
| 27:30 | 3650 |
| 38:00 | 5600 |
| 56:00 | 7300 |
| 59:00 | 7525 |
| 1:29:00 | 9475 |

Daily Field Report

# FMM-MD SENSOR ASSEMBLY LOGSHEET

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## DAILY FIELD REPORT

Project Name: ESTCP
Project Number: TR0479
Field Personnel: DMall PNicholson
Recorded By: DMall
Weather: Sunny 30°C

Date: Aug 8 2014 Page 1 of 2
Primary Activities: Radon/HC#0 sampling
Drill Holes

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | | | |
|---|---|---|---|---|---|
| | Indoor | Out door | VP09 | VP01 | VP02 |
| SA serial | 017M13 | 016M13 | 018M13 | 018M13 | 016M13 |
| FMM-MD Serial | SA#01 | SA#03 | SA#02 | SA#02 | SA#03 |
| Site ID | IN01 | EX01 | VP09 | VP01 | VP02 |
| Measurement type | Cont | Direct | Direct | Direct | Direct |
| At start of exp Sample # | 001 | 201 | 101 | 102 | 103 |
| Date | Aug 8 | Aug 8 | Aug 8 | Aug 8 | Aug 8 |
| Time | 848 | 917 | 904 | 1039 | 1052 |
| Prior exp? | Y | Y | Y | Y | Y |
| Photograph taken? | Y | Y | Y | Y | Y |
| End of Exp Date | Aug 8 | 1049 | 10:35 | 12:11 | 12:23 |
| Time | 2104 | Aug 8 | Aug 8 | Aug 8 | Aug 8 |
| Last Read | ~~1500~~ 1800 | <10ppb | <10ppb | <10ppb | <10ppb |
| Replace SA and Place in bag | YES | No | No, taking another Sample | No | NO |

Daily Field Report

# FMM-MD SENSOR ASSEMBLY LOGSHEET

## DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DMal; PNicholson
Recorded By: DMal
Weather: Sunny 30°C

Date: Aug 8 2014 Page 2 of 2
Primary Activities: Radon/HCHO Sampling
Drill Holes

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | | | | |
|---|---|---|---|---|---|---|
| | VP03 | VP04 | VP05 | VP06 | VP07 | VP08 |
| SA Serial | 018M13 | 016M13 | 018M13 | 016M13 | 018M13 | 016M13 |
| FMM Serial | SA#02 | SA#03 | SA#02 | SA#03 | SA#02 | SA#03 |
| Site ID | VP03 | VP04 | VP05 | VP06 | VP07 | VP08 |
| Measurement type | Direct | Direct | Direct | Direct | Direct | Direct |
| At Start of Exp Sample # | 104 | 105 | 106 | 107 | 108 | 109 |
| Date | Aug8 | Aug8 | Aug8 | Aug8 | Aug8 | Aug8 |
| Time | 12:13 | 1225 | 1352 | 1402 | 1528 | 1534 |
| Prior Exp? | Y | Y | Y | Y | Y | Y |
| Photo taken? | Y | Y | Y | Y | N[sic] | N |
| End of Exp Date | Aug8 | Aug8 | Aug8 | Aug8 | Aug8 | Aug8 |
| Time | 1550 | 1401 | 1524 | 1532 | 1718 | 1719 |
| Last Reading | <10ppb | <10ppb | 37ppb | 44ppb | <10ppb | |
| Replace SA in Foil? | No | No | No | No | No | No |

Daily Field Report

FMM-MD ~~018M13~~ 016M13
SA ~~#02~~ #03
SAMPLE # 200
CONTINUOUS MODE
INDOOR

START 19:23
STOP 21:05
12ppb

# FMM-MD SENSOR ASSEMBLY LOGSHEET

## DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DMoll, PNicholson, DMoll, Hulsey
Recorded By: DMoll
Weather: Sunny 30°C

Date: Aug 8 2014 Page 1 of 2
Primary Activities: Radon/HCHO Sampling

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | | | |
|---|---|---|---|---|---|
| [redacted] | Indoor | Out door | VP09 | VP01 | VP02 |
| SA serial | 017M13 | 016M13 | 018M13 | 018M13 | 016M13 |
| FMM-MD Serial | SA#01 | SA#08 | SA#02 | SA#02 | SA#03 |
| Site ID | IN01 | EX01 | VP09 | VP01 | VP02 |
| Measurement type | Cont | Direct | Direct | Direct | Direct |
| At start of exp Sample # | 001 | 201 | 101 | 102 | 103 |
| Date | Aug 8 | Aug 8 | Aug 8 | Aug 8 | Aug 8 |
| Time | 848 | 917 | 904 | 1039 | 1052 |
| Prior exp? | Y | Y | Y | Y | Y |
| Photograph taken? | Y | Y | Y | Y | Y |
| End of Exp Date | Aug 8 | 1049 | 10:35 | 12:11 | 12:23 |
| Time | ~~XX~~ 2104 | Aug 8 | Aug 8 | Aug 8 | Aug 8 |
| Last Reading | ~~[illegible]~~ 18ppb | <10ppb | <10ppb | <10ppb | <10ppb |
| Replace SA and Place in bag | YES | No | No, taking another Sample | No | NO |

Daily Field Report

C1.3
Site #1: Building 205
Radon Sampling

# Radon Sampling Sheet

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## DAILY FIELD REPORT

Project Name: ESTCP
Project Number: IR0479
Field Personnel: D.Mali P. Nicholson
Recorded By: D.Mali
Weather: Sunny 30°C

Date: Aug 8 2014 Page 2 of ___
Primary Activities: Radon/HCHO Sampling
Drilling Holes

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1144 | Serial # 3707 |
| | Sample ID RADVP04 |
| | Purge Began |
| 1148 | Start Sample |
| 1250 | Finished Sample |
| | |
| 1207 | Serial # 3523 |
| | Sample ID: RADVP05 |
| | Started Purge |
| 1203 | Started Sample |
| 1303 | Finished Sample |
| | |
| 1253 | Serial # 3707 |
| | Sample ID: RADVP06 |
| | Started Purge |
| 1255 | Started Sample |
| 1356 | Finished Sample |
| | |
| 1309 | Serial # 3523 |
| | Sample ID: RADVP07 |
| | Started Purge |
| 1310 | Started Sample |
| 1411 | Finished Sample |
| | |
| 1358 | Serial # 3707 |
| | Sample ID: RADVP08 |
| | Started Purge |
| 1359 | Started Sampling |
| | Finished Sampling |

Daily Field Report

* 87ft from front edge of building 3 102ft from ISRG Prop to GS

# Radon Sampling Sheet.

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## DAILY FIELD REPORT

Project Name: ESTCP
Project Number: IR0479
Field Personnel: DMoll PNicholson
Recorded By: DMoll
Weather: Sunny 30°C

Date: Aug 8 2014 Page 1 of ___
Primary Activities: Radon & HCHO Samples and Drill Logs

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 905 | Serial # 3707 |
| | Sample ID: ~~RADEX09~~ RADVP09 |
| | Purging began |
| 9:20 | Started Sampling |
| 10:16 | Finished Sampling |
| | |
| 9:16 | Serial # 3523 |
| | Sample ID: RADVP01 |
| | Purging began |
| 9:41 | Started Sampling |
| 10:41 | Finished Sampling |
| | |
| 10:27 | Serial # 3707 |
| | Sample ID: RADVP02 |
| | Purging Began |
| 10:38 | Sampling Began |
| 11:40 | Finished Sampling |
| | |
| 10:47 | Serial # 3523 |
| | Sample ID: RADVP03 |
| 1056 | Started Purge |
| 11:57 | Finished Sampling. |
| | |
| | |
| | |

©Daily Field Report

# Radon Sampling Sheet

## DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: IR0479
Field Personnel: DMak, D. Nicholson
Recorded By: DMak
Weather: Sunny 30°C

Date: Aug 8 2014 Page 2 of ___
Primary Activities: Radon/HCl/O Sampling
Drilling Holes

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1144 | Serial # 3707 |
| | Sample ID RADVP04 |
| | Purge Began |
| 1148 | Start Sample. |
| 1250 | Finished Sample |
| | |
| 1201 | Serial # 3523 |
| | Sample ID: RADVP05 |
| | Started Purge |
| 1203 | Started Sample |
| 1303 | Finish Sample |
| | |
| 1253 | Serial # 3707 |
| | Sample ID: RADVP06 |
| | Started Purge |
| 12.55 | Started Sample |
| 1356 | Finished Sample |
| | |
| 1309 | Serial # 3523 |
| | Sample ID: RADVP07 |
| | Started Purge |
| 1310 | Started Sample |
| 1411 | Finished Sample |
| | |
| 1358 | Serial # 3707 |
| | Sample ID: RADVP08 |
| | Started Purge |
| 1359 | Started Sampling |
| | Finished Sampling |

Daily Field Report

* 87ft from fan to edge of building } 102ft total
15ft Probe

# Radon Sampling Sheet.

## DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP
Project Number: TR0478
Field Personnel: DMoll PNicholson
Recorded By: DMoll
Weather: Sunny 30°C

Date: Aug 8 2014 Page 1 of ___
Primary Activities: Radon & HCHO Samples and Drill Holes

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 905 | Serial # 3707 |
| | Sample ID: ~~RADEX09~~ RADVP09 |
| | Purging begin |
| 9:20 | Start sampling |
| 10:30 | Finished Sampling |
| | |
| | |
| 9:16 | Serial # 3523 |
| | Sample ID: RADVP01 |
| | Purging began |
| 9:41 | Started Sampling |
| 10:41 | Finished Sampling |
| | |
| | |
| 10:27 | Serial # 3707 |
| | Sample ID: RADVP02 |
| | Purging Began |
| 10:38 | Sampling Began |
| 11:40 | finished Sampling |
| | |
| | |
| 10:47 | Serial # 3523 |
| | Sample ID: RADVP03 |
| 1056 | Started Purge |
| 11:57 | Finished Sampling. |
| | |
| | |
| | |

Daily Field Report

C2.0

Site #2: Building 200

Former Raritan Arsenal

C2.1
Site #2: Building 200
General Notes

# DAILY FIELD REPORT

**Geosyntec Consultants**
7 Graphics Drive, Suite 106
Ewing, NJ 08628
(609) 895-1400 Fax (609) 895-1401

Geosyntec consultants

**Project Name:** Raritan Arsenal **Date:** 7/24/15 **Page** 1 **of** 3
**Project Number:** **Primary Activities:**
**Field Personnel:** M. Mraw
**Recorded By:** NM
**Weather:** Sunny

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information | | | |
|---|---|---|---|---|
| 0800 | Arrive at USEPA Raritan Arsenal | | | |
| | Check in with Kevin at bldg 207 | | | |
| 0805 | Health and Safety ladder safety | | | |
| | 3 points of contact | | | |
| ~~0820~~ 0820 | Mobilize to bldg 200 Nurse station. | | | |
| 0825 | | | | |
| | Location | Vacuum in H2O | Velocity Rate (FPM) | Vent Pipe off |
| 0831 | ASDS 200-1 | 2.832 | 35 - 36 | NA |
| 0849 | ASDS 200-2 | 2,786 | 36 - 37 | NA |
| 0852 | ASDS 200-3 | 2.801 | 35 - 37 | NA |
| 0900 | ASDS 200-1 | 2,912 | 41 - 42 | 200-2, 200-3 |
| 0905 | ASDS 202 | 3.133 | 56 - 39 | 200-1, 200-3 |
| 0910 | ASDS 203 | 3,106 | 35 - 41 | 200-1, 200-2 |
| 0920 | Set up Summa Canister for Sample at 200-1 | | | |
| 0942 | Sampled ASDS-200-1 can 668, Vac 29.2 to 0.6 in Hg | | | |
| | Batch L1515395-02 | | | |
| 958 | Sampled ASDS-200-2 Can 875, vac 28.2 to 1.1 in Hg | | | |
| | Batch L1515395-02 | | | |
| 1000 | Sampled ASDS-200-3 Can 573 vac 29.2 to 0.9 in Hg | | | |
| | Batch L1515395-02 | | | |
| 1025 | Deploy WMS at ASDS-200-1 1506-AN-R-0060 | | | |
| 1035 | Deploy WMS at ASDS-200-2 1506-AN-R-062 | | | |
| 1040 | Deploy WMS at ASDS-200-3 1506-AN-R-063 | | | |

Kevin 732-241-4185

# DAILY FIELD REPORT

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Project Name: ESTCP HIS
Project Number: IM0479.
Field Personnel: D Mah W. Weitz E Ockel
Recorded By: DMah
Weather: Sunny

Date: 08/13/15 Page 1 of 1
Primary Activities: Meet & Greet, Radon Samples

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1312 | - Meeting with Kwong, Steve, & Barry of the maintenance. Bill, Darius & Emily from Geosyntec. |
| | - going over what we need from their crew. |
| | - Mike & Jim joined from operations. |
| | - Plan of action is to manually position the dampers, turn off the supply & keep the exhaust going |
| | - estimates +/- 1.5 HER |
| | - runs in occupied vs unoccupied mode. |
| | - Ask security to call Northside on radio. |
| | L Northside will let us in to B200 |
| | - Contact Steve or HVAC via radio. |
| 1415 | - went to Building 200 to set up for Radon samples |
| 1730 | - took Stakre vacuum measurements at 9/11 SSD locations, and made 3 New SSD locations 3 ft from vent pipes. |
| 1845 | - taking Radon & thoron measurements from all 3 Vent pipes & Combined vent pipe |
| 2215 | - Finish sampling leaving site. |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DMoll, W Weitz, E. Ockert
Recorded By: DMoll
Weather: Very Hot, Humid

Date: 08/18/15 Page 1 of 2
Primary Activities: Radon, Thoron, IA, Samples, Pressure transducer collection

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 705 | - Arrived on Site |
| | - Going to build stack extention |
| | |
| 920 | Called Scott (HVAC team) to |
| | ask which way the exhaust is facing, |
| | he told me west in the North East |
| | in the South and not sure in the middle |
| 930 | took Velocities of Ducts |
| | |
| 1007 | took Sample at South Duct. on roof |
| 1015 | took Sample at Middle Duct on roof |
| 1023 | took sample at North Duct on roof |
| 1107 | Not installed Stack anymore after |
| | talking with Todd. |
| 1230 | - Bill taking Stationary & walk around |
| | Samples on B205 |
| | - Dames taking Thoron & Tedlar Radon Samples |
| | in B205, same locations as Manometer |
| | Meters. |
| 1230 | - Purple Radon collected at 1230. (B205 Indoor Radon Samples) |
| 1246 | - Green - ~~East~~ East collected at 1246. |
| 1259 | - Green - West collected at 1259 |
| 1305 | - Yellow - East called at 1305 |
| 1406 | - took tedlar bag Sample at B205 |
| 1408 | - started RAD7 Sample at B200 |
| | 4 for Thoron. |
| | - Also took tedlar bag Samples for Radon Analysis |
| | |

Daily Field Report

# DAILY FIELD REPORT

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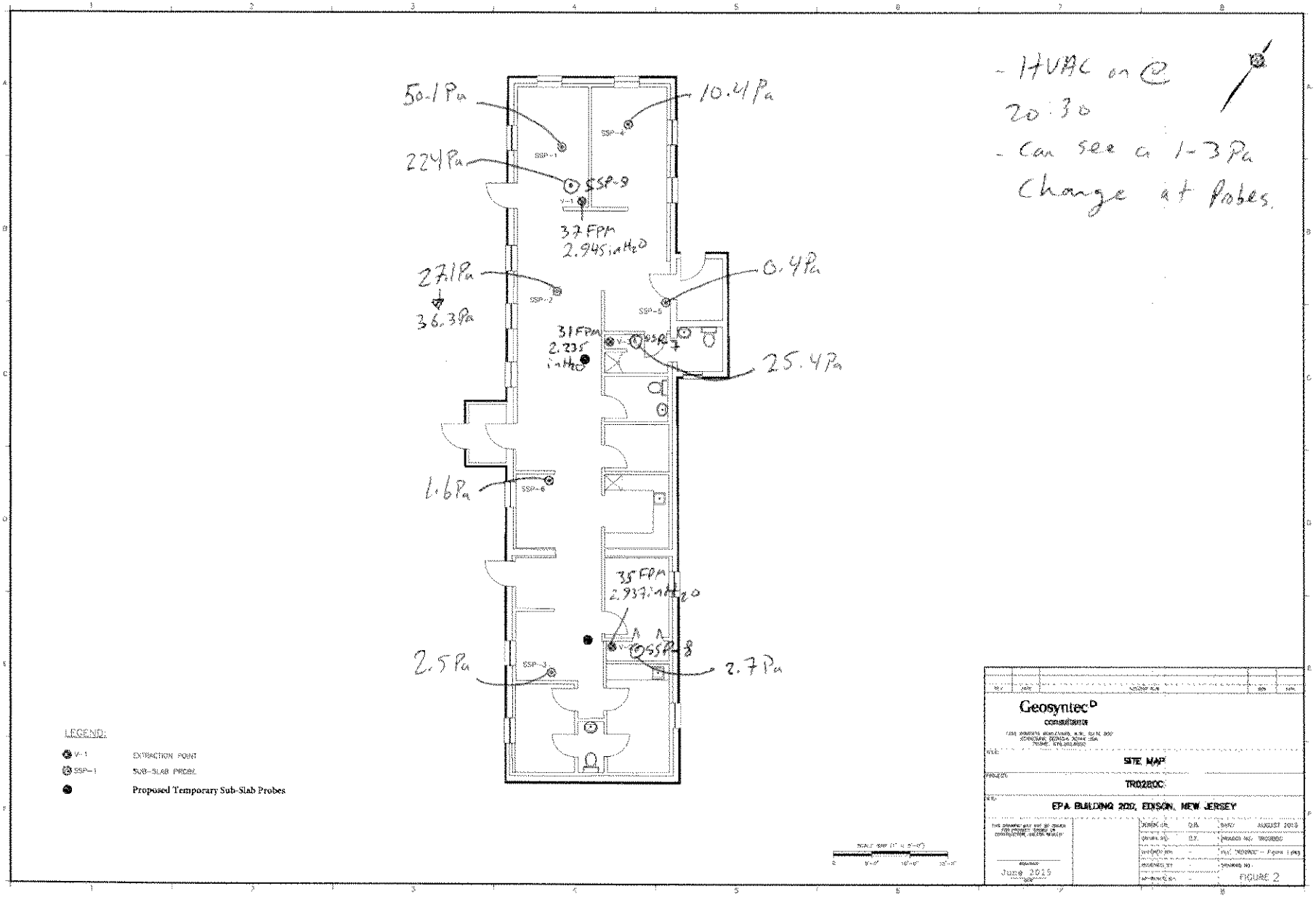
Project Name: ESTCP
Project Number: IR0479
Field Personnel: D Mali, W Weitz, E. Oakes
Recorded By: D Mali
Weather: Very Hot, Humid

Date: 08/16/15 Page 2 of 2
Primary Activities: IM, Radon, & Thoron Samples

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 14:15 | Deploying Ecorns in B700. |
| 16:05 | left Site for Airport. |

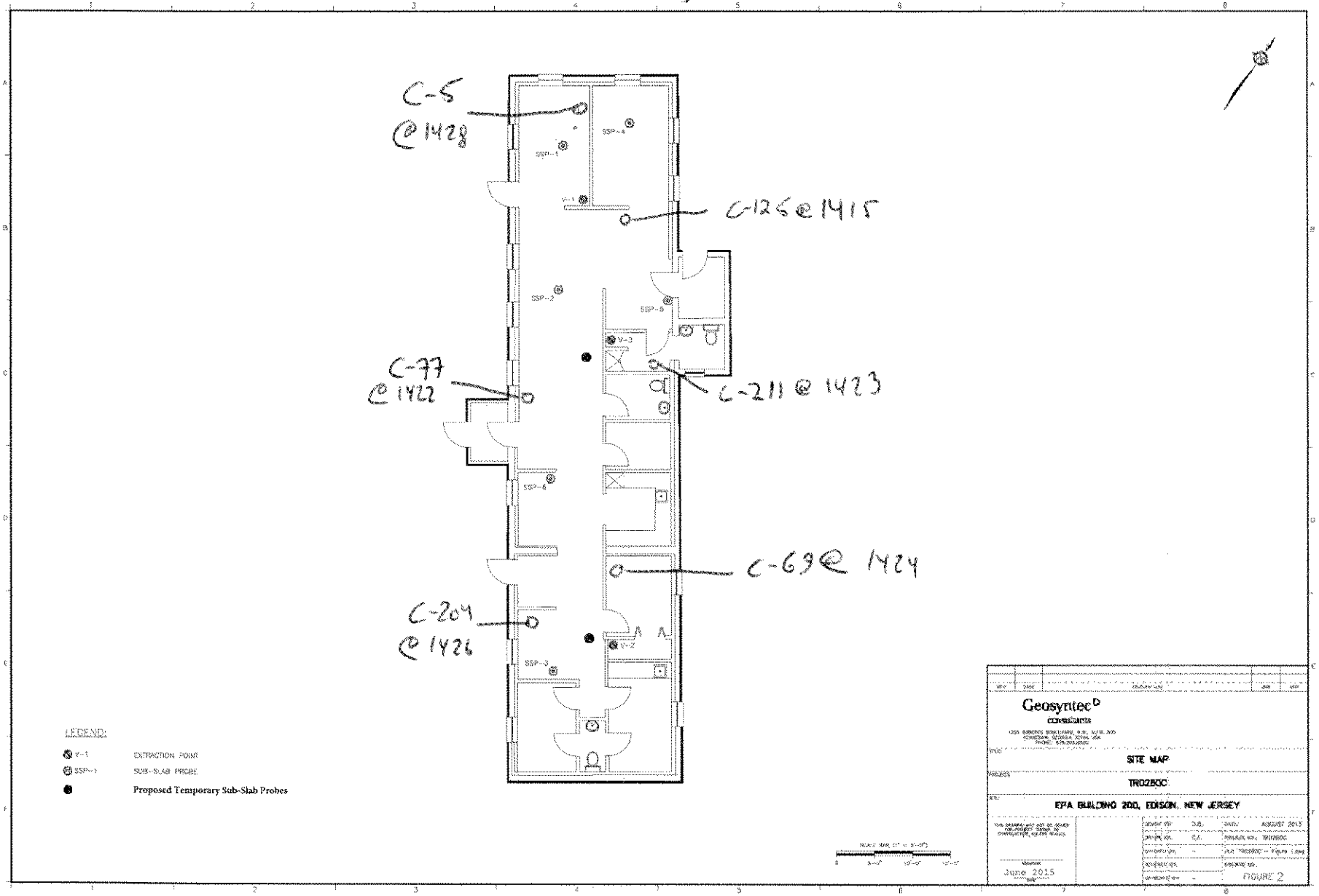
Daily Field Report

STATIC VACUUMS AT SSP & Vacuum / Flow Rates at VENT PIPES. 08/13/15

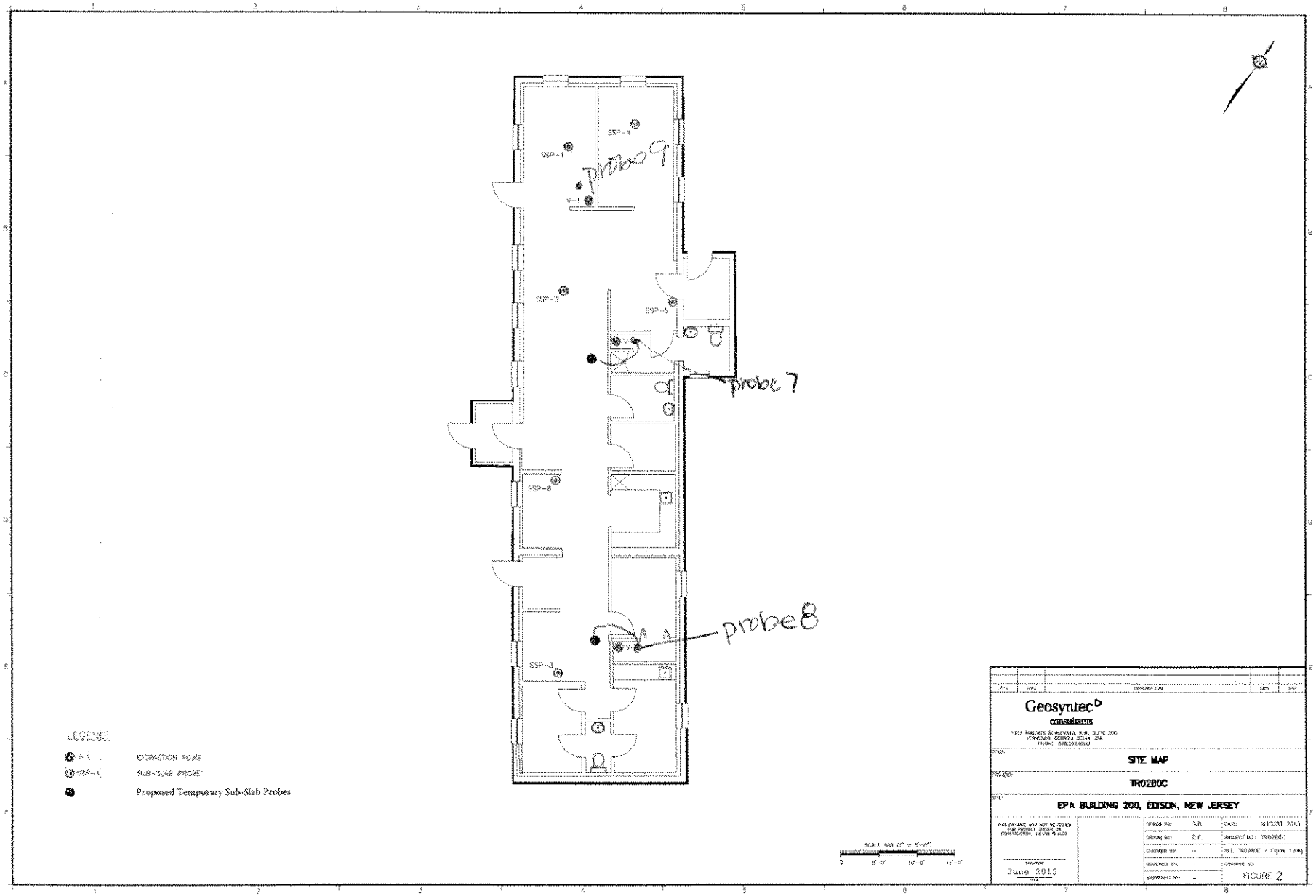


08/10/15

EPerm1 locations



NEW PROBE INSTALLS
(TEMP)



# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM BW EO TM
Recorded By: DM EO
Weather:

Date: 08/14/15 Page 1 of 1
Primary Activities: Tracer tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | |
|---|---|---|---|
| | Vent Pipe | Probe # | distance (in) |
| | 1 | 2 | 137 |
| | 1 | 1 | 103 |
| | 1 | 4 | 145 |
| | 1 | 5 | 157 |
| | 1 | 7 | 207 |
| | 3 | 7 | 36 |
| | 3 | 2 | 98 |
| | 3 | 1 | 297 |
| | 3 | 4 | 330 |
| | 3 | 5 | 122 |
| | 3 | 6 | 213 |
| | 2 | 6 | 271 |
| | 0 | 6 | |
| | 2 | 3 | |
| | 2 | 8 | 36 |
| | 2 | 3 | 107 |
| | 3 | 7 | 36 |
| | 1 | 9 | 36 |

Daily Field Report

# DAILY FIELD REPORT

**Geosyntec Consultants**
7 Graphics Drive, Suite 106
Ewing, NJ 08628
(609) 895-1400 Fax (609) 895-1401

Geosyntec consultants
engineers | scientists | innovators

**Project Name:** ESTCP
**Project Number:** TR0479
**Field Personnel:** M. Mraw (MM)

**Recorded By:** MM
**Weather:** Sunny 60's

**Date:** 4/15/16 **Page** 1 **of** 2
**Primary Activities:** Fan Replacement

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 0745 | MM onsite Site Security opens up B2000 |
| 0803 | Vacuum exterior 4.462 in $H_2O$ with Zephyll + |
| 08060 | Dwyer Velocity 110 fpm Range on Dwyer 1500 Range set to 5000 215 fpm |
| 813 | Range set to 500 – 105 fpm |
| 817 | ASDS-2000-1 Vacuum 4.334 in $H_2O$ Velocity 99 fpm |
| 820 | ASDS-2000-3 Vacuum 4.327 in $H_2O$ velocity 92 fpm |
| 0840 | Kuney attempt to find key for locked room in B2000 with ASDS-2000-2 |
| 0900 | James + helper, Bob (Electrician) onsite helper forgot ~~license~~ license will not be allowed onsite, helper also gave security attitude |
| 0905 | Conduct H+S discuss regarding head Safety ladder safety |
| | JAMES MUSARRA |
| 0920 | ASDS-2000-2 Vacuum 4.122 in $H_2O$ Velocity 92 fpm |

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|---|---|---|

**Project Name:** ESTCP
**Project Number:** TR0479
**Field Personnel:** M. Mraw (MM)

**Recorded By:** MM
**Weather:** Sunny 60's

**Date:** 4/15/10 **Page** 2 **of** 2
**Primary Activities:** Fan Replacement

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 924 | ~~FID~~ 0.5 amps at ~~240~~ 240V for old System (1.0 amps) 120W |
| 0925 | Shut down system begin install of new system |
| 0947 | Interim velocity measurement Suspect interior measurements do not add up to exterior |
| 1044 | finish install full throttle in new fan 1.8 amps at 120 V 216W |
| 1100 | Call Bill Bigham how to throttle down fan, Begin to throttle down fan to 5 in $H_2O$ |
| 1108 | 0.5 amps at 120V 60W |
| 1120 | James & Bob offsite |
| 1122 | Vacuum 5.079 in $H_2O$ exterior |
| | velocity 118 fpm exterior |
| | Vacuum 5.065 in $H_2O$ ASDS-200-1 |
| | Velocity 112 fpm ASSD-200-1 |
| 1128 | Vacuum 5.030 in $H_2O$ ASDS-200-3 |
| | Velocity 110 fpm ASDS-200-3 |
| 1131 | Vacuum 5.025 in $H_2O$ ASDS-200-2 |
| | velocity 110 fpm ASDS-200-2 |
| 1230 | Turn back on old system with bleed valve open to ambient air to check System |
| 1245 | offsite |

# DAILY FIELD REPORT

**Geosyntec Consultants**
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(609) 895-1400 Fax (609) 895-1401

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**Project Name:** Raritan Arsenal ESTCP
**Project Number:**
**Field Personnel:** M. Marra
**Recorded By:** MM
**Weather:** Sunny 60s

**Date:** 4/19/16 **Page** 1 **of** 1
**Primary Activities:** Install of Alarm & collect measurements

| Time | Description of activities – location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 0815 | MM onsite check in with Site Security |
| | & Arrive at Bldg |
| 0820 | Gather equipment |
| 0826 | Exterior Vac 5.126 in $H_2O$ |
| 0834 | Pitot tube vac -0.565 in $H_2O$ |
| | velocity 3012.546 ft/min |
| | Flow 145.913 $ft^3$/min |
| 0845 | ASDS-200-1 Vac 5.014 in $H_2O$ |
| | Pitot tube vac -0.003 in $H_2O$ |
| | Vel 214 ft/min Flow 10.632 $ft^3$/min |
| 0903 | ASDS-200-3 Vac 4.935 in $H_2O$ |
| | Pitot tube -0.001 in $H_2O$ |
| | vel 126.734 Flow 6.134 $ft^3$/min |
| 0920 | Install audible alarm at ASDS-200-1 |
| | Pitot tube vac -0.630 in $H_2O$ exterior |
| | velocity 3181.117 ft/min 154.078 $ft^3$/min |
| 0943 | Pitot tube exterior -0.275 in $H_2O$ |
| | -0.125 in $H_2O$ |
| 1054 | ASDS-200-1 Pitot tube -0.001 in $H_2O$ |
| | ASDS-200-3 Pitot tube -0.001 in $H_2O$ |
| 1105 | ASDS-200-2 Vac 4.890 in $H_2O$ |
| | Pitot tube 0.010 in $H_2O$ |
| | |

C2.2
Site #2: Building 200
Tracer Testing

Project Number: TR0479 Primary Activities: SF6 and He Tracer Tests

Recored by: Bill W.

SF6 Tracer Test at Building 200

| Meter SN | Vent Pipe # | Elapsed Time After SSV Start (min) | IA Concentration (ppm) | Vent Concentration (ppm) | % IA in Vent |
|---|---|---|---|---|---|
| Note: Measured IA and Vent Concentrations differed depending on which meter was used. Overall the IA concentrations were evenly distributed and diminished slightly over the course of the test. Sf6 was added to the IA after testing Vent 1 & Vent 3 (i.e. before testing Vent 2). | | | | | |
| 1123594 | 1 | 18-21 | 128 | 48.0 | 37.5 |
| 0006593 | 1 | 25 | 160 | 60.0 | 37.5 |
| 0006593 | 1 | 45-52 | 165 | 90.0 | 54.5 |
| 1123594 | 3 | 18-21 | 128 | 20.0 | 15.6 |
| 0006591 | 3 | 41:22 | 126 | 20.0 | 15.9 |
| 0006591 | 3 | 47:20 | 128 | 25.6 | 20.0 |
| Redose IA with SF6 | | | | | |
| 0006593 | 2 | 64:25 | 150 | | |
| 0006593 | 2 | 67 | 141 | | |
| 0006593 | 2 | 73 | 164 | 0.0 | 0 |
| 0006593 | 2 | 81:45 | 108 | | |
| 0006591 | 2 | 87:32 | 99.5 | 0.0 | 0 |

Building 200 Transient Response Tests
8/14/2015

Transient Test 1 Vent Pipe 1 off 2 minutes then on with vent 2 & 3 open

Start Cycle 1 Closed Time: 10:06 Open Cycle 1 Time: 10:08
10:08

Start Cycle 2 Closed Time: 10:10 Open Cycle 2 Time: 10:12

Complete test 10:14

HVAC off @ ~10:13
Transient Test 2 Vent Pipe 2 off 2 minutes then on with vent 1 & 3 open

Start Cycle 1 Closed Time: 10:14 Open Cycle 1 Time: 10:16

Start Cycle 2 Closed Time: 10:18 Open Cycle 2 Time: 10:20

HVAC on @ 10:16: 28
HVAC off @ ~10:22:02
HVAC on @ ~10:30:30
HVAC off @ ~10:39 ?
HVAC on @ 10:45:18
HVAC off @ 10:??? (<10:53)
HVAC on @ 10:59:36
HVAC off @

Transient Test 3 Vent Pipe 3 off 2 minutes then on with vent 1 & 2 open

Start Cycle 1 Closed Time: 10:21 Open Cycle 1 Time: 10:23

Start Cycle 2 Closed Time: 10:25 Open Cycle 2 Time: 10:26

Transient Test 4 Vent Pipe 1 & 3 off 2 minutes then Vent Pipe 1 on then off two minutes with vent 3 closed and vent 2 open

Start Cycle 1 Closed Time: 10:29 Open Cycle 1 Time: 10:31

Start Cycle 2 Closed Time: 10:33 Open Cycle 2 Time: 10:35

Transient Test 5 Vent Pipe 1 & 3 off 2 minutes then Vent Pipe 3 on then off two minutes with vent 1 closed and vent 2 open

Start Cycle 1 Time: 10:37 Open Vent 3 Time: 10:39

Start Cycle 2 Time: 10:41 Open Vent 3 Time: 10:43

Transient Test ~~6~~ Vent Pipe 2 & 3 off 2 minutes then Vent Pipe 2 on then off two minutes with vent 3 closed and vent 1 open

Start Cycle 1 Time: 10:45 Open vent 2 Time: 10:47

Start Cycle 2 Time: Open Cycle 2 Time:

10:49 Pipe 1 open late therefore re do test

Transient Test 6 (redo) Vent Pipe 2 & 3 off 2 minutes then Vent Pipe 2 on then off two minutes with vent 3 closed and vent 1 open

Start Cycle 1 Time: 10:51 Open vent 2 Time: 10:53

Start Cycle 2 Time: 10:55 Open vent 2 Time: 10:57

All open at 10:59

HVAC off @ 11:35:25~

Transient Test 7 Blower off two minutes with vent 3 vents open
Start Cycle 1 Time: 15:38 Open Cycle 1 Time:15:40

Start Cycle 2 Time: 15:42 Open Cycle 2 Time: 15:44

Transient Test 8 Blower off two minutes with vent 3 vents open recirculation valve off

Start Cycle 1 Time: Open Cycle 1 Time: 15:47

Start Cycle 2 Off Time:3:49 Open Cycle 2 Time: 15:51

Off Time 15:53

# DAILY FIELD REPORT

Geosyntec consultants
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**Project Name:** ESTCP
**Project Number:** TR0479
**Field Personnel:** DM BW EO TM
**Recorded By:** BW
**Weather:**

**Date:** 08/14/15 - 08/15/15 **Page** 1 **of** 3
**Primary Activities:** He Tests, $SF_6$ tests

| Time of Injection | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | |
|---|---|---|---|
| | Helium Probe | He Concentration | |
| | | 08/14/15 (8pm) | 08/15/15 (8AM) |
| 19:35 | 1 | 2.1% | 1.8% |
| 19:38 | 9 | 4.3% | 3.1% |
| 19:39 | 2 | 3.5% | 1.7% |
| 19:41 | 5 | 2.5% | 0.85% |
| 19:43 | 4 | 3.0% | 1.0% |
| 19:44 | 7 | 8.4% | 1.7% |
| 19:45 | 6 | 0.0% | 0.0% |
| 19:46 | 3 | 0.8% | ~~0.99%~~ 1.4% |
| 19:46 | 8 | 10.8% | 0.99% |
| 19:47 | VP-2 | 18.3% | 11.2% |
| | VP-1 | 4.3% | 3.7% |
| | VP-3 | 10.7% | 4.4% |
| | | 08/14/15 (Noon) | |
| Same as | 1 | 1.5% | |
| above. | 9 | 2.5% | |
| | 2 | 1.2% | |
| | 5 | 3750 ppm | |
| | 4 | 8700 ppm | |
| | 7 | 1.3% | |
| | 6 | 0 ppm | |
| | 3 | 1.2% | |
| | 8 | 5800 ppm | |
| | VP-2 | 7.8% | |
| | VP-1 | 2.4% | |
| | VP-3 | 1.9% | |
| | | | |

Daily Field Report

# DAILY FIELD REPORT

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**Project Name:** FSTCP
**Project Number:** TR0479
**Field Personnel:** DM BW EO TM
**Recorded By:** BW
**Weather:**

**Date:** 08/15/15 **Page** 2 of 3
**Primary Activities:** He tests, $SF_6$ Tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| | $SF_6$ in B200 |
| | Ambient |
| | 136 ppm @ 5min 5sec |
| | 131 ppm @ 13min 40 sec |
| | 130 - 140 ppm throughout 15min |
| | |
| | $SF_6$ in Ambient 128 ppm @ 18 min |
| | Serial # 1123594 |
| | VP-1: 48 ppm = 35% @ 21 min |
| | VP-3: 20 ppm = 15.6% @ 21 min |
| | Serial # 006593 VP-1: 160 ppm (ambient) : 60 (VP-1) @ 25 min |
| | ↳ 37.5% |
| | |
| | Serial # 006591 |
| | Ambient VP3 |
| | 126 20 = 15.9% @ 41min 22sec |
| | 128 25.6 = 20% @ 47min 20 sec |
| | Serial # 1123594 |
| | 1/3 |
| | Serial # 006593 |
| | 165 @ 45 min |
| | |
| * | Redosing using Serial # 006593 |
| | Ambient time |
| | 150 64min 25sec |
| | 141 67min |
| | 132 73min |
| | 108 81min 45sec |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM BW EO TM
Recorded By: BW
Weather:

Date: 08/15/15 Page 3 of 3
Primary Activities: He tests, SF6 Tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| | Redosing using Serial # 1123594 |
| | Ambient line |
| | 120 77min 46sec |
| | 109 81min 45sec |
| | Redosing using Serial # 0006591 |
| | Ambient line |
| | 99.5 89min 32sec |
| | |
| | IA near UP-2 |
| | Serial # 1123594 |
| | Ambient conc line |
| | 86.3 86min 39sec |
| | Serial # 0006591 |
| | 99.5 86min 39sec |
| | Serial # 0006553 |
| | 122 86min 39sec |

Daily Field Report

| Elapsed Time : | SF-6 : | Helium : | Vent #1 |
|---|---|---|---|
| ~~7:00~~ 7mins | ~~17.1 ppm~~ | 6000 ppm | |
| 10mins | | 7750 ppm | |
| 17:39 mins | | 6950 ppm | |
| 23:30 | | 5175 ppm | |
| 39 35 | | 4725 ppm | |
| 47:30 | | 4150 | |
| 65:00 | | 3575 | |
| 100:00 | | 3625 | |

| Time: | SF-6: | Helium: | Vent #2 |
|---|---|---|---|
| 74:54 | | 9825 | |
| 77:46 (SN # 1123544) | 120 | ~~9825~~ | ~~5.0~~ |
| 79:20 | | 9500 | |
| 80:45 | 109 | | |
| 84:24 | 94.7 | 9125 | 0.0 |
| 90:23 | | 9125 | |

ADI/CLC

| Time: | SF-6: | Helium: Vent #3 |
|---|---|---|
| 1420 | | 9300 |
| 1427 | | 5800 |
| elapsed time (min) | | |
| 1 | | 8580 |
| 1:30 | | 8750 |
| 2 | | 8775 |
| 3:30 | | 8550 |
| 6 | | 7950 |
| 8:30 | | 7450 |
| 12 | | 6850 |
| 27:01 | | 5550 |
| 30:27 | | 5350 |
| 32:00 | | 5250 |
| 41 | | 4850 |
| 47 | | 4625 |

09/15/16

# DAILY FIELD REPORT

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Project Name: _____ Date: _____ Page ___ of ___
Project Number: _____ Primary Activities: _____
Field Personnel: _____
_____
Recorded By: _____
Weather: _____

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| | Helium flow rate test |
| | |
| Filled | 3L in 5.28 sec |
| | |
| | $3L/5.28 = \frac{0.568L}{5ec} = \frac{0.020059\ ft^3}{5ec} \times \frac{60sec}{1min} \times \frac{60min}{1hr}$ |
| | $= 72\ ft^3/hr.$ |
| | |
| | |
| | - Videos of interwell tests are started at midpoint of injection eg 4sec injection video started at 2sec of injection |
| | |
| | - existing vacuum at VP-3 is 720 Pa. Lowered dilution closed and increased to 9.33 in $H_2O$ vacuum |
| | |
| @VP3 | - Helium flood velocity from 3" pipe is L 55 ft/min → max conc 10.2% |
| | $\pi r^2 = \pi(0.825)^2$ |
| | |
| | |
| @VP1 | - Helium flood #2 velocity from 3" pipe is L 140 ft/min → max conc 4.3% |
| | |
| @VP2 | - Helium flood #3 max conc of 18.6% |
| | L 60 ft/min |
| | |

Daily Field Report

C3.0
Site #3: Sun Devil Manor
Hill Air Force Base

C3.1
Site #3: Sun Devil Manor
General Notes

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: Darius Mal, Bill Wertz, Todd McAlary, Ming Guo
Recorded By: Todd
Weather: Sunny + Hot

Date: June 6 2016 Page 1 of 6
Primary Activities: Step test with Land Drain Closed

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 7:30 | Team arrived at SDM and discussed plans. Two new items since workplan was written: 1) granular fill layer is up to 1 ft 2) fan now has variable frequency drive |
| | Consequences: need either a higher flow rate or longer tests to purge sufficient volume to approach steady state at each step |
| | Building Area = 910 ft² |
| | Fill Thickness = 1 ft (max) |
| | assumed porosity = 0.25 |
| | one pore volume = 228 ft³ |
| | max flow rate = 80 scfm ∴ 2.8 min |
| | Team decided to run 80 scfm test first and monitor in real time until [TCE] stabilizes |
| | Ming can run a sample every 40 minutes or so |
| | ∴ decided to collect samples after 3, 6, 9, 18 and 27 minutes to capture any transient changes, analyze 9 minute sample and another after 49 minutes to assess whether system has reached steady state |
| 9:40am | Step test began @ 1130 ft/min flow rate = 98.6 scfm and 15.4 Pascals vacuum on pitot tube = 984 ft/min 85.9 scfm |
| | vacuum in vent pipe = 203 Pa |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: Dawn Ball Todd + Ming
Recorded By: Todd
Weather: Sunny + Hot

Date: June 6 2016 Page 2 of 6
Primary Activities: step test with land drain closed.

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 11:20 | end of first step of step test @ 85 scfm |
| | plumbed shop vac to test at lower flow rates |
| 1145 | start of second step of step test @ 40 scfm |
| | Samples planned for 18, 60, 100, 140 min |
| | approximately 3, 11, 18 and 25 pore volumes |
| | if no leakage |
| | alternatively, if there is 85% leakage (as |
| | indicated by the $SF_6$ data during the first step) |
| | then samples correspond to pore volumes of |
| | 0.5, 1.6, 2.6 and 3.7 |
| 1225 | terminated the second step after 100 |
| | minutes based on low TCE concentrations |
| | in the vent pipe samples |
| | re-plumbed the system to use the |
| | radon fan instead of the shop vac |
| 200pm | to 209pm |
| | adjusted flow to 625 Ft/min in 4 inch pipe |
| | and 1550 Ft/min in 2 inch bleed |
| | total flow = 54.5 $Ft^3$/min |
| | dilution flow = 33.8 $Ft^3$/min |
| | ∞ extraction rate = 20.7 $Ft^3$/min |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: Darius Bill Ming + Todd
Recorded By: Todd
Weather: Sunny + Hot

Date: June 6 2016 Page 3 of 6
Primary Activities: step test with land drain closed and interwell tracer test

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 3:55pm | first interwell tracer test ~9.5 ft<br>100% He injected at subslab probe #3 (radius ~12ft)<br>20 scfm extraction from vent-pipe<br>injected for 40 seconds at about 0.5 L/second<br>peak He reading in vent pipe was 3.2% at 3 min 10 seconds<br>Helium reading returned to zero in ~10 min |
| 4:14pm | Second interwell tracer test<br>100% He injected at subslab probe #6 (radius =14ft)<br>20 scfm extracted from vent pipe<br>injected for 40 seconds at about 0.5 L/second<br>first arrival at < 4 min<br>peak ~ 0.86% at ~6 min 10 sec |
| | #5 not #6 DJM |
| 4:30 | third interwell tracer test<br>100% He injected at subslab probe #6 (radius =17ft)<br>injected into 6 foot deep probe by mistake<br>test aborted and probe purged with lung box at 1.3 L/min<br>for about 3 hours to zero ppm |
| 5:12pm | ~~Fourth~~ Third interwell tracer test probe #4 (radius = 19 ft)<br>100% He injected at sub slab for 60 seconds<br>20 scfm extraction<br>no Helium was detected at the vent pipe |
| | so a lung box was used to pull ~~gas~~ from subslab probe #4 and He started at about 27% and after about 2 hrs at 2 L/min decreased to < 1000 ppm |
| 7:20pm | flow from SSD system set to 10 scfm using Helium tracer |
| 7:45 | leave for the day |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM BW TM MG
Recorded By: DM + TM
Weather: Sunny + Hot

Date: 06/07/16 Page 1 of 9
Primary Activities: Interwell tests (Land drain closed)
Step tests (Land drain open

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 750 | Testing the flow rate on vent pipe |
| | using He as a tracer in the bleed air line |
| | Initial 4150 ppm |
| | 245 Pa |
| | 780 ft/min $Q_{total}$ = 67.86 ft³/min |
| | Valve closed to subsurface $\Delta Q$ = 4 scfm |
| | final 5225 ppm |
| | 273 Pa |
| | 580 ft/min $Q_{total}$ = 50.46 ft³/min (all bleed) |
| | ~~$\Delta Q$ = 17.4 ft³/min~~ |
| | $\Delta Q$ = 0.84 scfm (which is within measurement error) |
| | Bleed air valve test |
| | $\Delta P$ = 245 Pa $\bar{v}$ = 735 Q = 63.9 ft³/min |
| | $\Delta P$ = 273 Pa $\bar{v}$ = 590 Q = 51.3 ft³/min |
| 9:00 am | Interwell tracer test from subslab probe 6 |
| | injected ~ 30L of 100% He |
| | vent pipe open to subsurface, bleed air closed + taped |
| | velocity = 1050 ft/min |
| 924 | Interwell tracer test from subslab probe #1 (r = 14.5ft) |
| | injected ~ 20L of He |
| | aborted after 20 minutes (no helium at all) |
| 1059 | Started Step test with Land drain open |
| | flow velocity = 1040 ft/min @ 204 Pascals |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: Todd, Darius, Bill Mug
Recorded By: Todd
Weather: Sunny + Hot

Date: June 7 2016 Page 2 of 9
Primary Activities: interwell tests with land drain closed and step test

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 11 35 | Interwell tracer test from subslab probe #3 injected ~10L He over ~10S velocity 1040 ft/min so flowrate 90.5 scfm |
| 1145 | Interwell tracer test from subslab probe #6 injected 8.0L He over 45 seconds |
| 1148 | Pitot tube differential pressure 15 Pascals = 85.6 scfm |
| 1200 | Interwell test at subslab probe #5 injected He for 45 seconds |
| 12:20 | Interwell test from land drain injected for 45 seconds at 60L/min Helium no Helium observed at subslab probe 6 Helium monitored by video at subslab 5 + vent pipe |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: Todd Ball Dorcus Mug
Recorded By: Todd
Weather: Sunny + Hot

Date: June 7 2016 Page 4 of 9
Primary Activities: Interwell + step tests with the land drain open

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1:50 | reduced flow to 20 scfm |
| | Q (scfm) Helium (ppm) |
| | Bleed air 40.26 6625 |
| | Total flow 60.9 2225 |
| | Sub slab 20.64 0 |
| | Helium data supports anemometer both 3X |
| 4:26 | pm 20 scfm step test ended |
| | one interwell test was done from the land drain @ 20 scfm 45 seconds of He injection to match previous test monitored SS-5 and vent pipe by video |
| 4:40 | set step to 60 scfm land drain open |
| | flow verification for 20 scfm step test |
| | @ 4:20 pm $\bar{V}_{Bleed}$ = 1740 Ft/min Q = 38.3 ft³/m |
| | $\bar{V}_{total}$ = 750 Ft/min Q = 65.3 ft³/m |
| | ΔP = 250 Pa Q = 26.8 ft³/m |
| | @ 430 $\bar{V}_{Bleed}$ = 1720 → 38 scfm |
| | $\bar{V}_{total}$ = 720 63 scfm |
| | 25 scfm |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: Todd Bill Ming + Darius
Recorded By: TMcA
Weather: Sunny + Hot

Date: June 7 2016 Page 7 of 9
Primary Activities: step tests, land drain open

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 6:00pm | started step test @ 120 scfm (land drain open) using shop vac with radon fan capped wellhead vacuum = 300 Pascals |
| 6:30 | attempted Summa canister sample from vent-pipe but terminated prematurely because fitting was questionable. Remaining vacuum in canister was >22in Hg so repaired fitting and continued to collect Summa canister. |
| 7:10 | terminated step test |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM BW TM MG
Recorded By: DM
Weather: Hot sunny

Date: 06/08/16 Page 1 of 8
Primary Activities: Tracer tests, He Flood

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 7:30 | Arrived on site with Todd, Bill, Darius and Ming, H&S Meeting |
| 7:45 | - Tracer test at location SS3, injection for 20 sec, response of ~3500 ppm |
| | - Another tracer test at location SS3 injection for 30 sec, response of ~ 6100 ppm |
| 8:10 | - Tracer test at location SS6, injection for 45 sec, response of ~ 1.8 % |
| | - Tracer test at location SS5, injection for 45 sec, response of ~3.2 %. |
| 8:37 | repeat interwell test from SS-5 with 10 scfm He |
| 9:00 | repeat interwell test from SS-6 with 10 scfm He |
| | PREP FOR HELIUM FLOOD, land drain closed |
| | test ended after 1 hour and 13 min |
| 9:30 | setup shop vac to blow air into vent pipe |
| | adjusted bleed air valve to 90 scfm injection (velocity of 4090 ft/min in 2 inch pipe) |
| | He flow set to 10L/min - expected injection 4,000 ppm |
| 10:42 | adjusted to 3000 ppm within first 30 seconds of test (started a little low @ 1200 ppm) |
| | after instrument read 2.5% or ~~2.3%~~ - bag apparently had residual He |

12,500 ppm 11500 12900
Serial # 021836 14357 R6133
would not zero - regenerated dessicant and got 12800

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0478
Field Personnel: DM BW TM MG
Recorded By: DM
Weather: Hot Sunny

Date: 06/08/16 Page 2 of 8
Primary Activities: Tracer tests, He floods

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1156 | End of Helium Flood |
| 1255 | The tee was closed on the vent pipe to eliminate dilution. Turned the fan back on to full capacity and recorded helium concentration on 5-SS, 5-3BS and the Ventpipe (Videos) |
| 1327 | - opened landdrain to see if any change on Videos |
| 1402 | - end of test / Videos |
| 1415 | Off site. |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: Estcp
Project Number: TR0479
Field Personnel: DM BW NG
Recorded By: DM
Weather:

Date: 06/09/16 Page 8 of 8
Primary Activities:

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 9:02 | Start VAC no HE |
| | V= 4032 |
| | - Samples of intake conc tested every 10 min |
| | 1040 #02183 1051 Am |
| Mins→ | 1 - 13875 ppm 13650 ppm |
| | 10 - 9575 ppm 8675 ppm |
| | 20 - 11675 ppm 11450 ppm |
| | 30 - 12950 ppm 12725 ppm |
| | 40 - 8275 ppm 8100 ppm |
| | 50 - 4250 ppm 4275 ppm |
| | 60 - 12375 ppm 12375 ppm |
| | 68 - 13325 ppm 13550 ppm |
| | |
| 11:15 | Recorded the conc on video of Helium being extracted from the subsurface, after we unbagged the stack, turned the valve on tee so no dilution |
| | |
| 12:30 | left site |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: BW DM MG
Recorded By: DM
Weather:

Date: 06/05/16 Page 1 of 8
Primary Activities: Transient tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| Test 1 | Transient Tests - SSP-05 - Drain Open |
| | DG700 - 41677 |
| | SSP-5 |
| | Ch A 5-5S |
| | Ch B 5-3BS |
| | DG700 - 41676 |
| | Ch A 5-6BS |
| | Ch B 5-9BS |
| | |
| | Ming Monitoring |
| | SS01, SS02, SS03, SS06 |
| | |
| Run 1 | Starting time 1420 |
| | HVAC came on at 1421 |
| | Turned off HVAC at 1422 |
| | Fan off @ 1423 |
| | |
| Run 2 | Fan on 1427 |
| | Fan off 1431 |
| | |
| | End of test. |

Daily Field Report

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# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: BW DM MG
Recorded By: DM
Weather:

Date: 06/05/16 Page 2 of 3
Primary Activities: Transient tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| Test 2 | Transient Tests - SSP-02 - Drain Open |
| | DG 700 - 41677 |
| | SSP-02 |
| | Ch A 2-SS |
| | Ch B 2-3BS |
| | DG 700 - 41676 |
| | Ch A 2-6BS |
| | Ch B 2-9BS |
| | |
| | Ming Monitoring |
| | SS01, SS03, SS05, SS06 |
| | |
| Run 1 | Start time 14:45 |
| | OFF time 14:49 |
| Run 2 | Start time 1452 |
| | off time 1455 |
| | |
| | |
| | Comparison test at SSP-02 SS |
| | start time 15:08 |
| | Stop time 15:09 |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: BW DM AL
Recorded By: DM
Weather:

Date: 06/05/16 Page 3 of 8
Primary Activities: Transient test

7 - 4, -55, 3
+6 65

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| Test 3 | Transient test SSP-04 (SS+03) SSP-07 (SS) |
| | DG700-41677 Drain Open |
| | SSP-04 |
| | Ch A 4-SS |
| | Ch B 4-3BS |
| | DG700-41676 ~~PBit has data~~ |
| | Ch A 7-SS |
| | Ch B N/A |
| | |
| | Mass Monitoring |
| | SS01, SS02, SS03, SS05, SS06 |
| Run 1 | Start time 15:19 |
| | Stop time 15:23 |
| Run 2 | Start time 1527 |
| | Stop time 1532 |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: BW DM MG
Recorded By: DM
Weather:

Date: 06/05/16 Page 4 of 8
Primary Activities: Transient test.

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| Test 4 | Transient test SSP-04 (SS 103) SSP-07 (SS) |
| | DG700-41677 Drain Closed |
| | SSP-04 |
| | ChA 4-55 |
| | ChB 4-385 |
| | DG700-41676 |
| | ChA 7-55 |
| | ChB N/A |
| | |
| | Mag Mastery |
| | SS01, SS02, SS03, SS05, SS06 |
| Run 1 | Start time 1729 |
| | Stop time 1732 |
| Run 2 | Start time 1736 |
| | Stop time. 1740 |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: BW DM MG
Recorded By: DM
Weather:

Date: 06/05/16 Page 5 of 8
Primary Activities: Transient test.

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| Test 5 | Transient Tests - SSP-02 - Drain Closed |
| | DG 700 - 41677 |
| | SSP-02 |
| | Ch A 2-5S |
| | Ch B 2-3BS |
| | DG 700 - 41676 |
| | Ch A 2-6BS |
| | Ch B 2-9BS |
| | |
| | Ming Monitoring |
| | SS01, SS03, SS05, SS06 |
| | |
| Run 1 | Start time 1752 |
| | Stop time 1755 ← may be slight spike |
| Run 2 | Start time 1759 due to fan clipped ON/OFF |
| | Stop time. 1802 by accident. |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: BW DM MG
Recorded By: DM
Weather:

Date: 06/05/16
Page 6 of 8
Primary Activities: Transient tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | |
|---|---|---|---|
| Test 6 | Transient Test - SSP-05 - Drain Closed | | |
| | DG 700 - 41677 | | |
| | SSP-5 | | |
| | Ch A 5-5S | C | C |
| | Ch B 5-3BS | -25 | -25 |
| | DG700 41676 | -17 | -14 |
| | Ch A 5-6BS | -29 | -27 |
| | Ch B 5-9BS | +50 | -34 |
| | | | |
| | Ming Monitoring | | |
| | SS01, SS02, SS05, SS06 | | |
| | | | |
| Run 1 | Start time 1814 | | |
| | Stop time 1818 | | |
| Run 2 | Start time 1822 | | |
| | Stop time 1826 | | |
| | | | |
| Closed → | Vent Pipe Vacuum = 194 Pa | | |
| | Velocity = 1020 ft/min / 970 Pitot in 4" pipe | | |
| | Ming's data is on Arizona time PST (3hr Diff) | | |
| | DG700 data is on Eastern time EST (0) | | |
| | Notes are on Utah time MST (2hr Diff) | | |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM BW MG
Recorded By: DM
Weather:

Date: 06/05/16 Page 7 of 8
Primary Activities: Specific Capacity tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| ~1615 | Specific Capacity tests (in wc) Drain Open |
| Probe ID | 0.1 0.3 0.5 L/min |
| 6-5S | 0.01 0.03 0.05 |
| 6-3BS | 0.16 0.31 0.6 |
| 6-6DS | 0.21 0.51 0.85 |
| 6-9BS | ~~>100~~ ~~>100~~ ~~>100~~ |
| 3-5S | <0.01 0.02 0.05 |
| 3-3BS | 0.13 0.31 0.55 |
| 3-6BS | 034 0.67 1.30 |
| 3-9BS | >100 >100 >100 |
| 7-5S | <0.01 0.03 0.05 |
| 2-5S | 0.05 0.08 0.10 |
| 2-3BS | 0.14 0.31 0.46 |
| 2-6BS | 029 061 0.95 |
| 2-9BS | >100 >100 >100 |
| 5-5S | 002 0.05 0.07 |
| 5-3BS | 014 033 0.50 |
| 5-6BS | 037 080 1.6 |
| 5-9BS | >100 >100 >100 |
| 4-5S | 004 009 0.14 |
| 4-3BS | 025 0.5 0.9 |
| 4-6BS | 029 0.6 1.1 |
| 4-9BS | >100 >100 >100 |
| 1-5S | 0.18 0.43 0.7 |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: IR0479
Field Personnel: DM BW MG
Recorded By: DM
Weather:

Date: 06/05/16 Page 8 of 8
Primary Activities: Specific Capacity tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | |
|---|---|---|---|
| ~ 19:00 | Specific | Capacity | tests (in WC) Drain Closed |
| Probe ID | 0.1 | 0.3 | 0.5 L/min |
| 4-5S | 0.03 | 0.07 | 0.09 |
| 4-3BS | 0.22 | 0.5 | 0.9 |
| 4-6BS | 0.29 | 0.7 | 1.2 |
| 4-9BS | | | |
| 1-5S | 0.15 | 0.40 | 0.70 |
| 1-3BS | 0.19 | 0.42 | 0.80 |
| 1-6BS | 0.26 | 0.60 | 1.1 |
| 1-9BS | | | |
| 5-5S | 0.02 | 0.04 | 0.06 |
| 5-3BS | 0.14 | 0.34 | 0.60 |
| 5-6BS | 0.35 | 0.80 | 1.50 |
| 5-9BS | | | |
| 2-5S | 0.02 | 0.04 | 0.06 |
| 2-3BS | 0.12 | 0.24 | 0.42 |
| 2-6BS | 0.21 | 0.48 | 0.80 |
| 2-9BS | | | |
| 7-5S | 0.02 | 0.04 | 0.07 |
| 3-5S | 0.01 | 0.03 | 0.05 |
| 3-3BS | 0.13 | 0.31 | 0.50 |
| 3-6BS | 0.30 | 0.65 | 1.30 |
| 3-9BS | ~~0.02~~ | ~~0.03~~ | ~~0.06~~ |
| 6-5S | 0.02 | 0.03 | 0.06 |
| 6-3BS | 0.17 | 0.39 | 0.70 |
| 6-6BS | 0.23 | 0.49 | 0.90 |
| 6-9BS | | | |
| | | | |

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM BW TM MG
Recorded By: DM
Weather:

Date: 06/06/16 Page 4 of 6
Primary Activities: Step tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| | Static Vacuum - ST-LDC-80 |
| | Pa (Transient tests LDC) |
| 6-SS | 8.3 |
| 6-3BS | 12.1 |
| 6-6BS | 13.2 |
| 6-9BS | 162.7 |
| 3-SS | 60.5 |
| 3-3BS | 52.4 |
| 3-6BS | 49.2 |
| 3-9BS | 57.4 |
| 4-6BS | 14.8 |
| 4-9BS | 47.3 |
| | |
| 3-SS | 23.4 |
| 3-3BS | 20.2 |
| 3-6BS | 18.6 |
| 3-9BS | 270 |
| 6-SS | 3.4 |
| 6-3BS | 5.4 |
| 6-6BS | 5.7 |
| 6-9BS | +80 |
| 5-SS | 7.4 |
| 5-3BS | 10.5 |
| 5-6BS | 10.7 |
| 5-9BS | +81 |
| 7-SS | 560 |
| | |
| | |

Use the rest of the static vacuums from the transit test data..

STATIC VAC - ST-LDC-40

| | |
|---|---|
| 4-SS | 9.5 |
| 4-3BS | 9.7 |
| 4-6BS | 4.8 |
| 4-9BS | 458 |
| 2-SS | 44 |
| 1-SS | 17 |
| 1-3BS | 225 |
| 1-6BS | 71.3 |
| 1-9BS | -402 |

Daily Field Report

# DAILY FIELD REPORT

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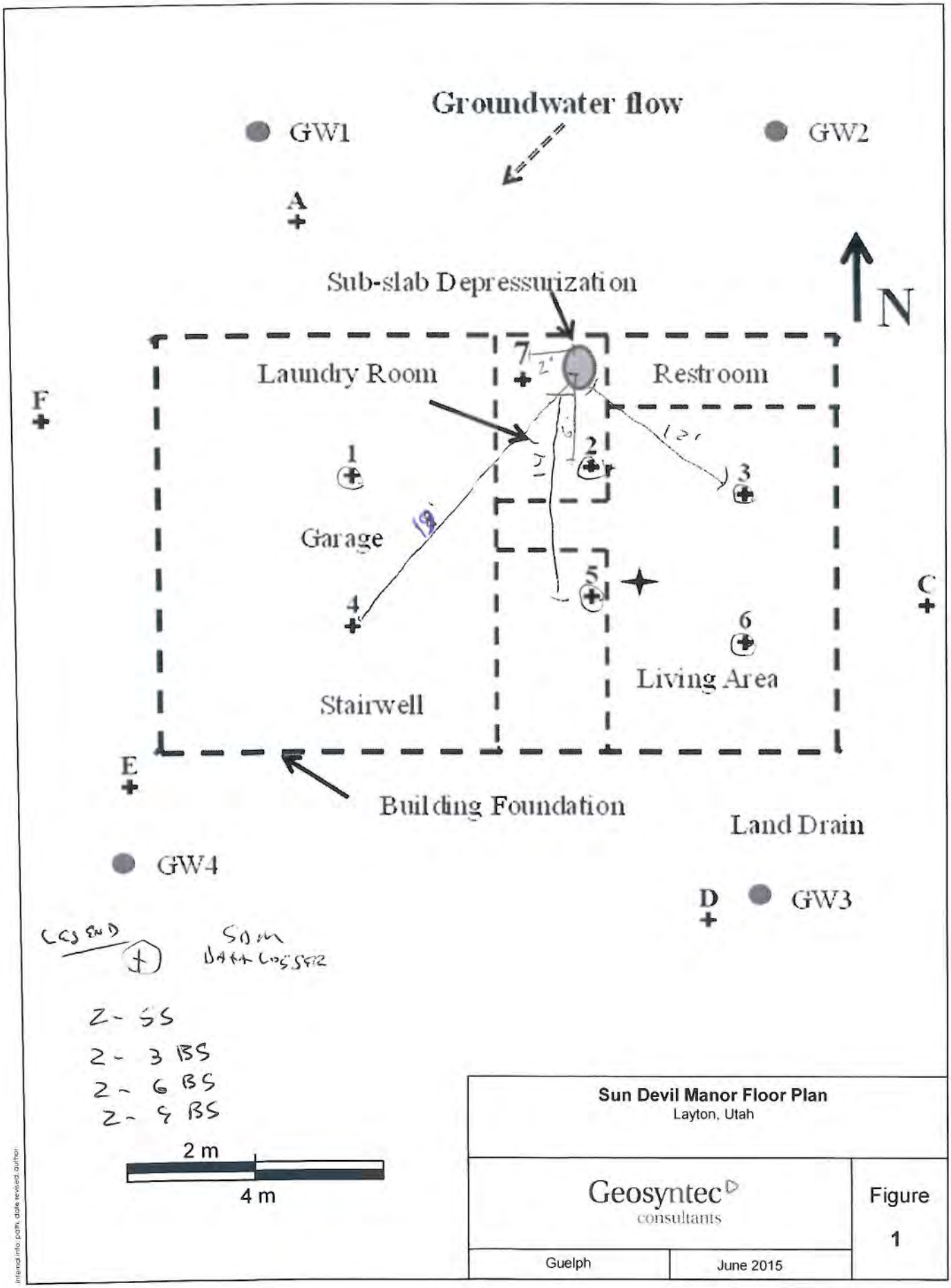
Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM BW TM AG
Recorded By: DM
Weather:

Date: 06/06/16 Page 5 of 6
Primary Activities: Step tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| | STEP TEST - 80 Vac: 203 Pa |
| | Sample time Flow: 98.6 scfm Ann (1130 ft/min) |
| | 3 - on hold = 85.95 cfm Pitot |
| | 6 - on hold |
| | 9 - may sampled for $SF_6$ & TCE initially |
| | 18 - may sampled for $SF_6$, TCE on hold |
| | 27 - may sampled for $SF_6$, TCE on hold |
| | 45 - may sampled for $SF_6$ & TCE |
| | 92 - collected Radon Sample |
| | Fan off @ 1h40min. End of first step. |
| | |
| | 11:44 STEP TEST - 40 Vac: ~~75~~ 75 Pa |
| | Start time Vel: 2080 ft/min (45.4 ft³/min) |
| | 18 - may to Sample $SF_6$ & TCE = 2120 (half way) |
| | 60 ~~60~~ - may to Sample $SF_6$ & TCE → 55min collected at |
| 85→ | 1h25min - collected Sample for $SF_6$ |
| | 90 - collected for $SF_6$ & TCE |
| | ~~130~~ 100 - collected Radon Sample |
| | |
| start | 1409 STEP TEST - 20 Vac: |
| | 36min - $SF_6$ & TCE Vel: |
| | 1~~6~~min Sample for $SF_6$ |
| | 85min - $SF_6$ + TCE |
| | 140 min - " " |
| | 245 - " " |
| | 246 Radon Sample |
| | |
| | |

Daily Field Report

~~Q~~ 100 cfm = $\pi r^2 * V$
908 ft/min = 20 cfm




**Sun Devil Manor Floor Plan**
Layton, Utah

Geosyntec consultants

Guelph | June 2015

Figure 1

internal:info:path, date revised, author

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: Bill Todd Darius and Ming
Recorded By: Todd
Weather: Sunny + Hot

Date: June 7 2016 Page 3 of 9
Primary Activities: step test and interwell tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 120 | round of static vacuum measurements at 905 from with land drain open |

| Probe | Vacuum (Pa) |
|---|---|
| SS 7 | 134 |
| 2-3BS | 90.7 |
| 2-6BS | 77.6 |
| 2-9BS | 0.8 |
| 2-SS | 109 |
| 6-3BS | 9.5 |
| 6-6BS | 11.6 |
| 6-9BS | 0.0 |
| 6-SS | 5.2 |
| 3-SS | 59.2 / 60.5 |
| 3-3BS | 49.4 |
| 3-6BS | 48.4 |
| 3-9BS | +24 Pa |
| 5-3BS | 26.4 |
| 5-6BS | 28.0 |
| 5-9BS | +57.5 |
| 5-SS | 14.6 |
| 4-SS | 18.0 |
| 4-3BS | 15.8 |
| 4-6BS | 14.0 |
| 4-9BS | +28.0 |
| 1-3BS | 52.4 |
| 1-6BS | 53.3 |
| 1-9BS | +5.4 |
| 1-SS | 42 |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0 479
Field Personnel: BILL TODD DARIUS
Recorded By: B. WERTZ
Weather: SUNNY & HOT

Date: JUN 7 2016 Page 5 of 9
Primary Activities: STEP TESTS & INTERWELL TESTS

AP

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | DRAW OPEN |
|---|---|---|
| 3:15 | SS-7 - 27.1 | |
| | 2-3BS - 14.4 | |
| | 2-6BS - 8.9 | |
| | 2-9BS - 0.1 | |
| | 2-SS - 21.24 | |
| | 6-3BS - 2.0 | |
| | 6-6BS - 2.4 | |
| | 6-9BS + 0.1 | INDOOR |
| | 6-SS 2.16 | REF |
| | 3-SS 11.81 | |
| | 3-3BS - 9.3 | |
| | 3-6BS - 9.1 | |
| | 3-9BS + 80 | |
| | 5-3BS - 5.2 | |
| | 5-6BS - 5.8 | |
| | 5-9BS + 93 | |
| | 5-SS - 4.02 | |
| | 4-SS - 4.5 | |
| | 4-3BS - 3.8 | GARAGE REF |
| | 4-6BS - 5.7 | |
| | 4-9BS + 71.0 | |
| | 1-3BS - 6.0 | |
| | 1-6BS - 10.1 | |
| | 1-9BS + 1.2 | GARAGE REF |
| | 1-SS - 9.24 | |
| | LAND DRAIN + 2.87 | INDOOR REF |
| | | |
| | | |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: BILL TODD DARIUS
Recorded By: B. WERTZ
Weather: SUNNY & HOT

Date: JUNE 7 2016 Page 6 of 9
Primary Activities: STEP TESTS & INTERWELL TEST
DRAIN OPEN

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | |
|---|---|---|---|
| | SS-7 | -68.7 | |
| | 2-3BS | -45.7 | |
| | 2-6BS | -39.2 | |
| | 2-9BS | +44.6 | |
| | 2-SS | -54.7 | |
| | 6-3BS | -4.9 | |
| | 6-6BS | -6.5 | |
| | 6-9BS | +40.6 | INDOOR |
| | 6-SS | 3.5 | REF |
| | 3-SS | -29.8 | |
| | 3-3BS | -24.5 | |
| | 3-6BS | -24.2 | |
| | 3-9BS | +27.6 | |
| | 5-3BS | -13.7 | |
| | 5-6BS | -14.3 | |
| | 5-9BS | +8.5 | |
| | 5-SS | -8.7 | |
| | 4-SS | -9.9 | |
| | 4-3BS | -16.1 | |
| | 4-6BS | -6.8 | |
| | 4-9BS | +38.3 | GARAGE REF |
| | 1-3BS | -22.0 | |
| | 1-6BS | -25.4 | |
| | 1-9BS | -0.1 | |
| | 1-SS | -20.4 | |
| | LAND DRAIN | -2.5 | 1A REF |
| | | | |
| | | | |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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**Project Name:** ESTCP
**Project Number:** TR0479
**Field Personnel:** DM JM BW MG
**Recorded By:** DM
**Weather:**

**Date:** 06/07/16 **Page** 8 of 9
**Primary Activities:** Step test
Land Drum open

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | |
|---|---|---|
| | Sampling form | |
| 10:59 | ST-LDO-80 | Vel 1040 ft/min ~ 90.5 |
| 3 | Sample for $SF_6$ & TCE | Vac 204 Pa |
| 6 | on hold → Supelco | Ptot tube 150 Pa = 85.6 |
| 9 | on hold → Supelco | |
| 18 | Supelco for $SF_6$ & TCE | |
| 27 | Supelco for $SF_6$ & TCE | |
| 52 | Supelco for $SF_6$ & TCE | |
| 62 | Radon Supelco | End of test |
| 133 | Supelco for $SF_6$ & TCE | Vel 1050 ft/min |
| | | Vac 202 Pa. |
| | | |
| 1350 | ST-LDO-20 | |
| 1 | Supelco for $SF_6$ & TCE | Vel 2" 1830 |
| 10 | Supelco for $SF_6$ & TCE | Vel 4" 700 |
| 24 | Supelco for $SF_6$ & TCE | Vac 252 |
| ~~40~~ | " " | |
| ~~50~~ 60 | " " | |
| ~~60~~ 70 | ~~Radon~~ " " | End of test. |
| 110 | " " | Vel 2" 1740 ~~38.5~~ |
| 75 | Radon | Vel 4" 750 ~~65.25~~ |
| 150 | | total = 26.75 ft³/min |
| | 2h 35 Step test | Vac 250 |
| | | |
| | Started adjustments at 1677 end of test | |
| | | Vel 2" 1720 |
| | | Vel 4" 720 |
| 1640 | ST-LDO-60 | |
| 1 | Sample $SF_6$ & TCE 50 $SF_6$ & TCE | ~~Vac~~ Vac 196 Pa |
| 10 | Sample $SF_6$ & TCE 57 pulse | Vel 4" 1003 ft/min |
| 25 | Supelco $SF_6$ & TCE 60 min end of test (1740) | 1460 ft/min |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM TM BW MG
Recorded By: DM
Weather:

Date: 06/07/16 Page 2 of 2
Primary Activities: Step tests
LDO

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 1800 | ST - LDO - 120 Vac 301 |
| 2 | $SF_6$ & TCE Flow = 124 cfm |
| 10 | $SF_6$ & TCE Vel = 5650 ft³/hr |
| 20 | $SF_6$ & TCE |
| 1850 (48 min) | Summa start time |
| 66 | $SF_6$ & TCE |
| | |
| | 19:10 shut down system |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM BW MG
Recorded By: DM
Weather:

Date: 06/09/16 Page 7 of 8
Primary Activities: Helium Flood

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 730 | - Arrived on site |
| | - H&S meeting |
| 745 | - took Radon Sample during LDD, at 80-90 CFM |
| 759 | - velocity in 4" VP = 1160 ft/min Vac = 20 "Hg before opening the blend valve on 2" pipe |
| 806 | Calibration of Helium meters |
| | Serial / Conc / Std (10000) |
| | 21836 15500 |
| | 14357 15100 |
| NEW STD | ~~15000~~ |
| | R6133 14500 High End |
| | ~~15000~~ |
| | 21836 14250 |
| | ~~R6133~~ |
| | 021836 3475 |
| | 14357 3300 Low End |
| NEW STD | 6133 3400 |
| | 14357 3350 |
| 1032 | Calibration After test. → Stand (10000) |
| | Serial / Conc / Indoor air |
| | 14357 18000 3800 |
| | 6133 16100 1975 |
| | 021836 14500 526 |

Daily Field Report

C3.2

Site #3: Sun Devil Manor

Tracer Tests

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP SDM
Project Number: TRO 479
Field Personnel: TODD DARIUS BILL MING
Recorded By:
Weather: Sunny Hot

Date: 6/8/16
Page 3 of 8
Primary Activities: HELIUM FLOOD DRAIN CLOSED

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information<br>LOCATION 2 | | | |
|---|---|---|---|---|
| | SUB SLAB | 3' BG | 6' BG | 9' BG |
| 1410 | | | | |
| ~~1460~~ | | 1825 | | |
| 1528 | | | 0 | |
| | | | | |
| 2619 | 8025 | | | |
| ~~2803~~ | | ~~1850~~ | | |
| 2836 | | | 0 | |
| 3738 | | 6595 | | |
| DM 6723 | 5625 | | | |
| DM 6830 | | | 1475 | |
| DM 6924 | | 3900 | | |

DM = 21836 #

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP SDM
Project Number: JRO 479
Field Personnel: T, D, B, M
Recorded By:
Weather: SUNNY Hot

Date: 06/8/16 Page 4 of 8
Primary Activities: HE FLOOD
DRAIN CLOSED

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information<br>LOCATION 5 | | | |
|---|---|---|---|---|
| | SUB SLAB | 3' BG | 6' BG | 9' BG |
| 1425 | 7025 | | | |
| 1540 | | 0 | | |
| 2344 | 8050 | | | |
| 2441 | | 625 | | |
| 3044 | | 0 | | |
| 3614 | | 2675 | | |
| 7228 | | | 0 | |
| 7310 | | 1125 | | |
| | 1156 END OF TEST | | | |

DM
DM
DM

DM = #021836

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP SDM
Project Number: TR0479
Field Personnel: T, D, B, M
Recorded By:
Weather: SUNNY Hot

Date: 6/8/16 Page 5 of 8
Primary Activities: HE FLOOD
DRAIN CLOGED

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information<br>LOCATION 6 | | | |
|---|---|---|---|---|
| | 6" BG SLAB | 3' BG | 6' BG | 9' BG |
| 1.50 PM | 75 | | | |
| 2.02 | 300 | | | |
| 3.00 | 1425 | | | |
| 7 20 | 2250 | | | |
| 20 53 | 8150 | | | |
| 2924 | | 0 | | |
| 4533 | | 625? | | |
| 63:00 | 6900 (14357) | | | |
| 1:11 53 | | 0 (14357) | ~~0 (14357)~~ | |

checked and all data used in plots

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP SDM
Project Number: TRO 4379
Field Personnel: T, D, S, M
Recorded By:
Weather: Sunny 40+

Date: 5/18/16 Page 6 of 8
Primary Activities: HE FLOOD
DRAIN CLOSED

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information<br>LOCATION 3 | | | |
|---|---|---|---|---|
| | SUB SLAB | 3' BG | 6' BG | 9' BG |
| 22:10 | 7950 | | | |
| 7952 | | 0 | | |
| 14721 | | 0 | | |
| 50:00 | 6825 (6633) | | | |
| 51:00 | 6550 (14575) | | | |
| 52:00 | | 0 (14575) | | |
| 1:05 | 6200 | | | |
| 1:08 | | 10:50 (14575) | | |
| 1:09 | | | 0 (14575) | |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP SDM
Project Number: IR3479
Field Personnel: T, D, B, M
Recorded By:
Weather: SUNNY Hot

Date: 6/8/16 Page 7 of 8
Primary Activities: HE FLOOD
DRAIN CLOSED

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information<br>Location 4 SUB SLAB | 3' BG | 6' BG | 9' BG |
|---|---|---|---|---|
| 6:10 | 6625 | BAD M+R | | |
| 7:00 | ~~2025~~ | | | |
| 17:20 | 5350 | | | |
| 24:00 | 2050 | | | |
| 25:00 | | 4625 DIRECT | NOT VALID (LOW METER NOT ON FLOW THRU) | |
| 26:30 | 2050 | | | |
| 27:00 | | 4250 DIRECT | | |
| 34:30 | 2150 | | | |
| 36:00 | 2425 | | | |
| 37:00 | 2550 | 1725 FLO THRU | | |
| 38:30 | | | | |
| DM 6312 | | | 1625 | |
| DM 6417 | | 2375 | | |
| DM 6530 | 3100 | | | |

DM = 21836

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP SVM
Project Number: TR0429
Field Personnel: TDBM
Recorded By: TDBM
Weather: SUNNY HOT

Date: 6/8/16 Page 8 of 8
Primary Activities: HE FLOOD DRAIN CLOSED

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information<br>LOCATION | | | |
|---|---|---|---|---|
| | SUB. SLAB | 3' BG | 6' BG | 9' BG |
| ~~1000~~ | ~~2700~~ | RAD METER | | |
| 1028 | 375 | | | |
| 13:00 | 175 | | | |
| 1620 | 3025 | | | |
| 2130 | 3350 | | | |
| 28:30 | 3600 | | | |
| 30:00 | | 4600 DIRECT | NOT USED NO FLOW THRU | |
| 33:00 | 3900 | | | |
| 40:00 | | 3125 FLO THRU | | |
| 42:00 | 4175 | | | |
| 55:00 | 3925 | | | |
| 58.30 | | 2775 | | |
| DM 5948 | 3650 | | | |
| DM 62:30 | | | 1150 | |

Daily Field Report

DM = 21836

INFLUENT CONCENTRATION

| t | | | |
|---|---|---|---|
| Serial # | 02836 | 14357 | ming |
| | 4100 | 7400 | |
| 45 min | 7700 | | |
| 55 min | 8425 | 7850 | 1250 |

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: SDM
Project Number: TR0 479
Field Personnel: B D M
Recorded By:
Weather: SUNNY Hot

Date: 6/9/16 Page 1 of 8
Primary Activities: HE FLOOD
DRAIN OPEN

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information<br>Loc 1 | | | |
|---|---|---|---|---|
| | 55 | 3' BG | 6' BG | |
| 03:45 | 150 | | | |
| 07:15 | 150 | | | |
| 12:00 | 100 | | | |
| 14:00 | | 0 | | |
| 18:26 | ~~950~~ 700 | | | |
| 21:04 | 950 | | | |
| 24:06 | | 250 | | |
| 25:39 | 1200 | | | |
| 34:55 | ~~1275~~ 1275 | | | |
| 39:30 | 575 | - R6133 | | |
| 40:40 | 2025 | | | |
| 47:17 | ~~2050~~ 2050 | | | |
| 55:23 | | 500 | | |
| 59:15 | ~~1925~~ 2250 | | | |
| 1:02:30 | 2050 | | | |
| 1:05:48 | | 575 | | |
| 1:09:34 | ~~1975~~ 2100 | | | |

Daily Field Report

905 start of test

Reading ~ 2000 ppm in indoor air

# DAILY FIELD REPORT

#14357

Geosyntec consultants

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Project Name: ESTCP 50M

Project Number: TR0479

Field Personnel: B, D, M

Recorded By:

Weather: Sunny Hot

Date: 6/9/16 Page 2 of 8

Primary Activities: HS FLOOD DRAIN OPEN

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | | |
|---|---|---|---|---|
| | LOC 2 SS | 3' BG | 6' BG | |
| 609 | 7650 | | | |
| 830 | | 0 | | |
| 954 | 7025 | | | |
| 1210 | | 0 | | |
| 13.48 | 7125 | | | |
| 18.11 | | 0 | | |
| 19.02 | 6025 | | | |
| 24.12 | 7000 | | | |
| 29.40 | | 2750 | | |
| 34.50 | 7275 | | | |
| 37.20 | | 2500 | | |
| 44.50 | 7650 | | | |
| 46.57 | | 3850 | | |
| 47.40 | | | 0 | |
| 5620 | | | 2775? | |
| 5650 | | 5700 | | |
| 5830 | 7825 | | | |
| 66.03 | | | 3700 | |
| 67.00 | | 5925 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

2250

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP SDM
Project Number: TRO 479
Field Personnel: B, M, D
Recorded By:
Weather:

Date: 6/9/16 Page 3 of 8
Primary Activities: HE FLOW DRAIN OPEN

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | | |
|---|---|---|---|---|
| | LOC 3 | | | |
| | 95 | 3' BG | 6' BG | |
| 5:30 | 7725 | | | |
| 6:30 | | 0 | | |
| 8:30 | 7600 | | | |
| 11:00 | | 0 | | |
| 12:30 | 7450 | | | |
| 14:30 | 7125 | | | |
| 15:00 | | 0 | | |
| 23:00 | 6875 | | | |
| 24:00 | | 0 | | |
| 25:30 | 6700 | | | |
| 32:00 | 6375 | | | |
| 36:30 | 6200 | | | |
| 49:00 | 6225 | | | |
| 51:30 | | 600 | | |
| 53:00 | 6150 | | | |
| 54:00 | INDOOR AIR 500 PPM | | | |
| ~~55:00~~ | | 575 | | |
| 60:00 | | 1125 | | |
| 62:00 | | 900 | | |
| 63:00 | | 625 | | |
| 69:00 | | 600 | | |
| | | 700 | | |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESYCP SDM
Project Number: TR0 479
Field Personnel: B, D, M
Recorded By:
Weather: Sunny Hot

Date: 6/9/16 Page 4 of 8
Primary Activities: HE FLOOD DRAIN OPEN

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information Loc 4 | | | |
|---|---|---|---|---|
| | 55 | 3' BG | 6' BG | |
| 05:42 | ~~225~~ 225 | | | |
| 10:30 | 250 | | | |
| 19:44 | | | | |
| 27:10 | ~~350~~ 325 | | | |
| 31:40 | | 500 | | |
| 42~~3~~ | 1600 — | F6133 | | |
| 44:30 | 2175 | | | |
| 48:5 6 | ~~2200~~ | | | |
| 51:27 | | ~~350~~ 375 | | |
| 57:00 | 2400 | | | |
| 1:04:39 | 2425 | | | |
| 1:08:30 | | ~~500~~ 550 | | |

10:5 END of TEST.

#14357

# DAILY FIELD REPORT

Geosyntec consultants

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Project Name: ESTCP SDM

Project Number: IRO479

Field Personnel: B, D, M

Recorded By:

Weather: Sunny Hot

Date: 6/1/16 Page 5 of 8

Primary Activities: 14 FLOOD DRAIN OPEN

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information Loc 5 | | | |
|---|---|---|---|---|
| | 5'S | 3'BG | 6'BG | NOTES |
| 6:00 AM | 0 | 0 | 0 | OVERNIGHT DRAIN OPEN PRE TEST |
| 7.08 | 7525 | | | |
| 10.55 | 6925 | | | |
| 14.38 | 7050 | | | |
| 21.08 | 6700 | | | |
| 21.02 | | 0 | | Dec change |
| 32.20 | | 950 | | |
| 33.06 | 8025 (Flow through) | | | |
| 39.12 | 7175 | | | |
| 40.30 | | 1650 | | |
| 42.40 | | | [illegible] | |
| 49.11 | | | 0 | |
| 50.24 | | 2200 | | |
| 51.54 | 8125 | | | |
| 62.09 | | | 525 | |
| 63.40 | | 3125 | | |
| 64.50 | 8075 | | | |
| 69.10 | | | 1600 | |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: ESTCP SDM
Project Number: RD 479
Field Personnel:
Recorded By: B, D M
Weather:

Date: 6/9/16 Page 6 of 8
Primary Activities: HS FLOW
DRAW DOWN

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | | |
|---|---|---|---|---|
| | LOC 6 | | | |
| | SS | 3' BG | 6' BG | |
| 3:30 | 7150 | | | |
| 4:00 | 7350 | | | |
| 4:30 | 7425 | | | |
| 9:30 | 7375 | | | |
| 13:30 | 7200 | | | |
| 30 MIN | CHANGE DES - NEW DES IA | | | 900 PPM |
| 22:00 | 7175 | | | |
| 28:00 | INDOOR AIR | 300 | PPM | |
| 29:00 | 6550 | | | |
| 29:30 | | 0 | | |
| 31:00 | 6575 | | | |
| 33:00 | 6350 | | | |
| 34:00 | | 0 | | |
| 35:00 | 6200 | | | |
| 38:00 | 6350 | | | |
| 46:50 | 6625 | | | |
| 47:00 | INDOOR AIR | 800 | PPM | |
| 48:00 | | 0 | | |
| 50:00 | 6000 | | | |
| 58:00 | | 0 | | |
| 59:00 | 6025 | | | |
| 65:00 | | 0 | | |
| 66:30 | 5625 | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Daily Field Report

C4.0

Site #4: Building 11193

Vandenberg Air Force Base

C4.1
Site #4: Building 11193
General Notes

SSP Screen
**~~DAILY FIELD~~ REPORT**
6517

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Project Name: UDB 11193 Date: _____ Page ___ of ___
Project Number: _____ Primary Activities: _____
Field Personnel: _____
Recorded By: _____
Weather: _____

| Time | Description of activities - ~~work~~ flow location of work, work performed, equipment & personnel used, incidental information | PID | GEM | | |
|---|---|---|---|---|---|
| SSP 1A 08:11 | 0.16 @ 50 mL/min | 6.1 | 0.0 | 0.1 | 20.2 |
| | | ~~PID~~ ~~$CH_4$~~ ~~$CO_2$~~ ~~$O_2$~~ | | | |
| | | PID | $CH_4$ | $CO_2$ | $O_2$ |
| SSV-MP-5 | 0.37 @ 500 | 103.1 | 0.0 | 11.8 | 6.6 |
| SSV-MP-10 | 0.42 @ 500 | 160.5 | 0.0 | 14.1 | 3.7 |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: VDB 11193
Project Number: TR0626
Field Personnel: WERTZ
Recorded By: WERTZ
Weather: SUNNY MILD

Date: 06 16 17 Page 1 of ___
Primary Activities: DOWN LOAD PRESSURE DATA
PREP FOR SSV TESTS

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 09:00 | ARRIVE ON SITE |
| | DG700 REPORT = IA |
| 11:00 | DOWNLOAD PRESSURE DATA DG-700 44062 |
| | FRONT CORNER OF BUILDING - SSP-1-E = CHANNEL A |
| | & RESTART CROSS-BUILDING = CHANNEL B |
| 11:20 | DOWN LOAD PRESSURE DATA DG700-44063 |
| | & RESTART SVP-1-5S = CHANNEL A |
| | SVP-1-5' = CHANNEL B |
| 11:42 | DOWN LOAD PRESSURE DATA DG700-44289 |
| | & RESTART SVP-2-5S = CHANNEL A |
| A | NOTE - CHANNEL IS HOOKED TO SVP-2-10' WHEN DATA DOWNLOADED SVP-2-5' = CHANNEL B |
| 12:00 | DOWNLOADED PRESSURE DATA DG700-41676 |
| | & RESTART SVP-3-5S = CHANNEL A |
| | SVP-3-5' = CHANNEL B |
| 12:15 | DOWNLOADED PRESSURE DATA DG700-44286 |
| | & RESTART SVP-4-5S = CHANNEL A |
| | SVP-4-5' = CHANNEL B |
| | |
| 12:30 | DOWNLOADED PRESSURE DATA DG700-41677 BLOWER DOOR A |
| | CHANNEL A = CROSS BUILD |
| 14:15 | PID-SCREENING CHANNEL B = FAN |
| | 5S POINTS |
| 15:15 | LEAVE FOR FEDEX |
| | |
| | |
| | |
| | |
| | |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: [redacted] UDR 611493
Project Number: TR0626 / TR0479
Field Personnel: WORTZ
Recorded By: WORTZ
Weather: SUNNY WARM

Date: 06 16 17
Page 2 of 2
Primary Activities: E-PERM DEPLOYMENT

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 16:30 | DEPLOY E-PERM IN CLOSED BUILDING FOR BACKGROUND RADON. |
| 16:35 | DEPLOYED EPERM # SJF993 } 1/2 WAY BETWEEN<br>DEPLOYED EPERM # SJF405 } CENTRAL WALL & SVP-4 |
| 16:40 | DEPLOYED EPERM # SIQ565 AT PRESSURE AIR PIPE IN CENTRAL AREA OF ROOM NEXT TO SVP-1 |
| 16:47 | DEPLOYED EPERM # SIQ580 ON TABLE NEAR SVP-2 AND GC-7 SAMPLE PORT (ASU) |
| 16:50 | DEPLOYED EPERM # SJF891 ON HOMER BUCKET NEAR SVP-3 |
| 17:10 | STARTED SSV<br>$\Delta P$ MEASUREMENTS |
| 17:15 | SSP-1-E VACUUM = -4.7 to -5.2 Pa<br>SSP-2-E VACUUM = -5.0 to -5.6 |
| 17:25 | [redacted] SVP-4-SS = [redacted] -32.5 Pa |
| 17:45 | [redacted] CONNECTED DG700 - 41677 to EOC<br>PERFORM SSV TRANSIENT<br>SSV HAS BEEN RUNNING SINCE 17:10 |
| 17:59 | FAN OFF - 18:03 FAN OFF |
| 18:04 | FAN ON 18:05 FAN ON |
| [redacted] | [redacted] STACK VELOCITY = ≈900 FPM<br>16:12 FAN OFF |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: VDB 1193 Date: 061817 Page 1 of 3
Project Number: TR0479 Primary Activities:
Field Personnel: WERTZ PID THROUGH MEASUREMENTS
Recorded By:
Weather:

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 11:30 | ARRIVE ON BASE |
| [redacted] | DEPLOYED EPERM # SJF804 |
| 12:02 | UPGRADIENT OUTDOOR AIR SAMPLING LOCATION |
| 12:30 | CALIBRATED PID & GEM |
| 19:00 | CLOSED & RETRIEVED OUTDOOR EPERM |
| | SCREENED PROBES |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: TROUT  Date: 06/8/17  Page 2 of 3
Project Number:  Primary Activities:
Field Personnel: WSFR+2
Recorded By:
Weather:

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| | ELECTRET BACKGROUND W/ GARBAGE CAN IN BUCKET |
| | SSV-MP-5 & 10 SCREEN |
| | GEM |
| | SSV VACUUM @ ELBO |
| | PID ELBO |
| | VACUUM @ 3' PROBE |
| | VACUUM @ SSP-N-2 |
| | VACUUM @ SSP-4-B |
| 17:39 | SSV ON |
| 17:40 | INITIAL PURGE 7.4PPM PID |
| 17:50 | GEM $CH_4$ $CO_2$ $O_2$ 0.0 0.1 20.0 |
| | STOPPED SSV TO REPLACE VACUUM GAUGE |
| 18:07 | RESTART 30" $H_2O$ VAC @ WELL HEAD |
| | -30.1 PA AS SVP-2-SS -19.5 Pa @ SVP-2-5' |
| | FLOW = [redacted] CFM 900 (est) |

PURGE AT 18:44
7.3 PPM
$CH_4$ $CO_2$ $O_2$
0.0 0.1 20.5

18:55 FAN OFF
19:00 DEPART

# DAILY FIELD REPORT

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Project Name: VDB 11193
Project Number: TR0479
Field Personnel: WERTZ, MCALARY, MALI
Recorded By: WERTZ
Weather: SUNNY, MILD

Date: 061917
Page 1 of ___
Primary Activities: SSV OPERATION & TESTING

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 0:700 | ARRIVED ON SITE |
| | CALIBRATE METERS |
| | TAPE EXTRACTION PIPE |
| 16:24 | NOTICED that PRESSURE PORTS at SSV-1-SS AND SSV-1-5' |
| | WERE SWITCHED (5' = A, SS = B). REVERSED |
| | PORTS TO COMMON THEME SS = A, 5' = B |
| 06:37 to 17:45 | PID & GEM SCREEN STACK, SSP-N-2 & SVP-4-SS |
| 17:45 | COLLECTED SSV STACK SAMPLE 450 CFM |
| 17:48 | 10" H2O |
| | NOTE CAN WAS LEFT OPEN BRIEFLY AFTER REMOVAL |
| | FROM STACK |
| 18:30 | COLLECTED & PROCESSED OUTDOOR AIR SAMPLES |
| 18:45 | DEPART |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: [redacted] UDB 11193
Project Number: TR0479
Field Personnel: TM, DM, WW
Recorded By: WW
Weather: Sunny Cool – AM Fog

Date: 06 2017
Page 1 of 2
Primary Activities: Optimization

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| [redacted] | |
| 07:15 | ARRIVED ON SITE |
| | CALIBRATE PID, GEM |
| | DEPLOYED OA SAMPLES |
| | SAMPLED SSU STACK (PID, GEM, SUMMA, RADON) |
| 09:25 | PID SCREEN SUB-SLAB FAN @ 450, 10" $H_2O$ |

| SS | PID (ppm) | SS | PID |
|---|---|---|---|
| SSP-2-E | 1.2 | SS | PID |
| SSP-W-3 | 0.8 | SSP-W-1 | 0.8 |
| SSP-1-E | 0.4 | SSP-1-B | 2.4 |
| SUP-1-SS | 2.7 | SUP-4-SS | 185.9 |
| SUP-1-5' | [redacted] 10.1 | SVP-4-5' | 830 [redacted] |
| SUP-1-10 | 34.9 | SUP-4-10' | 1831.0 |
| SUP-N-2 | 1.2 | | |
| SSP-4-B | 392.7 | FLOW DURING SS [redacted] | |
| SSP-4-E | 11.1 | SUP-4-10 0.25" @ 500 mL/min | |
| SUP-2-SS | 7.6 | ★ SUP-4-5 80.0" @ 500 mL/m ★ | |
| SVP-2-5' | 33.3 | | |
| SVP-2-10' | 30.1 | | |
| SSP-S-2 | 0.7 | | |
| SSP-3-E | 11.2 | | |
| SSP-E-3 | 105.4 | | |
| SUP-3-SS | 40.4 | | |
| SUP-3-5' | 137.9 | | |
| SVP-3-10' | 137.7 | | |
| SSP-E-2 | 3.6 | | |
| SSP-2-B | 4.5 | | |
| 10:10 | | | |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: VDB 11493 Date: 6 20 17 Page 2 of 2
Project Number: TR0479 Primary Activities:
Field Personnel: TM, DM, WW PD (ASU) STRESS TEST OF SSV
Recorded By: DMW
Weather: SUNNY WARM (PM)

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 15:00 | ± SWITCHED SSV to FULL FLOW |
| | W/ BLOWER DOOR CONSTANT STRESS |
| | to SEE IMPACT OF GREATER SSV FLOW |
| | |
| | |
| | SUPER STACK – W/ AIR FORCE SHOP VAC |
| | TIMEON = 16:15 |
| | VAC @ WELL HEAD |
| | FLOW through STACK |
| | PID |
| | SAMPLE @ BLOWER DOOR |
| | SAMPLE @ STACK |
| | NOTE: COMBINED OPERATION OF SHOP VAC & OBAR CAUSED OBAR to QUIT |
| | |
| | ~~&~~ TESTING W/ SHOP VAC SUSPENDED |
| | |
| | OBAR STARTED AGAIN AT FULL SPEED W/O SHOP VAC |
| 17:35 | DEPART |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM TM WW
Recorded By: DM
Weather:

Date: 06/19/17 Page 1 of 1
Primary Activities: Step test, interwell tests

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 7:00 | Arrival on site |
| 8:45 | At 11193 |
| 9:00 | Collect & electrets |
| 10 00 | Deploy OA Samples upwind & Downwind |
| 620 | Helium Cal Check |
| | 33323 27827 R6134 |
| | 87.8 % 90.8 % 90.1 % |
| | 34.6 % 34.5 % 340 % |
| 11:00 | Helium Interwell tracer tests |
| 1300 | Deployed RAD STAR near RAD 7 |
| | by the crack in the floor. |
| | Building Volume ~ 101045 ft³ |
| 1450 | STEP Test 1 Sample (Summa taken) 44 CFM |
| | intial Vac 29.05 Final Vac 2.18 |
| | STEP 1 - 44 → B11193-061917-SSV-1-44 |
| 15:01 | Radon Sample Collected STEP1-44 |
| 15:05 | Pneumatic tests collected at |
| | SSP-3B chB |
| | SSP-E1 chA 15:24 END. |
| 1527 | SSP-S2 chA |
| | SSP-S1 chB 15:35 END |
| 1539 | SSV-MP. |
| | 5ft chA |
| | 10ft. chB |
| 1550 | Changed flow to 450 ft/min |
| 1600 | off site. |
| | |
| | |

* Ran out of Helium

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM drw TM.
Recorded By: DM
Weather:

Date: 06/20/17 Page 1 of 1
Primary Activities: Stress test.

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 7:30 | - on site |
| | - Round of static vacuums |
| | - Summa sample at 10" $H_2O$ & 450 ft/min |
| | - Radon Sample |
| 9:00 | - Added fresh air line to dilution valve, increased velocity to 510 ft/min and vacuum to 12" $H_2O$ |
| | - Outdoor Air Samples deployed |
| 10 30 | Regulators on site, gave tour and explained the tests |
| 10:00 — | 10:45 Sealed floor |
| 13:44 | Started Blower Door @ -10 Pa (Difference of -5Pa) |
| | ~ 5200 CFM |
| 1445 | Indoor Air & SSV Samples taken for Stress test 1 |
| 15:00 | Bleed Valve closed on system |
| 15:32 | Flow with cracks sealed 1200 ft/min vacuum 30" $H_2O$ |
| 15:38 | Disconnected the Helium test & Plugged into the Subslab Point at SSV4-SS. Also changed the monitoring from 5ft depth to 10ft depth |
| 16:15 | Shop Vac added to Flow rate |
| | Flow rate 136 cfm @ 35" |

Ran at -10 Pa, Not -5Pa

Summa samples taken at around 4pm that evening

Daily Field Report

# DAILY FIELD REPORT

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**Project Name:** ESTCP
**Project Number:** TR0479
**Field Personnel:** DM TM WW
**Recorded By:** DM
**Weather:**

**Date:** 06/21/17 **Page** 1 of 2
**Primary Activities:** Stress test, Helium flood, pneumatic tests.

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 7:00 | arrival on site |
| 8:05 | started Blower door operations |
| 8:36 | Radon Sample taken at ST-44 SCFM |
| 9:05 | Collected IA sample infront of Blower door |
| | running at ~5200 CFM |
| | Collected SSV sample running at ~ 58 CFM 30" $H_2O$ |
| 942 | Connected Shop Vac to SSV running at |
| | 36" $H_2O$ & 1100 FPM |
| 1038 | Connected 2 Shop Vacs & OBAR to system. |
| | Running at 44" $H_2O$ 65 CFM (1328 ft/min) |
| 1036 | SSP-3E has +1.0 Pa Pressure Building at -50 Pa |
| | depressurization, Probe reading -40 Pa |
| 11:10 | Reconfigured system to a singe exhaust Point |
| | Vel = 1300 ft/min / 64 CFM / 41 in $H_2O$ |
| 12:10 | IA at Blower face and SS Sample at SSV |
| | collected. Radon sample at SSV collected |
| 1219 | Turned blower down to -5 Pa. |
| 13:15 | PID reading 8.8 ppm |
| | Vacuum 42 in $H_2O$ vel = 1300 ft/min 65 CFM |
| 1335 | IA at Blower face SS Sample and Radon Sample |
| | collected at -5 Pa / 64 CFM / 42 in $H_2O$ |
| 1358 | Switched to just OBAR running, noticed it |
| | was only drawing 10" $H_2O$. Turned off to |
| | cool. Flange on OBAR was broken |
| 15:06 | Transient tests Conducted at 30" $H_2O$ |
| | 1185 ft/min = 58 CFM with Shop Vac |
| | running |
| 1523 | on 3rd effect at SSP3B & SSPE1 started with |

Valve closed, then started vacuum. Same but reverse when turned off vacuum

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: WW DM TM
Recorded By: DM
Weather:

Date: 06/21/17 Page 2 of 2
Primary Activities:

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 16:13 | - Started Blower Door at -5Pa |
| | - Shop Vac on at -30 in $H_2O$ 58 scfm |
| 16:30 | off site |

Daily Field Report

# DAILY FIELD REPORT

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Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM WW TM
Recorded By: DM
Weather:

Date: 06/22/17 Page 1 of
Primary Activities: Helium flood

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 7:00 | Arrived on site. |
| 7:30 | tested helium flow rate to ~ 45 sec/10L to mimic ~1% of 55 CFM (current flow of OBAR) |
| 830 | Helium Cal check |
| | R 11188 R 6134 (AGU) 27827 33322 |
| | 32.1 4.7 33.1 33.2 |
| 953 | Helium • flood test done at 350 ft³/min because exhaust was plugged. when unplugged the ~~test~~ flow was too high and the plate on the SSV leaves. Test terminated |
| 1115 | downloaded Building Pressure Monitoring Data for DG-700 at SUP-4 |
| 1132 | ~~downloaded~~ SUP 2 |
| 1141 | Model 41670 I ~~could not connect~~ to. ~~Data NOT downloaded yet.~~ |
| 1152 | Printed RAD STAR DATA. |
| 1200 | Downloaded SUP 1 DG-700 |
| 1203 | Downloaded SUP3 DG-700 |
| 1208 | Downloaded OA DG-700 |
| 1330 | Made Map of Building. |

Daily Field Report

Geosyntec consultants

924 Anacapa Street, Suite 4A
Santa Barbara, California 93101
805-897-3800 (phone) 805-899-8689 (fax)

# DAILY FIELD REPORT

PROJECT: VAFB - Building 11193
LOCATION: Building 11193 PROJECT NO.: TR0626 TASK NO.: _____
DESCRIPTION: Demo Plans DATE: 5 day 6 month 17 year
CONTRACTOR(S): BC2 Env., Sentom Head
WEATHER, TEMPERATURE: Cold, overcast.

0630 - Depart Santa Barbara

0730 - Arrive onsite (VAFB). Meet Kathy Gerber and Bill Mertz (Geosyntec) at Building 11193. Conduct walkthrough. Conduct safety tailgate meeting to discuss scope for the day.

Tasks completed:
- Construct SSV stack
- Install vapor pins at monitoring points SSPE3, SSPE2, SSP3c, SSPS2, SSP2c

0930 - Wrap up and depart site.

6/8/17

NAME: D. Fisher PROJECT NO.: TR0626 HOURS: _____

Sheet No. 1 of 1

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Santa Barbara, California 93101
805-897-3800 (phone) 805-899-8689 (fax)

# DAILY FIELD REPORT

PROJECT: VAFB Building 11193
LOCATION: Building 11193 PROJECT NO.: TR0626 TASK NO.:
DESCRIPTION: Demo Plans DATE: 6 day 6 month 17 year
CONTRACTOR(S): BC2 Env. , Senborn-Head
WEATHER, TEMPERATURE: Cold, overcast

0700 - Arrive e site
0715 - BC2 Arrives site. Bill Werts arrives @ sik. Conduct safety tailgate meeting with discussions including air ventilation. Discuss scope.
0740 - Conduct walk Through with BC2.
0815 - Calibrate MiniRae 3000 & GEM 2000
PID = reading 100ppm & Cal gas = 100ppm isobutylene
GEM2000 = ready $CH_4$ = 48.9% $CO_2$ = 33.7% ~~$O_2$ = 8~~ Nitrogen Balance = 19.3%
(Cal gas $CH_4$ = 50% & $CO_2$ = 35% )
1000 - Begin coring holes for direct push drilling at location SVP-1.
Core thickness = 4inches.
Continue coring. Well screen set ~~13'~~ 8'-13'. Annular set = 0.5ft of bentonite chips. DTW = 10ft (6.71ft PID) btos (below top of surface)
1600 - Mob to location SVP-2 & begin hand augering GW well. Setup drill rig on Soil Vapor (SV) well.
1630 - Begin drilling at SVP-2 @ soil vapor well (SV). Collect soil cores. Set probes at 5 & 10 ft. →(GW+SV)
1630 - set well boxes for SVP-1 & SVP-2 (SV) & begin wrapping up.
1815 - Drillers depart site.
1830 - Depart site & mob to Staples to purchase scale to weigh VOC samples.
1915 - Depart Staples
*All PID readings in breathing zone = 0.0 ppm*

1330 - Don (RWQCB) & Kathy Gerber (VAFB) onsite for approx. 0.75 hrs.

10/6/17

NAME: PROJECT NO.: HOURS:

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Santa Barbara, California 93101
805-897-3800 (phone) 805-899-8689 (fax)

# DAILY FIELD REPORT

PROJECT: VAFB - Building 11193
LOCATION: Building 11193 PROJECT NO.: TR0626 TASK NO.:
DESCRIPTION: Demo plans DATE: 7 day 6 month 7 year
CONTRACTOR(S): BC2 Env., Seaborn - Head
WEATHER, TEMPERATURE: Cold, overcast

$07^{00}$ - Arrive @ site. Conduct safety tailgate meeting. Setup on SVP-2-GW well. Calibrate PID = 100.3ppm (Iso).
$07^{18}$ - Begin drilling SVP-2-GW. Install well screen 8-13' bgs. DTW = 11 ft bgs. Wellbox set. Air readings = 0.0ppm
$08^{45}$ - Mob to well SVP-4. Clear ducting / ceiling tiles above borehole locations. Begin hand augering SVP-4-GW.
0.3 to 1 ft soil screen = 0.7ppm (SVP-4-GW)
Downhole PID readings = ~~0~~ 3ppm, (SVP-4-GW)
[PID] 2 ft soil screen = 0.5ppm ( " )
2.5 ft soil screen = 0 ppm. ( " )
4 ft (clay) soil screen = 0.5ppm ( " )
Downhole PID reading = 3.1ppm ( " )
$9^{30}$ - Drill SVP-4-SV. Install probes @ 5 and 9.5 ft bgs.
[PID] 10ft soil screen = 0.1 ppm (SVP-4-SV)
7ft soil screen = 2.0 ppm (SVP-4-SV)
$10^{45}$ - Drill SVP-4-GW. Install screen from ~~8'-13' ft bgs~~ 8.[illegible] - 13.75 ft bgs.
7.2 ft soil screen = 4.2ppm (SVP-4-GW)
$13^{00}$ - Drill SSV-MP. Install probes @ 5 & 10 ft bgs
[PID] 5 ft soil screen = 0.3ppm (SSV-MP)
10 ft soil screen = 0.0ppm (SSV-MP)
$13^{40}$ - Drill SVP-3-GW. Screen set 8.7 - 13.7 ft bgs. DTW = 10.7 ft bgs.
[PID] Downhole reading - 2.8ppm (SVP-3-GW) - after 5 ft core removed.
7ft - 8.5 ft soil screen = 0.9ppm ( " )
Downhole reading - 10.2 ppm ( " ) - after 10 ft core removed. Breath Zone = 0.0 ppm.
$14^{50}$ - Drill SVP-3-SV. Set probes @ 5 & 10 ft bgs.
[PID] Downhole reading - 4.4 ppm (SVP-3-SV) - after 1-5 ft core removed

NAME: D. Fisher PROJECT NO.: TR0626 HOURS:

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924 Anacapa Street, Suite 4A
Santa Barbara, California 93101
805-897-3800 (phone) 805-899-8689 (fax)

# DAILY FIELD REPORT

PROJECT: VAFB - Building 11193

LOCATION: Building 11193 PROJECT NO.: TR0626 TASK NO.: _____

DESCRIPTION: Demo Plans DATE: 7 day 6 month 17 year

CONTRACTOR(S): BC2, Sanborn-Head

WEATHER, TEMPERATURE: _____

15[15] - Regulators onsite
16[45] - Regulators offsite
17[15] - Parl/Dahlen onsite
18[00] - Parl offsite
18[15] - Drillers & all others offsite
*All breathing zone PID readings = 0.0 ppm.

6/7/17

NAME: D. Fisher PROJECT NO.: TR0626 HOURS: _____

Sheet No. 2 of 2

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Santa Barbara, California 93101
805-897-3800 (phone) 805-899-8689 (fax)

# DAILY FIELD REPORT

PROJECT: VAFB Building 11193
LOCATION: Building 11193 PROJECT NO.: TR0626 TASK NO.:
DESCRIPTION: Demo Plans DATE: 8 day 6 month 17 year
CONTRACTOR(S): ~~BCT Env.~~
WEATHER, TEMPERATURE: Cold overcast

0730 - Onsite with Bill Wertz. Conduct safety tailgate meeting. Paul Dahlen onsite.

Tasks completed:

- Install (complete install) of sub-slab monitoring points with vapor pins.
- Seal openings in building including windows, doors, & roof exhausts / penetrations.
- Well development + GW monitoring for VOCs
  - Note well SVP-4 partially developed when GW sample collected. This well had slow recharge. All other wells (SVP-1 thru 3) had good recharge + stability.
- Paul set up GC / other equipment + conducted blower door baseline testing.

6/8/17

NAME: D. Fisher PROJECT NO.: HOURS:

Sheet No. 1 of 1

# DAILY FIELD REPORT

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Project Name: VAFB-Building 1193
Project Number: TR0626
Field Personnel: D.Fisher P.Dahlen B.Wertz
Recorded By: DFisher
Weather: cold, overcast

Date: 6-9-17
Page ___ of ___
Primary Activities:

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 07$^{30}$ | Onsite. Conduct tailgate safety meeting. Setup on (DP) |
| 09:15 | Set up to sample SVP-1 SS, 5', 10' |
| 955/1015 | Sample time for SVP-1-SS |
| 1029/1055 | Sample time for SVP-1-10 |
| 1059/1119 | Sample time for SVP-1-5 |
| 1130 | Set-up to sample SVP-2 SS, 5', 10' |
| 1203/1227 | Sample time for SVP-2-SS |
| 1220/1243 | Sample time for SVP-2-5 |
| 1240/1258 | Sample time for SVP-2-10 |
| 1300 | Setup on sample location SVP-3 SS, 5', 10' |
| 1419/1434 | Sample time for SVP-3-SS |
| 1420/ | Sample time for SVP-3-5 |
| 1505 ~~1437~~/1535 | Sample time for SVP-3-10 |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: VAFB - 1193 Date: 6/10/17 Page 1 of ___
Project Number: TR0626 Primary Activities: SAMPLE SVP's & SSP's
Field Personnel: WERTZ
Recorded By: WERTZ
Weather: SUNNY MILD

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| ~~0700~~ | |
| 09:15 | ARRIVE ON SITE |
| | CALIBRATE GEM, PID |
| | |
| | SWITCHED PID - PREVIOUS ONE STOPPED @ 400 PPM |
| | |
| | |
| 13:40 | He DETECTOR QUIT WHILE ON SVP-4-10 |
| | |
| 1600 | GEM QUIT - REPLACED & RECALIBRATED NEW ONE |
| | |
| | |
| 16:00 | CLOSE UP & LEAVE |
| | |
| | |
| |

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: VDB 11193
Project Number: TR0626
Field Personnel: WERTZ
Recorded By: WW
Weather: SUNNY WINDY

Date: 061117
Page 1 of 1
Primary Activities: SET UP & TEST SSD
DEPLOY PRESSURE METERS

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 0:900 | ARRIVE ON SITE & PREP DG700 # 44062 |
| 0:9:30 | START to DEPLOY PRESSURE METERS |
| | END OF BUILDING DOORS OPEN |
| 10:37 | SSP-1-E ON LINE |
| | CHANNEL A = SS } QUITE |
| | CHANNEL B = OUTSIDE } WINDY |
| 10:45 | # 44289 DG 700 |
| | SSP-W-3 - CHANNEL A |
| | ~~SSP-E-3~~. |
| | SSP-2-E - NOT YET HOOKED UP |
| | CHANNEL B NEED TUBING ~ (HOOKED UP AT 11:38) |
| 10:50 | CLOSED WOOD SHOP END DOORS |
| | INDOOR = REF |
| | SSP-3-E = CHANNEL A } NOTE HOOK UP |
| | OUTSIDE = CHANNEL B } OPPOSITE OF WHAT I DF DID |
| | # 44063 |
| | DG700 |
| 11:20 | SVP-4-SS = CHANNEL A # 44286 } NOTE: Forgot to OPEN VALVES |
| | SVP-4-S' = CHANNEL B |
| | DRIFT ~ 6:00PM |
| 12:00 | FILLED CORE HOLE WHERE UTILITY PIPE |
| | HAD BEEN UNCOVERED |
| 12:30 | SUPPLY RUN |
| 5:20 | FAN HOOKED UP & RUNNING |
| | SSD |
| 6:30 | DEPART |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: VDB 11193
Project Number: TR0626
Field Personnel: DAWSON, WORTZ
450 → DAHLEN, KUO
Recorded By: WW
Weather: SUNNY COOL WINDY

Date: 061217
Page 1 of 2
Primary Activities: PREP FOR BPC
DO BUILDING LEAKAGE CURVE

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 07:30 | ARRIVED ON SITE, DAWSON AWAITING PASS. |
| 08:10 | DAWSON ARRIVES HEALTH & SAFTEY BRIEFING |
| | |
| 9:50 | SWITCHED OA to REF on PRESSURE METERS |
| 10:00 | SWITCHED BACK to NORMAL - REF = INDOOR |
| | |
| 10:00 | SWITCHED BLOWER DOOR SO REF IS INDOOR |
| 10:08 | SWINCHED BLOWER DOOR SO REF IS OUTDOOR |
| | |
| | PLAYING WITH BLOWER DOOR SETUP |
| 10:16 | STARTED BLOWER DOOR TEST to -10 Pa ~~ADJUSTED FOR~~ BASELINE PDR - 16.6 Pa |
| 10:27 | FAN OFF |
| 10:28 | FAN ON — FAN @ -10 Pa TARGET |
| | DECIDED NOT to ADJUST FOR BASELINE |
| | ~~No change needed to~~ This doesn't impact K-slab readings as the flow rate stayed the same |
| | FAN @ MAX UNDER BOTH CONDITIONS i.e- SAME FLOW RATE (30 |
| | |
| | |
| 1:08 | - REMOVE 44289 - |
| 1:21 | 44063 - |
| 1:35 | HOOKED 44063 to SVP-1-55 CHANNEL A |
| | SVP-1-5 CHANNEL B |
| 644 | HOOKED UP 44289 to - |
| | SVP-2-55 CHANNEL A |
| | SVP-2-5 CHANNEL B |

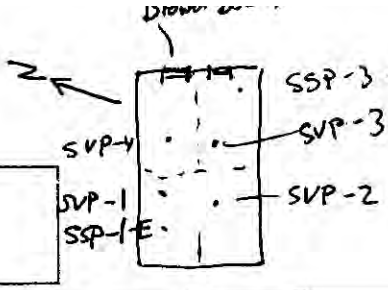
# DAILY FIELD REPORT

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Project Name: UDB 111193
Project Number: TRO 626
Field Personnel: DAWSON, WORTZ
ASU DAHLEN, GUO
Recorded By: WW
Weather: SUNNY WINDY

Date: 06 12 17
Page 2 of 2
Primary Activities: BPC PRELIM.

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 2:00 | CALIBRATE PID |
| | WALK AROUND AND TEST CRACKS W/ PID |
| | (SEE PHOTOS) - NOTE BUILDING IS POSITIVELY PRESSURIZED |
| | WIND PICKING UP ΔP = +21.4 |
| | @ 14:10 to 15:10 |
| 3:30 | FAN TEST - OPEN FAN |
| | TO SEE WHAT WE CAN DEPRESSURIZE TO. |
| | FAN @ -20 Pa |
| | SOME VI PRESENCE BASED ON |
| | 6.1 PPM IN CRACK BY POOL |
| | 2.6 PPM IN CRACK BY SVP-4 |
| | 9.1 PPM IN WALL DRAIN BELOW POOL |
| 17:30 | DEPART SITE |




# DAILY FIELD REPORT

Geosyntec consultants
www.geosyntec.com

Project Name: TR0626 VB11193
Project Number: 0
Field Personnel: H. Dawson, B. Wertz
Recorded By: H. Dawson
Weather: Windy Fair

Date: 6/12/17
Primary Activities: BPL Pap

Page 1 of 2

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | |
|---|---|---|
| 13:19 | SVP-3-5 ~ +5 to +4 | x-s ↑ |
| 13:19 PM | SVP-3-SS ~ -1 to +1 | x-s ~ |
| 13:22 | SSP-3-Outside ~ -6 to +2 Channel B Outside Ref = inside | x-B (~ +) |
| 13:28 | SSP-1-Outside ~ +20 to 0 Channel B Outside Ref = inside | x-B (−) |
| 13:28 | SSP-1-SS +0 to +1.5 Channel A SSP-1 " | x-S ↑ |
| 13:36 | SVP-4-SS ~ -0.1 to 0.1 Channel A " | x-Shd ~ |
| 13:37 | SVP-4-5 +1.7 to ~4.0 Channel B " | x-Shd ↑ |
| | | |
| 14:02 | SVP-4-SS ~0.5 to 0.1 ↑ | ~ |
| 14:02 | SVP-4-5 ~2 to 5 | ↑ |
| 14:05 | SVP-1-SS ~ -1.0 to 0.8 ↑ | ~ |
| 14:05 | SVP-1-5 ~ +12 to 7.0 | ↑ |
| 14:06 | SVP-2-SS ~ -1.5 to +0.7 ↑ | ~ |
| 14:06 | SVP-2-5 ~ +3.0 to 7.0 ↑ | ↑ |
| 14:08 | SVP-3-SS -0.7 to +4.0 ↑ | ~ |
| 14:08 | SVP-3-5 +6.0 - 5.7 | ↑ |
| | | |
| | SUMMARY OF MOVES DG-700 | |
| | #44289 6/11/17 @ SSP-W-3 Channel A | |
| | @ SSP-2-E Channel B | |
| | 6/12 @ SVP-2-SS A | |
| | SVP-2-5 B | |
| | | |
| | #44063 6/11/17 @ SSP-3-E A #44062 6/11 @ SSP-1-E A | |
| | Outside B Outside B | |
| | 6/12/17 @ SVP-1-SS A | |
| | SVP-1-5 B | |
| | #44286 6/11/17 @ SVP-4-SS A | |
| | SVP-4-5 B | |
| | #41676 6/11/17 @ SVP-3-SS A | |
| | SVP-3-5 B | |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: VB11193 Date: 6/12/2017 Page 2 of 2
Project Number: TR0626 Primary Activities:
Field Personnel: H. Dawson, B. Wertz BPC Prep
Recorded By: H. Dawson
Weather: Windy Fair

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 15:13 | BPC X-Bldg 14:13 - 15:13 +22.2 |
| 15:29 | BPC set to -10 |
| 15:30 | Flow P2(Pa) stabilized ~ Flow @ ~6017 over 6.5 minutes |
| | |
| 15:40 | SVP-4-SS ~ -0.5 to 3.0 |
| 15:40 | SVP-4-S 6 to 15 |
| 15:42 | BPC set to -22 |
| 15:42 | ΔP = -13.9 F = 5534 49 seconds |
| 15:54 | ΔP = -22.9 F = 4844 |
| | |
| 16:17 | SVP-3-SS +3.4 - +16 |
| 16:17 | SVP-3-S +38.0 |
| 16:20 | Pods Door at 30 sec intervals logs ~6100 CFM |
| | |
| 16:23 | SVP-2-SS +3. - +6 |
| 16:23 | SVP-2-S +36 39 |
| | |
| 16:25 | SVP-1-SS +2 +1.0 |
| | SVP-1-S +40 +45 |
| | |
| 16:28 | SVP-4-SS +2 +3 |
| 16:28 | SVP-4-S +13 +15 |
| | |
| | Cook |

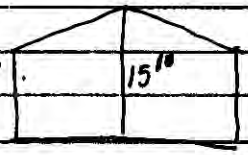
# DAILY FIELD REPORT

Geosyntec consultants
www.geosyntec.com

Project Name: B11193
Project Number: TR0626
Field Personnel: H. Dawson, B. Wertz
Recorded By: H. Dawson
Weather: Fair

Date: 6-13-17
Page 1 of 2
Primary Activities: BPC

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 08:00 | Set up blower door |
| 08:12 | Baseline POR = +7.5 Pa |
| 08:18 | Redo: Baseline POR = +5.6 Pa |
| 08:22 | POR NID Unsealed ~5.9 Pa 5832 |
| 08:32 | 3150 14.5 Pa |
| | 3200 -90. |
| 08:55 | Tied the external ΔP ports of the two blower doors together. ΔP much more stable now. |
| 09:05 | (B) HD 2375 - 2400 (2385 - 2395) ~9 |
| | (A) HD 2660 avg at -90 Pa over past 1.2 minutes |
| 09:32 | (A)(HD): 2796 -9.3 avg over 32-37 minutes |
| 09:30 | (A)(HD) 2730 -9.4 avg over past 30 minutes |
| 9:34 | B 2351 -9.5 $CFM_{TOTAL}$ = 2730 + 2351 = |
| 9:49 | Building Dimensions H |
| | ~~54'2" - 80'8" + 8"~~ = 135.5 |
| | W = 80' |
| | 69'4" + 67'8" = 137' |




$A_{BLDG}$ = 10,960 ft²
$H_{BLDG}$ = 13.25 ft
$V_{BLDG}$ = 145,220 ft³

| | |
|---|---|
| 10:12 | Avg Blower Door - A = -9.2 2743 $CFM_{50}$ = 2743 + 2351 = 5094 |
| | AER = 1/28 min |
| 10-12:30 | Set up SVP-SS and IA and OA sample vacuum |
| | Collected samples over approx 30-40 min |

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: B11193 Date: 6-13-17 Page 2 of 2
Project Number: TR0626 Primary Activities: DPC
Field Personnel: H. Dunn, B. Wentz
Recorded By: H. Dunn
Weather: Fair

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 12:47 | Tech log program stopped recording. Reset and started new file to contain N10 test. |
| 12:54 | N20 test w/ Ring A- |
| 12:57 | N20 test w/ no rings - unsealed |
| 13:05 | N20 test flows balanced at both doors ~ 4000 - 4500 CFM |
| 13:17 | N20 stab for BLC: |
| | A -20.0 ~~4428~~ 4447 over 5 minute |
| | B -20.0 4350 |
| | |
| | Air Exchange/Rate 1/17 min |
| 14:00 | Collected IA and SVP-SS-10-1 samples, COC, forms, etc., prep for IA/OA-20 |
| 15:40 | Deployed IA-A-20, B-20, C-20, OA-A-20 |
| 15:42 | BLC: A -19.8 4360 |
| | BLC: B -19.7 4460 |
| | |
| 16:15 | Started collecting IA-A/B/C-20 and OA-A-20 |
| 16:45 | Finished pressure " " " |
| 16:54 | BLC DATA: A: -33.8 5431 over 10 minute previous |
| | B: -33.3 5850 ~ |
| 16:41 | Bumped Blower Door Fan up to max |
| | A: -34.8 avg over 27 minute 5428 |
| | B: -34 5920 |

# DAILY FIELD REPORT

Geosyntec consultants
www.geosyntec.com

Project Name: VDB 11193 Date: 061317 Page 1 of ___
Project Number: TR0624 Primary Activities:
Field Personnel: DAWSON, WURTZ, LAUSCH BPC
ASU→ DAHLEN, GUO
Recorded By: WW
Weather: SUNNY COOL

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 7:10 | ARRIVED AT BUILDING |
| | PREP FOR BPC |
| | |
| | |
| 8:15 | SET UP FOR LEAKAGE TEST |
| 8:45 | CONNECT OUTDOOR PRESSURE TUBES FROM BOTH |
| | BLOWER DOORS |
| | |
| | NOTE: B11193-061317-OA-B-20 |
| | WILL BE REPLACED by B11193-061317-IA-B-20 |
| | |
| | BPC - 35± |
| | CHECKED CRACKS W/ PID |
| | |
| 18:30 | DEPART |
| | |
| | |
| |

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: VDB 11493
Project Number: TR0626
Field Personnel: WERTZ
DARLEN, GUO (ASU)
Recorded By: WERTZ
Weather: Cool, Foggy IN AM

Date: 06 14 17 Page ___ of ___
Primary Activities: ASU - Long Duration BPC @ -10 Pa

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| 6:45 | ARRIVE ON SITE |
| | DEPLOY BASELINE INDOOR AIR CANS @ A, B, C & OA |
| | |
| 08:00 | RETRIEVED CANS |
| | |
| 09:00 | STARTED ASU BLOWER DOOR @ -10 Pa, LOCATION 10 |
| | X-BUILDING PRESSURE @ LOCATION A and B TIED TOGETHER |
| | AS DONE 06/13/17 |
| | |
| | PREPED SAMPLES - SUMMA - IA, OA - 55 |
| 17:20 | SAMPLERS DEPLOYED |
| 18:10± | STOPPED SAMPLING |
| 18:30 | DEPART |
| | |
| | NOTE: 55 SAMPLES AT SVP-1-55-10-2 |
| | B11493-061417-SVP.1-55-2 |
| | B11493-061417-SVP-1-55-2-DUP |
| | MAY BE BIASED LOW BECAUSE THE VALVE TO THE |
| | DG-700 WAS OPEN FROM 17:40 - 17:50 |
| | ONCE THAT WAS NOTED, THE VALVE WAS |
| | CLOSED AND SAMPLING CONTINUED UNTIL |
| | 18:10 |
| | |
| | |
| | |
| | |
| | |
| | |

Daily Field Report

# DAILY FIELD REPORT

Geosyntec consultants
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Project Name: VDB 11193
Project Number: TR0626
Field Personnel: WSR+Z
DAHLEN, 600 (ASU)
Recorded By: WSR+Z
Weather: SUNNY, COOL, MORNING FOG

Date: 061517
Page 1 of ___
Primary Activities: BPC - POSITIVE PRESSURE TEST

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information |
|---|---|
| [redacted] | |
| 07:10 | ARRIVE |
| | PREP |
| | |
| | VAC TEST @ S&LEGO |
| | SSV-MP-55, 5', 10' |
| | |
| ~9:50 | HOOKED UP [redacted] TUBES TO DG700 @ SVP-3-55 |
| | to SEE IF EXTENDING REFERENCE LOCATION |
| | OUT OF FAN FLOW WOULD IMPACT ΔP READINGS |
| | |
| 1:30 - | TRAVEL to FEDEX SANTA MARIA |
| 3:00 | to SHIP CANS (9 BOXES) |
| | |
| 3:45 | SET UP FOR BPC -20 |
| | SAMPLE 15:20 - 15:58 - LOCATIONS = FRONT WINDOW LEDGE WINDOW SLIGHTLY OPEN to CREATE FLOW PATH |
| | ADDED BLOWER DOOR @ LOCATION A |
| | SAMPLE ~16:50 → 17:30 - SAMPLES ID'D AS Z-FAN |
| | |
| 18:00 | DEPART |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

C4.2
Site #4: Building 11193
Indoor Air Sampling

# AIR MONITORING FORM

Geosyntec consultants

Site Name VDB11193 Project ID TR0626

Sampler Name WSR+Z

Sample Location: Building 11193 Floor ~~SF~~ SLAB Room

Sample Type: 6 Liter Summa ✓ Weather Conditions SUNNY, MILD-MOD WIND

Analytical Method (circle one): TO-15 SIM and TO-15 Scan

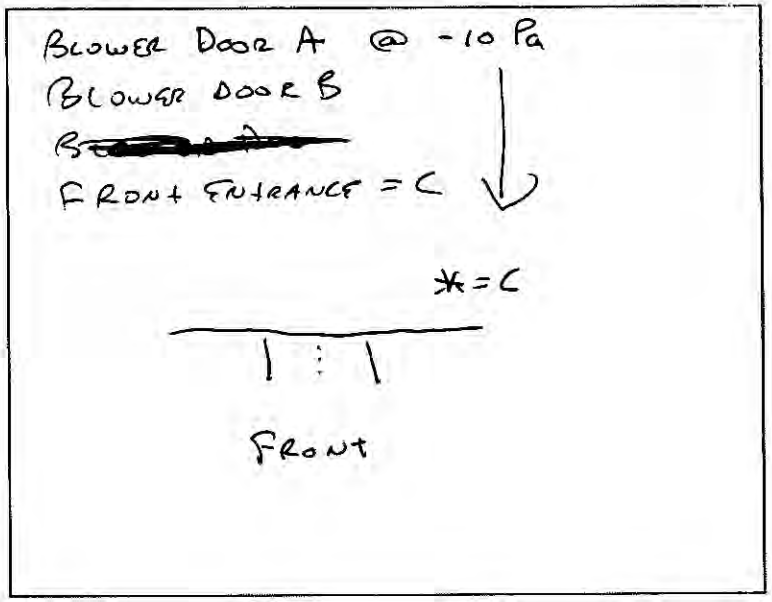
| Sample ID | ~~Canister ID~~ | CAN Regulator ID | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B11193-061317- | BPC-IA-A-10-1 | GL16884 22759 | 29.05 | 11:49 | 06-13-17 | 1.07 | 12:33 | 06-13-17 |
| B11193-061317- | BPC-IA-B-10-1 | 01816 21090 | 28.86 | ~~12:51~~ 11:50 | 06-13-17 | -0.9 | 12:51 | 06-13-17 |
| B11193-061317- | BPC-IA-B-10-1 | -DUP 6L09502 22308 | 28.83 | ~~12:51~~ 11:50 | 06-13-17 | -2.06 | 12:51 | 06-13-17 |
| B11193-061317- | BPC-IA-C-10-1 | GL0868 20619 | 27.78 | 11:50 | 06-13-17 | -2.37 | 12:30 | 06-13-17 |

Room Temperature

PID Reading (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

Sketch of Sample Location (s)




Air Monitoring Form.ai

# AIR MONITORING FORM

Geosyntec consultants

Site Name VDB 11193 Project ID TR0626

Sampler Name WERTZ

Sample Location: Building 11193 Floor CONCRETE Room BLOWER DOORS & ENTRANCE ↓ C

Sample Type: 6 Liter Summa ✓ Weather Conditions SUNNY, SLIGHT TO MODERATE WIND ↓ A, B

Analytical Method (circle one): (TO-15 SIM) and TO-15 Scan

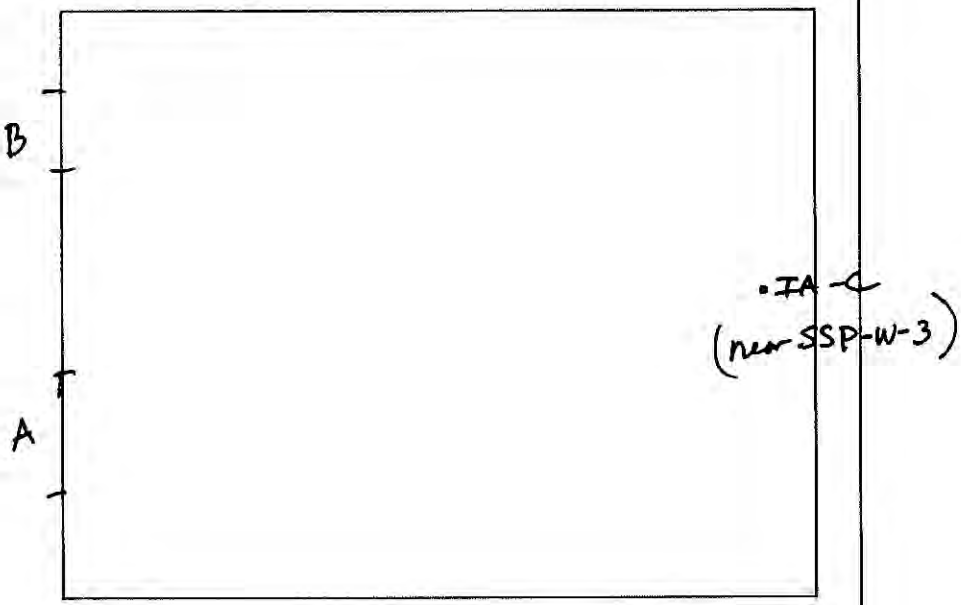
| Sample ID | Canister ID | CAN Regulator ID | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B11193-061317-BR | IA-A-20 | 6L0708 | 28.86 | 15:40 | 06-13-17 | 2.65 | 16:21 | 06-13-17 |
| B11193-061317- | BR-IA-B-20 | 6L0471 | 28.68 | 15:40 | 06-13-17 | 0.92 | 16:33 | 06-13-17 |
| B11193-061317- | BPC-IA-C-20 | 6L0822 | 29.75 | 15:40 | 06-13-17 | 2.54 | 16:31 | 06-13-17 |
| B11193-061317 | BPC-OA-A-20 | 03380 | 28.75 | 15:40 | 06-13-17 | 3:06 | 16:21 | 06-13-17 |

Room Temperature

PID Reading (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

Sketch of Sample Location (s)




Air Monitoring Form.ai

# AIR MONITORING FORM

Geosyntec consultants

Site Name VAB 1163 Project ID TR0626

Sampler Name WCRT

Sample Location: Building 1163 Floor _____ Room _____

Sample Type: 6 Liter Summa ✓ Weather Conditions _____

Analytical Method (circle one): TO-15 SIM and TO-15 Scan

| Sample ID | ~~Canister~~ ID | CAN Regulator ID | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B1163-061317-B | BPC-OA-A-10-1 | 01261 | 25.77 | 11:51 | 06-13-17 | 1.13 | 12:37 | 06-13-17 |
| | | | | | | | | |
| B1163-061417- | BPC-IA-C-10-2 | 6L 1218 | 29.28 | 17:25 | 06 14 17 | 4.18 | 18:05 | 06 14 17 |
| | | | | | | | | |

Room Temperature _____

PID Reading _____ (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

Sketch of Sample Location (s)

OUTDOOR AIR - 061317

IA-C-AIR - 061417

Air Monitoring Form.ai

# AIR MONITORING FORM

Geosyntec consultants

Site Name VDB 11193 Project ID TR0626

Sampler Name WERTZ

Sample Location: Building 11193 Floor _____ Room _____

Sample Type: 6 Liter Summa ✓ Weather Conditions S

Analytical Method (circle one): TO-15 SIM and TO-15 Scan

| Sample ID | ~~Canister ID~~ | CANISTER ~~Regulator~~ ID | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B11193-061417 | -BCP-IA-A-BASELINE | 01782 | 29.3 | 06:53 | 061417 | 0.98 | 07:51 | 061417 |
| B11193-061417 | -BCP-IA-B-BASELINE | 6L1246 | 28.86 | 06:57 | 061417 | 1.12 | 07:54 | 061417 |
| B11193-061417 | -BCP IA-C-BASELINE | 6L1716 | 29.46 | 06:56 | 061417 | 1.06 | 07:56 | 061417 |
| B11193-061417 | -BPC-OA-A-BASELINE | 01925 | 29.34 | 06:54 | 061417 | 1.16 | 07:52 | 061417 |

Room Temperature _____

PID Reading _____ (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

BASELINE SAMPLES COLLECTED MORNING AFTER BLOWER DOOR TEST W/ BUILDING CLOSED PREVIOUS NIGHT

Sketch of Sample Location (s)

Air Monitoring Form.ai

# AIR MONITORING FORM

Geosyntec consultants

Site Name VDB 11193 Project ID TR0626

Sampler Name WERTZ

Sample Location: Building _____ Floor _____ Room _____

Sample Type: 6 Liter Summa ✓ Weather Conditions SUNNY, MILD, GENTLE AM BREEZE

Analytical Method (circle one): TO-15 SIM and TO-15 Scan

| Sample ID | ~~Canister ID~~ | CAN ID ~~Regulator ID~~ | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B11193-061417-BPC-10A-A-10-Z | | 1653 | 26.45 | 17:21 | 061417 | 3.21 | 17:54 | 061417 |
| B11193-061417-BPC-IA-D-10-Z | | 6L1230 | 29.37 | 17:20 | 061417 | 1.53 | 18:07 | 061417 |
| B11193-061417-BPC-IA-B-10-Z | | 01613 | 29.47 | 17:21 | 061417 | 2.65 | 18:14 | 061417 |
| B11193-061417-BPC-IA-B-10-Z-DUP | | 6L0760 | 29.43 | 17:21 | 061417 | 0.77 | 18:15 | 061417 |

Room Temperature _____

PID Reading _____ (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

Sketch of Sample Location (s)

IA-D - IS LOCATED AT SUP-4
THERE IS NO IA-A FOR THE
BPC-10-Z EVENT BECAUSE
WE WERE ONLY USING BLOWER
DOOR B TO DEPRESSURIZE BUILDING

Air Monitoring Form.ai

# AIR MONITORING FORM

Geosyntec consultants

Site Name VDB 11193 Project ID TR0626

Sampler Name WERTZ

Sample Location: Building 11193 Floor _____ Room _____

Sample Type: 6 Liter Summa _____ Weather Conditions _____

Analytical Method (circle one): TO-15 SIM and TO-15 Scan

| Sample ID | ~~Canister ID~~ | CANISTER ~~Regulator ID~~ | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B11193-061517 | BPC-IA-D-10-P-2FAN | / 02648 | 29.34 | 16:53 | 061517 | 3.68 | 17:31 | 061517 |
| B11193-061517 | BPC-IA-D-10-P | / 6L0624 | 29.56 | 15:22 | 061517 | 2.46 | 16:04 | 061517 |
| B11193-061517 | BPC-IA-E-10-P | / 6L0773 | 29.26 | 15:20 | 061517 | 4.29 | 15:58 | 061517 |
| B11193-061517 | BPC-IA-E-10-P-2FAN | / | 28.75 | 16:55 | 061517 | 3.25 | 17:33 | 061517 |

Room Temperature _____

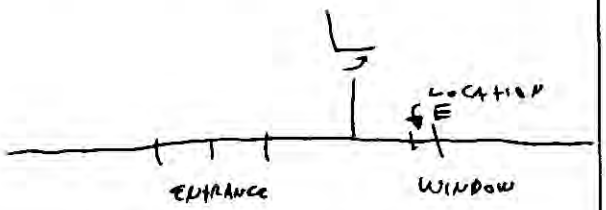
PID Reading _____ (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

Sketch of Sample Location (s)

B11193-061517-BPC-IA-D-10-P
LOCATED AT SVP-4

B11193-061517-BPC-IA-E-10-P
LOCATED ON WINDOW LEDGE NEAR FRONT OF BUILDING WITH WINDOW OPEN TO DIRECT FLOW




Air Monitoring Form.ai

# AIR MONITORING FORM

Geosyntec consultants

Site Name VDB 11193 Project ID TR-0479

Sampler Name Mali

Sample Location: Building UPGRADING 11193 Floor _____ Room _____

Sample Type: 6 Liter Summa ✓ Weather Conditions SUNNY, WARM

Analytical Method (circle one): TO-15 SIM and TO-15 Scan

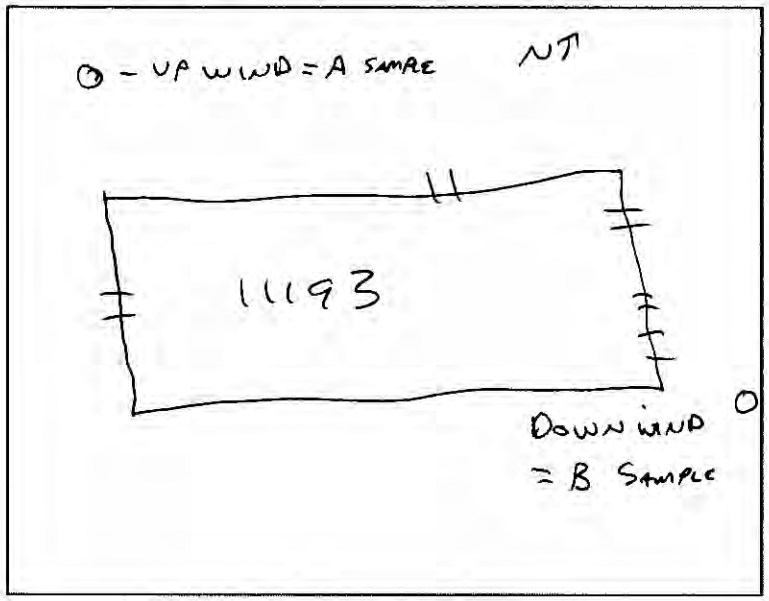
| Sample ID | ~~Canister~~ ID | CANE Regulator ID | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B11193-06-19 | 17-SSV-0A-A | 01048 | 29.06 | 09:56 | 061917 | 3.59 | 18:28 | 061917 ✓ |
| B11193-061917 | 17-SSV-0A-B | 6L0772 | 29.21 | 10:06 | 061917 | 4.65 | 18:38 | 061917 ✓ |
| B11193-062017 | 7-SSV-0A-A | 6L1565 | 29.31 | 07:54 | 062017 | 3.67 | 16:04 | 062017 ✓ |
| B11193-0620 | 17-SSV-0A-B | 6L0842 | 29.34 | 07:55 | 062017 | 4.68 | 16:05 | 062017 ✓ |

Room Temperature _____

PID Reading _____ (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

Sketch of Sample Location (s)




Air Monitoring Form.ai

06/19 06 2017 2 of 3

# AIR MONITORING FORM

Geosyntec consultants

Site Name VDB 11193 DM  Project ID TR0479

Sampler Name WSR+Z

Sample Location: Building 11193  Floor ____  Room ____

Sample Type: 6 Liter Summa  Weather Conditions ____

Analytical Method (circle one): TO-15 SIM and TO-15 Scan

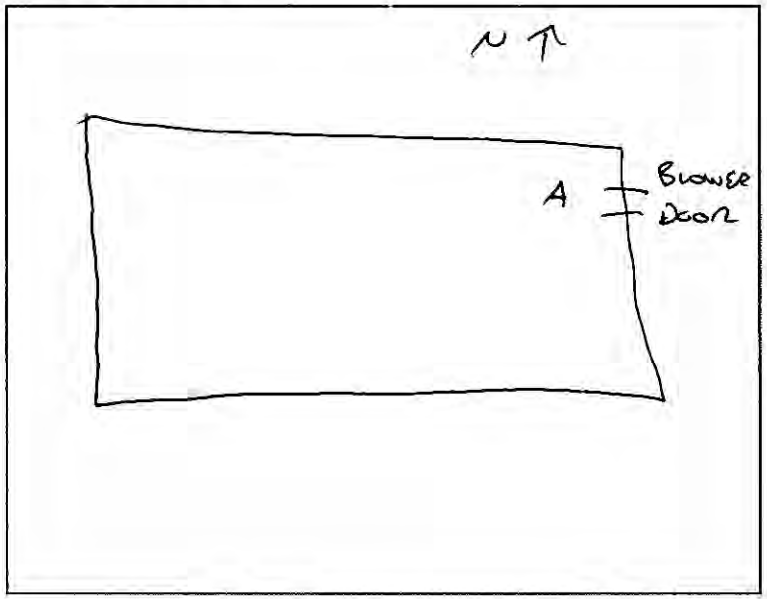
| Sample ID | ~~Canister ID~~ | CAN # ~~Regulator ID~~ | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B11193-062017-ST-1-IA-A-10 | | 6L0979 | 29.33 | 14:45 | 06 20 17 | 2.03 | 14:53 | 06 20 17 |
| B1193-062017-ST-1-IA-A-10-Dup | | 6L0719 | 27.78 | 14:45 | 06 20 17 | 1.97 | 14:53 | 06 20 17 |
| B11193-062017-ST-2-IA-A-10 | | 9946 | 29.18 | 16:02 | 06 2017 | 2.09 | 16:12 | 06 2017 |
| B11193-062117-ST-3-IA-A-10 | | 6L1735 | 29.34 | 9:05 | 06 21 17 | 2.71 | 9.15 | 06 21 17 |
| B11193-062117-ST-4-IA-A-10 | | 1848 | 29.46 | 12:10 | 06 21 17 | 0.91 | 12:20 | 06 21 17 |

Room Temperature ____

PID Reading ____ (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

Sketch of Sample Location (s)




Air Monitoring Form.xl

# AIR MONITORING FORM

Geosyntec consultants

Site Name VOB 11193 Project ID TR0479

Sampler Name D Mali

Sample Location: Building 11193 Floor ____ Room ____

Sample Type: 6 Liter Summa Weather Conditions ____

Analytical Method (circle one): (TO-15 SIM) and TO-15 Scan

| Sample ID | Canister ID | ~~Regulator ID~~ Can # | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B11193-062117-ST-5-IA-A-S | 6L1260 | | 29.26 | 13:35 | 06/21/17 | 3.92 | 1350 | 06/21/17 |
| B11193-062117-SSV-OA-B | 01853 | | 29.27 | 07:25 | 06/21/17 | 5.94 | 15:35 | 06/21/17 |
| B11193-062117-SSV-OA-A | 6L1568 | | 29.41 | 07:25 | 06/21/17 | 5.61 | 15:35 | 06/21/17 |
| B11193-062117-ST-6-IA-A-S | 6L0387 | | 29.37 | 1750 | 06/21/17 | 3.18 | 1805 | 06/21/17 |

Room Temperature ____

PID Reading ____ (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

Sketch of Sample Location (s)

Air Monitoring Form.ai

Radon Detector/Monitor
Version 1.6
Serial#: 02024
Calib.#: 00318 Bkgnd16
TestID#: 80212

No Delay
Interval Report

| Hour | T | B | AC | pCi/L | Temp | Hum | Alph |
|---|---|---|---|---|---|---|---|
| 001 | | | | 000.1 | 079 | 059 | 0006 |
| 002 | | | | 000.2 | 078 | 057 | 0008 |
| 003 | | | | 000.1 | 080 | 055 | 0004 |
| 004 | | | | 000.0 | 080 | 052 | 0002 |
| 005 | | | | 000.1 | 080 | 050 | 0006 |
| 006 | | | | 000.0 | 079 | 050 | 0000 |
| 007 | | | | 000.0 | 076 | 052 | 0000 |
| 008 | | | | 000.0 | 075 | 055 | 0000 |
| 009 | | | | 000.1 | 073 | 057 | 0004 |
| 010 | | | | 000.0 | 072 | 058 | 0000 |
| 011 | | | | 000.0 | 071 | 059 | 0000 |
| 012 | | | | 000.0 | 070 | 060 | 0000 |
| 013 | | | | 000.0 | 069 | 061 | 0000 |
| 014 | | | | 000.0 | 068 | 061 | 0000 |
| 015 | | | | 000.0 | 068 | 062 | 0000 |
| 016 | | | | 000.0 | 068 | 062 | 0000 |
| 017 | | | | 000.0 | 068 | 063 | 0000 |
| 018 | | | | 000.0 | 068 | 063 | 0000 |
| 019 | | | | 000.0 | 069 | 062 | 0003 |
| 020 | | | | 000.0 | 070 | 062 | 0000 |
| 021 | | | | 000.0 | 072 | 062 | 0000 |
| 022 | | | | 000.1 | 073 | 060 | 0005 |
| 023 | | | | 000.0 | 075 | 059 | 0000 |
| 024 | | | | 000.1 | 077 | 056 | 0005 |
| 025 | | | | 000.0 | 078 | 052 | 0000 |
| 026 | | | | 000.0 | 078 | 051 | 0000 |
| 027 | | | | 000.0 | 078 | 051 | 0000 |
| 028 | | | | 000.0 | 076 | 051 | 0000 |
| 029 | | | | 000.0 | 074 | 053 | 0000 |
| 030 | | | | 000.0 | 073 | 056 | 0000 |
| 031 | | | | 000.0 | 071 | 058 | 0000 |
| 032 | | | | 000.0 | 070 | 059 | 0000 |
| 033 | | | | 000.0 | 070 | 059 | 0000 |
| 034 | | | | 000.0 | 069 | 060 | 0000 |
| 035 | | | | 000.0 | 068 | 061 | 0000 |
| 036 | | | | 000.0 | 068 | 062 | 0000 |
| 037 | | | | 000.0 | 068 | 062 | 0000 |
| 038 | | | | [illegible] | | | |
| 039 | | | | | | | |
| 040 | | | | | | | |

| | | | | |
|---|---|---|---|---|
| 043 | 000.0 | 067 | 064 | 0000 |
| 044 | 000.0 | 068 | 064 | 0000 |
| 045 | 000.0 | 070 | 064 | 0000 |
| 046 | 000.0 | 072 | 063 | 0000 |
| 047 | 000.0 | 073 | 059 | 0000 |
| 048 | 000.1 | 074 | 057 | 0000 |
| 049 | 000.0 | 074 | 058 | 0000 |
| 050 | 000.0 | 074 | 058 | 0000 |
| 051 | 000.0 | 075 | 056 | 0000 |
| 052 | 000.0 | 075 | 055 | 0000 |
| 053 | 000.0 | 074 | 056 | 0001 |
| 054 | 000.0 | 071 | 057 | 0000 |
| 055 | 000.0 | 071 | 058 | 0000 |
| 056 | 000.0 | 070 | 059 | 0000 |
| 057 | 000.0 | 069 | 060 | 0000 |
| 058 | 000.0 | 068 | 060 | 0000 |
| 059 | 000.0 | 068 | 060 | 0000 |
| 060 | 000.0 | 068 | 060 | 0000 |
| 061 | 000.0 | 068 | 061 | 0000 |
| 062 | 000.0 | 067 | 061 | 0000 |
| 063 | 000.1 | 067 | 062 | 0006 |
| 064 | 000.1 | 067 | 062 | 0005 |
| 065 | 000.0 | 067 | 062 | 0000 |
| 066 | 000.0 | 067 | 063 | 0002 |
| 067 | 000.0 | 069 | 062 | 0002 |
| 068 | 000.0 | 071 | 063 | 0000 |
| 069 | 000.0 | 073 | 063 | 0000 |

Avg: 000.0
Max: 000.1
Min: 000.0

Start Date/Time

End Date/Time

Address

Location of Instrument

Tested By

C4.3
Site #4: Building 11193
Soil vapor Monitoring

# SOIL GAS PROBE MEASUREMENTS During SSV Full

Geosyntec consultants

① Project Name: VDB 1193
Date: 06/19/17 Project Number:
Site Location:
Weather:
Field Personnel:
Recorded By:

Probe No.: SSP-N-2 ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M:
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) in. $H_2O$

⑤ Shut in test prior to pneumatic test completed, in. $H_2O$ held for 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/19/17 | 11:10 | -30 sec | | 1 | | 1 | 0.0 | 0.0 | 21.0 | | | | 9.8 |
| | 11:13 | | | 1 | | 2 | 0.0 | 0.0 | 21.0 | | | | 5.08 |
| | 11:17 | | | | | 3 | 0.0 | 0.0 | 21.1 | | | | 4.9 |
| | 11:22 | | | | | 4 | 0.0 | 0.0 | 21.0 | | | | 4.2 |
| | 11:30 | | PURGED | 5L to SEE IMPACT | | 10 | 0.0 | 0.0 | 21.1 | | | | 2.7 |

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) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS Durus SSV 10" $H_2O$ 450 FPM

Geosyntec consultants

① Project Name: VAB 11193
Date: 061917 Project Number:
Site Location: Bld 11193
Weather: Sunny Warm
Field Personnel: Wertz McAlary Mali (Oahlen - ASU)
Recorded By: T. Miller Miller (Engineering)

Probe No.: SSP-N-2 ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M:
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)

⑤ Shut in test prior to pneumatic test completed, in. $H_2O$ held for 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) 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.) | 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 061917 | 17:13 | | | | | 1 | 0.0 | 0.0 | 21.3 | | | | 6.7 |
| | 17:15 | | | | | 2 | 0.0 | 0.0 | 21.3 | | | | 4.5 |
| | 17:18 | | | | | 3 | 0.0 | 0.0 | 21.3 | | | | 3.7 |
| | 17:20 | | | | | 4 | 0.0 | 0.0 | 21.3 | | | | 3.3 |
| | 17:24 | | | | | 5 | 0.0 | 0.0 | 21.3 | | | | 2.7 |

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) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Comments:

# SSV ~~SOIL GAS PROBE MEASUREMENTS~~ STACK SAMPLE

Geosyntec consultants

① Project Name: [redacted] VDB 11193
Date: 061917 Project Number: TR0626
Site Location: Building 11193
Weather: Sunny Mild
Field Personnel: Wertz, McAuley, Mari DaLeo(ASU), Tony Mink Entanglement
Recorded By: Wertz

Probe No.: ☐ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M:
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)

⑤ Shut in test prior to pneumatic test completed, ___ in. $H_2O$ held for ___ 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) ____ 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.) | 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 061917 | 10:06-10:09 | B1193-061917-SSV-COMB-1 | 1L1635 | | | 28.86 | 2.19 |
| 06 19 17 | 14:50 | B11193-061917-SSV-1-44 | 1L2746 | | | 29.05 | 2.18 |
| | | | | | | | |

Comments: OPENED FLOW CONTROLLER VALVE TO INCREASE FILL RATE

Geosyntec Consultants Vandenberg Air Force Base SSV Sampling Form

Date: 06 18 17 Weather SUNNY, MILD Personnel WORTZ, MCALLEN, MALI
ASU-DAHLEN | SUBANGLEMENT TONY M MIKE

PID # 7320 GEM # 4484 (PINE) Flow (fpm) 880 Fan Vac (in $H_2O$) 30"

| Sample Time | VOCs PID (ppm) | $CH_4$(%) | $CO_2$(%) | $O_2$(%) | Comments |
|---|---|---|---|---|---|
| 08:37 | 11.8 | 0.0 | 0.2 | 20.7 | |
| 08:44 | 12.8 | 0.0 | 0.2 | 20.7 | |
| 08:48 | 12.0 | 0.0 | 0.2 | 20.8 | |
| 08:54 | 11.8 | 0.0 | 0.2 | 20.7 | |
| 08:56 | 8.6 | 0.0 | 0.2 | 20.8 | |
| 09:00 | 9.1 | 0.0 | 0.1 | 20.9 | |
| 09:05 | 9.5 | 0.0 | 0.2 | 20.8 | |
| 09:08 | 8.5 | 0.0 | 0.1 | 20.9 | |
| 09:14 | 9.7 | 0.0 | 0.1 | 20.9 | |
| 09:19 | 10.0 | 0.0 | 0.2 | 20.9 | |
| 09:21 | 9.3 | 0.0 | 0.2 | 20.9 | |
| 09:25 | 9.6 | 0.0 | 0.1 | 20.9 | |
| 09:28 | 9.4 | 0.0 | 0.1 | 20.9 | |
| 09:32 | 9.4 | 0.0 | 0.2 | 20.9 | |

Geosyntec Consultants Vandenberg Air Force Base SSV Sampling Form

Date: 061917 Weather _____ Personnel _____

PID # _____ GEM # _____ Flow (fpm) _____ Fan Vac (in $H_2O$) _____

| | Sample Time | VOCs PID (ppm) | $CH_4$(%) | $CO_2$(%) | $O_2$(%) | Comments |
|---|---|---|---|---|---|---|
| | 09:36 | 9.7 | 0.0 | 0.2 | 21.8 | |
| | 09:40 | 9.7 | 0.0 | 0.1 | 21.0 | |
| | 12:00 | 10.1 | 0.0 | 0.1 | 21.1 | |
| | 12:10 | 8.5 | 0.0 | 0.0 | 21.2 | |
| | 12:15 | 7.7 | 0.0 | 00 | 21.2 | |
| | | | | | | |
| SVP-4-SS | 12:30 | 399 | 0.0 | 0.0 | 21.3 | |
| | | | | | | |
| STACK | 15:45 | 10.2 | 0.0 | 0.0 | 21.2 | 900 FPM |
| PHASE 3→ | 17:45 | 8.8 | 0.0 | 0.0 | 21.2 | 450 FPM |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

50% Flow

Geosyntec Consultants | Vandenberg Air Force Base | SSV Sampling Form

Date: 061917 Weather Sunny, warm Personnel _____

PID # _____ GEM # _____ Flow (fpm) 450 Fan Vac (in $H_2O$) 10"

| | Sample Time | VOCs PID (ppm) | $CH_4$(%) | $CO_2$(%) | $O_2$(%) | Comments |
|---|---|---|---|---|---|---|
| STACK | 15:50 | 7.5 | 0.0 | 0.0 | 21.1 | 450 FPM |
| | 15:59 | 8.2 | 0.0 | 0.0 | 21.2 | |
| | 16:02 | 8.5 | 0.0 | 0.1 | 21.2 | |
| | 16:06 | 8.5 | 0.0 | 0.0 | 21.2 | |
| | 16:09 | 8.5 | 0.0 | 0.0 | 21.2 | |
| | 16:13 | 8.3 | 0.0 | 0.0 | 21.2 | |
| | 17:45 | 6.8 | 0.0 | 0.0 | 21.2 | |

# SSV STACK SAMPLE
~~SOIL GAS PROBE MEASUREMENTS~~

Geosyntec consultants

① Project Name: VDB 11493
Date: 06 20 17 Project Number: _____
Site Location: 11493
Weather: COOL FOGGY
Field Personnel: WGntz McLaug Mah DahLen
Recorded By: WGntz

Probe No.: SSV STACK ☐ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: _____ Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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) _____ in. $H_2O$

⑤ Shut in test prior to pneumatic test completed,____ in. $H_2O$ held for ___ 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06 2017 | 08:30 | | | | | 1 | 0.0 | 0.3 | 20.8 | [redacted] | - | | 9.1 |
| | 09:10 | | | | | 2 | 0.0 | 0.3 | 20.8 | | | | 9.0 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 06 2017 | 08:48<br>08:52 | B11193-062017-SSV-3-22 | 1L 2579 | | | 29.32 | 0.71 |
| 06 2017 | 14:45 | B11193-062017-SSV-4-22 | 1L 3063 | | | 29.03 | 0.80 |
| 06 2017 | 14:45 | B11193-062017-SSV-4-22-DUP | 1L 2940 | | | 29.21 | 0.78 |

Comments: STACK SAMPLE - AFTER OVERNIGHT RUN OF SSV @ 450 CFM = #3
STACK SAMPLE @ BPC -10 = #4 and #4 DUP

# SSV Stack Sample
## ~~SOIL GAS PROBE MEASUREMENTS~~

Geosyntec consultants

(1) Project Name: VDB 11193
Date: 06 20 17 Project Number: _____
Site Location: B 11193
Weather: Sunny Warm
Field Personnel: _____
Recorded By: _____

Probe No.: SSV Stack ☐ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: _____ Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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) _____ in. $H_2O$

(5) Shut in test prior to pneumatic test completed,____ in. $H_2O$ held for ___ 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

(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) |
|---|---|---|---|---|---|---|---|
| 06 20 17 | 16:02 | B11193-062017-SSV-5-59 | 1L2721 | | | 28.85 | 0.15 |
| 06 21 17 | 9:05 | B11193-062117-SSV-6-59 | 1L2610 | | | 28.19 | 1.97 |
| 06 21 17 | 12:10 | B11193-062117-SSV-7-65 | 1L1926 | | | 28.50 | 2.92 |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: ESTCP
Date: 06/21/17 Project Number: TR0473
Site Location: 11193
Weather:
Field Personnel: DM TM UW
Recorded By: DM

Probe No.: ☒ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M:
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)

⑤ Shut in test prior to pneumatic test completed, ___ in. $H_2O$ held for ___ 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) ____ 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.) | 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 06/21/17 | 13:35 | B11193-062117-SSV-8-65 | IL2450 | – | – | 27.51 | 2.92 |
| 06/21/17 | 17:59 | B11193-062117-SSV-9-58 | IL1546 | – | – | 24.97 | 2.55 |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: ESTCP
Date: 22 June 2017 Project Number: 10479
Site Location: B11193
Weather: Fair 22C
Field Personnel: TMCA
Recorded By: TMCA

Probe No.: SVP1SS ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 18121 Lamp (10.6) / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M:
MDG 2002 Helium detector Serial No.:
Tracer Gas: ☐ Helium ☐ Other none

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) -13.6 in. ~~$H_2O$~~ Pa

⑤ Shut in test prior to pneumatic test completed, ___ in. $H_2O$ held for ___ 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 1.7 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 22 June 17 | 12:04 | B11193-062217-SVP1SS | 1026 | none | | 29.03 | 2.91 |
| | | | | | | | |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: ESTCP
Date: 22 June 2017 Project Number: TR0479
Site Location: B11193
Weather: fair 22C
Field Personnel: TMcA
Recorded By: TMcA

Probe No.: SVP255 ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 18121 Lamp (10.6) / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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 1 Casing Volume
☑ Sub-slab <0.1 L
Soil gas probe _____ (L)

⑤ Shut in test prior to pneumatic test completed, ___ in. $H_2O$ held for ___ 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) -28.5 ~~in $H_2O$~~ Pa

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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 4.7 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 22 June 17 | 12:11 | B11193-062217-SVP255 | 1L2303 | None | | 29.00 | 2.59 |
| | | | | | | | |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: ESTCP
Date: 22 June 2017 Project Number: TR0479
Site Location: B11193
Weather: Rain 22c
Field Personnel: TMSA
Recorded By: TMSA

Probe No.: SVP3 SS ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 18121 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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 1 Casing Volume
☑ Sub-slab <0.1 L
Soil gas probe _____ (L)

④ Initial Vacuum (prior to pumping) -9.4 in ~~$H_2O$~~ Pa

⑤ Shut in test prior to pneumatic test completed. ___ in. $H_2O$ held for ___ 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 34 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 22June17 | 11:38 | B11193-062217-SVP3SS | 1L2293 | none | | -29.15 | ~~-5.50~~ -3.57 TMSA |
| | | | | | | | |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: ESTCP
Date: 22 Jun 2017 Project Number: TR0479
Site Location: B11193
Weather: Fair 22C
Field Personnel: TMcA
Recorded By: TMcA

Probe No.: SVP4 SS ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 18121 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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 1 Casing Volume
☑ Sub-slab <0.1 L
Soil gas probe _____ (L)

⑤ Shut in test prior to pneumatic test completed, ___ in. $H_2O$ held for ___ 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) -39.5 in. ~~$H_2O$~~ Pa

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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 85 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 22 Jun 2017 | | B11193-062217-SVP4SS | IL2651 | none | | 28.96 | 6.52 |
| | | | | | | | |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: ESTCP
Date: 22 Jun 2017 Project Number: TR0479
Site Location: B11193
Weather: fair 22C
Field Personnel: TMcA
Recorded By: TMcA

Probe No.: SSPE3 ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 18121 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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 1 Casing Volume
☑ Sub-slab <0.1 L
Soil gas probe _____ (L)

⑤ Shut in test prior to pneumatic test completed,____ in. $H_2O$ held for ___ 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) -1.7 in ~~$H_2O$~~ Pa

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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 70 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 22 Jun 17 | 11:49 | B11193-062217-SSPE3 | IL 2472 | none | | 29.05 | ~~3.57~~ 0.38 TMcA |
| | | | | | | | |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: ESTCP
Date: 22 June 2017 Project Number: TR0479
Site Location: B11193
Weather: Rain 22°C
Field Personnel: TMcA
Recorded By: TMcA

Probe No.: SSPN2 ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: 18121 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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)

④ Initial Vacuum (prior to pumping) -34.7 in~~H₂O~~ Pa

⑤ Shut in test prior to pneumatic test completed, ___ in. $H_2O$ held for ___ 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | 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) |
|---|---|---|---|---|---|---|---|
| 22June17 | 11:14 | B11193-062217-SSPN2 | 1L 2401 | none | | 28.96 | 8.88 |
| | | | | | | | |
| | | | | | | | |

Comments:

Geosyntec consultants

130 Stone Road West
Guelph, Ontario, Canada N1G3Z2
PH 519.822.2230
www.geosyntec.com

45 SCFM

INTERWELL HELIUM TESTS

Page 1 of 1

Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM JM WW
Recorded By: DM

Date: 06/19/17
Primary Activities: _____

| Injection Location | Time of Injection | Velocity (ft/min) | Vacuum (in H2O) | Peak Time | Comments |
|---|---|---|---|---|---|
| SSP 2A | 2 sec | 880 | 30 | Nothing | Start time 2m 31 sec |
| " " | 5 sec | 880 | 30 | " " | Start time 0:00 |
| " " | 5 sec | " | " | " " | |
| " " | " " | " " | " | — ✓ | " " |
| SSP-S1 | 5 sec | 880 | 30 | | Start 0:00, Pump not on |
| SSP-S1 | 5 sec | 880 | 30 | ~15 sec | ✓ |
| SSP-S2 | 10 sec | 880 | 30 | 2 min | Start at 0:00 ✓ |
| SSP-3C | 10 sec | 880 | 30 | ~2.5 min | " " ✓ |
| SSP-3B | 5 sec | 880 | 30 | 19 sec | " " ✓ |
| SSP-E1 | 5 sec | 880 | 30 | 20 sec | " " ✓ |
| SSV-MP | 5 sec | 880 | 30 | Nothing | 5 ft depth |
| 1338 SSP-4-S5 | 10 sec | 880 | 30 | [illegible] | ✓ |
| SSP-2B | 5 sec | 880 | 30 | ~18 sec | ✓ |
| SSP-1B | 5 sec | 880 | 30 | 45 sec | 14:24 ✓ |
| | | | | | |
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Geosyntec consultants

130 Stone Road West
Guelph, Ontario, Canada N1G3Z2
PH 519.822.2230
www.geosyntec.com

Cracks sealed running at half speed

Page 1 of 1

INTERWELL HELIUM TESTS

Project Name: ESTCP
Project Number: TR0479
Field Personnel: DM TM WW
Recorded By: DM

Date: June 20
Primary Activities:

| Time | Injection Location | Time of Injection | Velocity (ft/min) | Vacuum (in H2O) | Peak Time | Comments |
|---|---|---|---|---|---|---|
| 9:11 | SSP-3B | 5 Sec | 510 | 12 | 20 sec | 25CFM ✓ |
| 922 | SSP-E1 | 5 sec | | | 48 sec | 25CFM ✓ |
| 936 | SSP-S1 | 5 sec | | | 24 sec | 25CFM ✓ |
| 947 | SSP-S2 | 10 sec | | | 3min 30sec | 25CFM ✓ |
| 1043 | SSP-3C | 10 sec | | | | Pump Not working 25CFM |
| | ~~SSP-3C~~ | ~~10 sec~~ | | | | 25CFM |
| 1157 | SSP-2B | 5 sec | | | 38 sec | Video description (2E) wrong 25CFM ✓ |
| 1218 | SSP-3C | 10 sec | | | 4min | 25CFM ✓ |
| 1514 | SUP4SS | 15 sec | | | 16min | running at full speed (crack sealed) ✓ 45 CFM |

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HELIUM FLOOD TESTS

Page ___ of ___

Project Name: _____
Project Number: _____
Field Personnel: _____
Recorded By: _____

Date: _____
Primary Activities: _____

Initial Information

Probe Name: SSP-1B

Velocity: _____
Flow Rate: _____
(X-sec 3" pipe =0.049 ft$^2$)

Vacuum: _____

Start Time: ___ _____

Subtract 2 min from Elapsed time for actual start time (video time)

| Elapsed Time | Helium Concentration | Comments |
|---|---|---|
| ~5 min | 18700 | moved to next location so that I did not miss it |
| | | |
| | | |
| | |

PID SCREEN. & RESULTS
6/18/17






Sub-slab probes (SSPs) will be installed at radial distances of 3, 12 and 45 feet to measure vacuum in several compass directions to assess anisotropy

Figure 8. Planned locations for testing instrumentation in Building 11193



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SSP SCREEN

# ~~DAILY FIELD~~ REPORT

~~6/9~~ 6/10/17

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Project Name: VAS Build 1193 Date: _____ Page ___ of ___

Project Number: _____ Primary Activities: _____

Field Personnel: _____

Recorded By: _____

Weather: _____

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | PID | CH4 CO2 O2 GEM |
|---|---|---|---|
| 10:40 | SSP3C 0.1" @ 500 ML/MIN | 102.5 | 0.0 0.5 20.1 |
| | SSP4B 0.11 @ 500 | 77.1 | 0.0 0.1 20.8 |
| | SVP-4-10 0.26 @ 500 | SEE SAMPLING FORM | |
| ★ | SVP-4-5 [illegible] @ 500 NOTE high VAC | SEE SAMPLING FORM | |
| 1701 | SSP-W-2 0.14 @ 500 | 121 | 0.0 0.3 20.6 |
| 1714 | SSP-4-E 0.17 @ 500 | 28 | 0.0 0.1 21.2 |
| 1725 | SSP-1-E 0.12 @ 500 | 13.4 | 0.0 1.0 18.8 |
| 1735 | SSP-W-3 0.21 @ 500 | 7.9 | 1.0 1.8 19.3 |
| 1745 | SSP-2-E 0.14 @ 500 | 7.6 | 0.0 5.6 15.1 |
| 1805 | SSP-S-2 0.10 @ 500 | 6.2 | 0.0 1.7 19.8 |
| 1820 | SSP-E-2 0.15 @ 500 | 66.7 | |
| | SWITCHED to 6EM 6m07654 - | ~~[illegible]~~ | 0.0 0.1 19.4 |
| 1857 | SSP-3-C | 11.9 | 0.0 0.3 19.8 |
| 1850 | SSP-E-1 0.10 @ 500 | 5.7 | 0.0 0.1 20.3 |
| 1857 | SSP-3-B 0.2 @ 500 | 4.1 | 0.0 0.1 20.4 |
| 17:55 | SSP-S1 0.17 @ 500 | 4.1 | 0.0 0.3 20.4 |
| 17:15 | SSP-2-A 0.10 @ 500 | 3.9 | 0.0 0.2 20.5 |
| 17:30 | SSP-1-B 0.12 @ 500 | 4.5 | 0.0 0.2 20.5 |
| | POSITIVE Pa (20) 6/9/17 MOST OF THE DAY | | |
| | 6/16/17 | PPM | |
| | 14:15 PID DIRECT SSP-3-C | ~~[illegible]~~ 12.3 | |
| | SSP-S-E | 4.1 | |
| | SSP-E-3 | 126.5 | |
| | SSP-W-1 ← SSP-1-W | 7.3 | |
| | SSP-2-B | 11.2 | |
| | SSP-4-E | 9.2 | |
| | SWP-4-55 | 4(7 (∞) | |

6/12/17 PID READINGS H Dawson



## 5.2 Baseline Characterization Activities

### 5.2.1 Design and Layout of Technology Components

Field construction tasks will include soil boring, whole soil sampling, soil vapor probe installation, and groundwater monitoring well installation at each of the four interior locations shown on Figure 10 (SVP1, SVP2, SVP3, and SVP4). The locations were selected to represent each quadrant of the building. Continuous minimally disturbed soil cores will be collected using a Geoprobe drill rig (or equivalent) and the dual tube system. The initial boring at each location

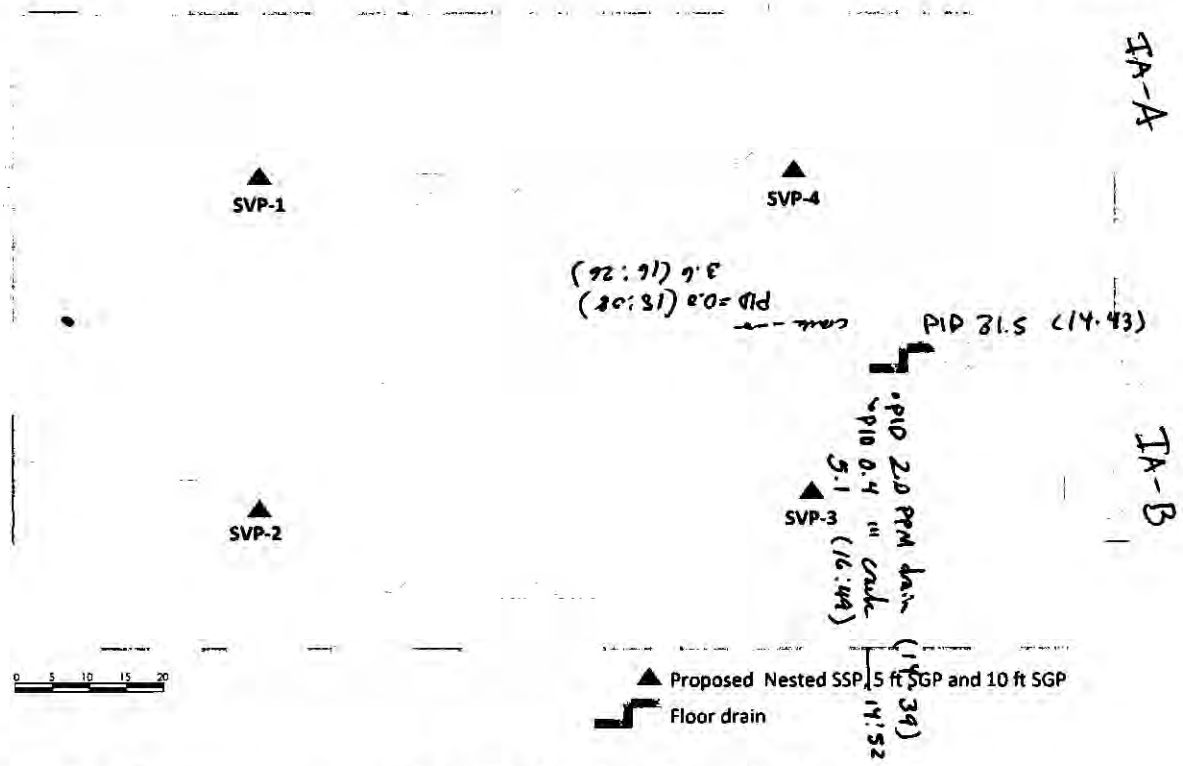



**Figure 10. Proposed groundwater, soil and soil vapor sampling locations.**

will be advanced to approximately three feet below the water table, which will be assessed by visual inspection of the soil cores and sounding of the borehole. A groundwater monitoring well will installed in the boring and a groundwater sample will be collected (Section 5.4.1). Soil from the extracted soil cores will be visually logged and subsampled for testing (Section 5.4.2). The information obtained from each location's initial boring will be used to position the deep (i.e. "10 ft") soil vapor probe at a depth about two ft above the water table at each location. The soil vapor probes will be installed following the Suggested Operating Procedure (SOP) for soil gas probe installation described in Appendix B. Probes will be installed in separate boreholes to approximate depths of 10 ft, 5 ft and at sub-slab depth (12 probes total).

SSP SCREEN
~~DAILY FIELD~~ REPORT

Geosyntec consultants
www.geosyntec.com

Project Name: ~~TROUBLE~~ VDB 11193
Project Number: TRO 479
Field Personnel: WGR+Z
Recorded By: WGR+Z
Weather: SUNNY WARM

Date: 061817
Page 3 of 3
Primary Activities:

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | | | | |
|---|---|---|---|---|---|---|
| | | PID | $CH_4$ | $CO_2$ | $O_2$ | VAC @ 500ML/MIN |
| | SSP-1-A | 12.9 | 0.0 | 0.2 | 20.6 | 0.2 |
| | SSP-2-A | 7.7 | 0.0 | 0.1 | 20.5 | 0.14 |
| | SSP-3-A | 7.1 | 0.0 | 0.1 | 20.7 | 0.11 |
| | SSP-4-A | 8.3 | 0.0 | 0.1 | 20.7 | 0.13 |
| | ~~SSP-5-E~~ | | | | | |
| | SSP-3-E | 15.6 | 0.0 | 1.3 | 19.8 | 0.10 |
| | SSP-E-3 | 157.3 | 0.0 | 0.2 | 20.5 | 0.15 |
| | SSP-W.1 | 18.4 | 0.0 | 0.4 | 20.3 | 0.12 |
| | SSP-2-B | 45.6 | 0.0 | 1.5 | 18.6 | 0.08 |
| | SSP-4-E | 21.5 | 0.0 | 0.0 | 20.8 | 0.1 |
| | SVP-4-SS | | | | | |
| | | | | | | |
| | FLOW & VAC | | | | | |
| | | Vac @ 500ML/MIN | | | | |
| | SVP-1-SS | 0.10 | | | | |
| | SVP-1-5' | 0.20 | | | | |
| | SVP-1-10 | 0.60 | | | | |
| | SVP-2-SS | 0.15 | | | | |
| | SVP-2-5 | 0.30 | | | | |
| | SVP-2-10 | 0.90 | | | | |
| | SVP-3-SS | ~~0.15~~ | 0.15 | | | |
| | SVP-3-5 | 0.5 | | | | |
| | SVP-3-10 | 0.27 | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Daily Field Report

Geosyntec Consultants | Vandenberg Air Force Base | SSV Sampling Form

Date: 06 20 17 Weather: Sol Foggy - AM Personnel: NW, TM, DM

PID # PGM 7320 GEM # 4484 (Pine #) Flow (fpm) 450 Fan Vac (in $H_2O$) 10"

| Sample Time | VOCs PID (ppm) | $CH_4$(%) | $CO_2$(%) | $O_2$(%) | Comments |
|---|---|---|---|---|---|
| 11:30 | 8.6 | 0.00 | ~~0.2~~ 0.1 | 20.7 | Stack Sample. Post SEALING CRACK. |
| | | | | | |
| | | | | | |
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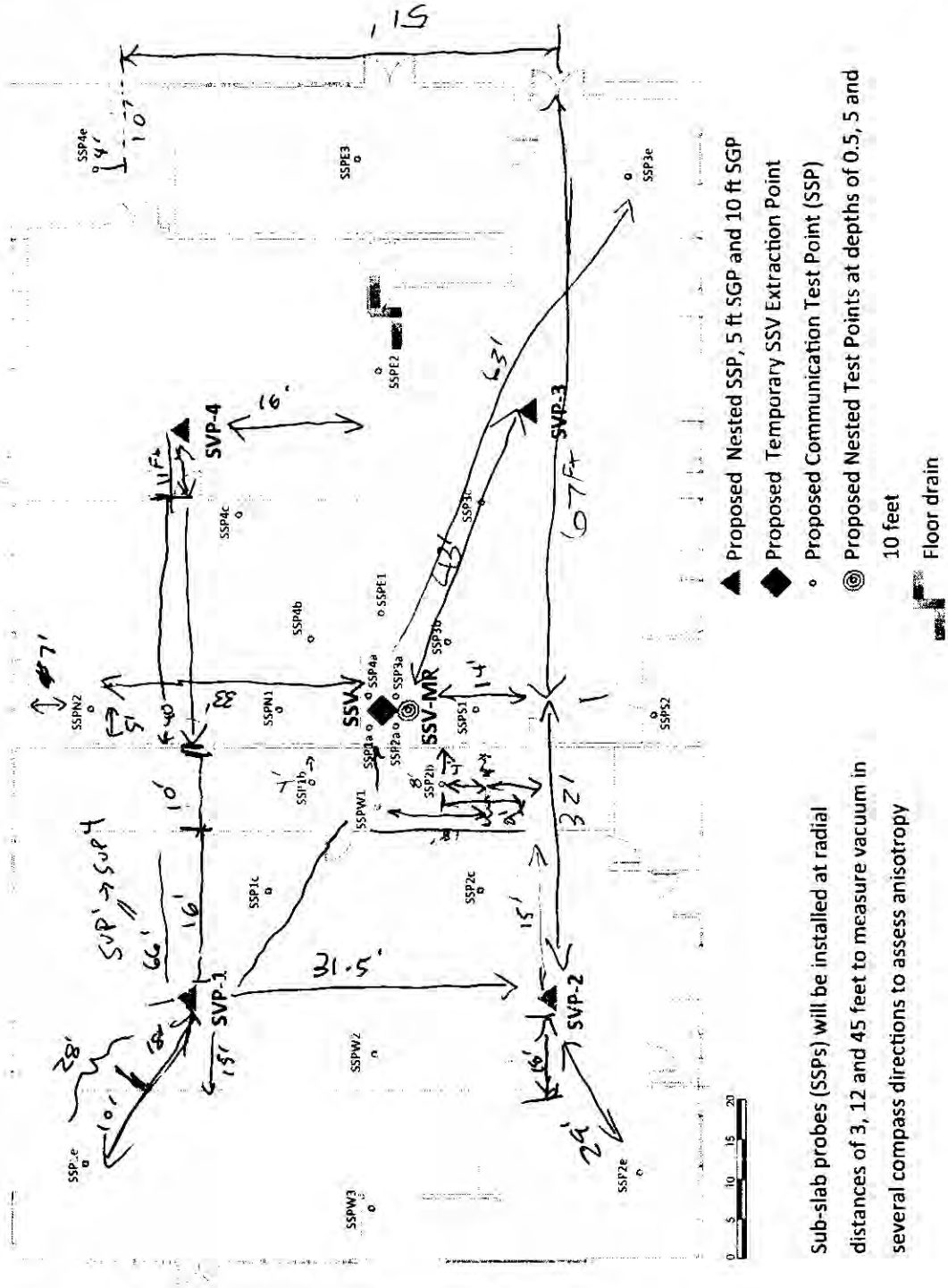



Figure 8. Planned locations for testing instrumentation in Building 11193

# SUB-SLAB SAMPLING PROBE MEASUREMENTS

Geosyntec consultants

SVP-1-SS

| | | | | | |
|---|---|---|---|---|---|
| Sampling Personnel: Tyler Boyd | | Recorded By: DF | | | |
| Building #: 11193 | | Date: 06/09/17 | Weather: Slight Rain, Mist | Row | Column |
| Slab Thickness: | | | Sub-slab Probe No.: SVP-1-SS | | |

**Purging Data**

| | | |
|---|---|---|
| ppbRae 3000 Serial No.: 592906370 | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 06/09/17 8:00 |
| ~~PhoCheck PID Serial No.~~: GEM 4484 | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 06/09/17 8:00 |

| Purge # | Start Time | End Time | Elapsed Time (~~sec~~ min) | ~~Purge Rate (LPM)~~ Cumulative Volume (L) | He (%) initial | VOCs by MiniRae (specify ppbv ~~ppmv~~) | ~~VOCs by PhoCheck~~ (specify ppbv – ppmv) | He (bg) % or ppmv |
|---|---|---|---|---|---|---|---|---|
| 1 | 9:41 | 9:41 | ~~0.5~~ 15 | 1 | 10 | 8 | — | 0 |
| 2 | 9:43 | 9:43 | ~~60 ± 0.5~~ 15 | 2 | — | 5.5 | ~~16~~, 16, 16.7 | — |
| 3 | 9:47 | 9:47 | 15 sec | 3 | — | 5.1 | — | — |
| Additional purge if needed for stabilization | 9:49 | 9:49 | 15 sec | 4 | — | — | 0.0, 2.4, 16.4 | — |
| Sample of Record | | | | | | | | |

| | Sample ID No. |
|---|---|
| Column Sample for HAPSITE | |
| Row Sample For HAPSITE | |

| | Start Time | End Time | Elapsed Time (mins) | Sample ID B11193-060917- | Summa Canister ID | Flow Controller # | Initial Vacuum (in. Hg) | Final Vacuum (in. Hg) |
|---|---|---|---|---|---|---|---|---|
| SUMMA Sample | 955 | 1015 | 20 | SVP-1-SS | 1L2778 | 21290 | 28.91 | 4.43 |

Tracer Gas (Helium)

| Min Shroud % | Max Shroud % | Sample ( PPM or %) |
|---|---|---|
| 10 | 13.5 | 0 |

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: B11193
Date: 6-13-17 Project Number: TR0626
Site Location: V B11193
Weather: Fair
Field Personnel: H. Davis, D. Hertz
Recorded By: H. Davis

Probe No.: SVP-1-SS (10') ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: _____ Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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) 27.89 in. $H_2O$

⑤ Shut in test prior to pneumatic test completed. ___ in. $H_2O$ held for ___ 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) | $CH_4$ (%) | $CO_2$ (%) | $O_2$ (%) | He Tracer Gas Shroud (%) Min | He Tracer Gas Shroud (%) Max | He Tracer Gas Sample ($ppm_v$, %) (circle one) | VOCs by PID ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6-13-17 | 10:56 | | | | | | | | | 12.2 | 13.5 | 0.0 | 5.7 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 6-13-2017 | 11:30 - 12:21 | B11193-061317-SVP-1-SS-10-1 | 1L1594 | | | 27.89 | 1.51 |
| 061417 | 17:46 19:19 | B11193-061417-SVP-1-SS-10-2 | 1L2724 | 22329 | | 29.01 | 0.74 |
| 061417 | 17:46 18 | | 1L2743 | 21791 | | 29.2 | 0.92 |

Comments: B11193-061417-SVP1-SS-10-2 } T-VALVE WAS OPEN TO DG700 FROM 17:40 TO 17:50
B11193-061417-SVP-1-SS-10-2-DUP } MAY BE BIASED LOW IF DG700 LEAKS AIR

# SUB-SLAB SAMPLING PROBE MEASUREMENTS

Geosyntec consultants

SVP-1-5

| | | | |
|---|---|---|---|
| Sampling Personnel: DF & BW | Recorded By: DF | | |
| Building #: 11193 | Date: 6-9-17 | Weather: | Row / Column |
| Slab Thickness: | | ~~Sub-slab~~ Probe No.: SVP-1-5 | |

**Purging Data**

| | | |
|---|---|---|
| ppbRae 3000 Serial No.: R8846 | Lamp: (10.6) / 11.7 eV | Calibrated @ Time 6-9-17 800 |
| ~~PhoCheck~~ PID Serial No.: 4483 GEM 2000 | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 6-9-17 800 |

(CH4, CO2, O2 (%))

| Purge # | Start Time | End Time | Elapsed Time | ~~Purge Rate (LPM)~~ Cumulative Volume (L) | VOCs by MiniRae (specify ppbv – (ppmv)) | ~~VOCs by PhoCheck~~ (specify ppbv – ppmv) |
|---|---|---|---|---|---|---|
| 1 | 1047 | 1047 | 20 sec | 1 | 57.3 | — |
| 2 | 1050 | 1050 | 20 sec | 2 | 58.8 | 0.0, 15.0, 2.8 |
| 3 | 1054 | 1054 | 20 sec | 3 | 49.7 | 0.0, 15.7, 2.6 |
| Additional purge If needed for stabilization | | | | | | |
| Sample of Record | | | | | | |

| | Sample ID No. |
|---|---|
| Column Sample for HAPSITE | |
| Row Sample For HAPSITE | |

| | Start Time | End Time | Elapsed Time | Sample ID B11193-060917-SVP-1-5 | Summa Canister ID | Flow Controller # | Initial Vacuum (in. Hg) | Final Vacuum (in. Hg) |
|---|---|---|---|---|---|---|---|---|
| SUMMA Sample | 1059 | 1119 | 20 min | | 3299 | 20657 | 29.03 | 3.35 |

Tracer Gas (He)

| | Min Shroud % | Max Shroud % | Sample ( PPM or %) | |
|---|---|---|---|---|
| | — | — | — | |

# SUB-SLAB SAMPLING PROBE MEASUREMENTS

Geosyntec consultants

SVP-1~~0~~

| | | | |
|---|---|---|---|
| Sampling Personnel: DF + BW | Recorded By: | | |
| Building #: 11193 | Date: 6-9-17 | Weather: | Row / Column |
| Slab Thickness: | | ~~Sub-slab~~ Probe No.: SVP-1-~~5~~10 | |

**Purging Data**

| | | |
|---|---|---|
| ppbRae 3000 Serial No.: 592906370 (280416) | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 06-09-17 8:00 |
| ~~PhoCheck~~ PID Serial No.: 4494 ~~GEM 2000~~ | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 06-09-17 8:00 |

| Purge # | Start Time | End Time | Elapsed Time | ~~Purge Rate (LPM)~~ Cumulative Volume (L) | VOCs by MiniRae (specify ppbv ~~(ppmv)~~) | ~~VOCs by PhoCheck~~ GEM 2000 (specify ppbv ~~= ppmv~~) (CH4, CO2, O2 (%)) |
|---|---|---|---|---|---|---|
| 1 | 10:11 | 10:11 | 20 sec. | 1 | 51.7 | — |
| 2 | 10:15 | 10:15 | 20 sec | 2 | 51.6 | 0.0, 14.3, 3.8 |
| 3 | 10:20 | 10:20 | 20 sec | 3 | 53.4 | — |
| Additional purge If needed for stabilization | 10:22 | 10:22 | 20 sec | 4 | — | 0.0, 16.9, 2.1 |
| Sample of Record | | | | | | |

| | Sample ID No. |
|---|---|
| Column Sample for HAPSITE | |
| Row Sample For HAPSITE | |

| | Start Time | End Time | Elapsed Time | Sample ID B11193-060917-SVP-1-10 | Summa Canister ID | Flow Controller # | Initial Vacuum (in. Hg) | Final Vacuum (in. Hg) |
|---|---|---|---|---|---|---|---|---|
| SUMMA Sample | 10:29 | 10:55 | 26 mins | | 1L2408 | 22047 | 29.15 | 2.40 |

Tracer Gas (He)

| Min Shroud % | Max Shroud % | Sample ( PPM or %) |
|---|---|---|
| 11 | 14.6 | Ø |

# SUB-SLAB SAMPLING PROBE MEASUREMENTS

Geosyntec consultants

SVP-2-SS

| | | | |
|---|---|---|---|
| Sampling Personnel: DF & BW | | Recorded By: DF | |
| Building #: 11193 | Date: 6-9-17 | Weather: | Row / Column |
| Slab Thickness: | | Sub-slab Probe No.: SVP-2-SS | |

**Purging Data**

| | | |
|---|---|---|
| ppbRae 3000 Serial No.: 28846 | Lamp: (10.6) / 11.7 eV | Calibrated @ Time 6-9-17 8:00 |
| ~~PhoCheck~~ PID Serial No.: 4483 (GEM 2000) | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 6-9-17 8:00 |

| Purge # | Start Time | End Time | Elapsed Time | ~~Purge Rate~~ (LPM) Cumulative Volume (L) | VOCs by MiniRae (specify ppbv ~~(ppmv)~~) | ~~VOCs by PhoCheck~~ (specify ppbv ~~(ppmv)~~ ~~(EDF)~~) [$CH_4$, $CO_2$, $O_2$ %] |
|---|---|---|---|---|---|---|
| 1 | 11:47 | 11:47 | 25 sec | 1 | 17.8 | — |
| 2 | 11:50 | 11:50 | 25 sec | 2 | 15.7 | — |
| 3 | 11:53 | 11:53 | 25 sec | 3 | 14.1 | 0.0, 4.9, 15.9 |
| Additional purge If needed for stabilization | 11:57 | 11:57 | 25 sec | 4 | — | 0.0, 6.0, 13.4 |
| Sample of Record | | | | | | |
| | | | | | Sample ID No. | |
| Column Sample for HAPSITE | | | | | | |
| Row Sample For HAPSITE | | | | | | |

| | Start Time | End Time | Elapsed Time | Sample ID B11193-060917-SVP-2-SS | Summa Canister ID | Flow Controller # | Initial Vacuum (in. Hg) | Final Vacuum (in. Hg) |
|---|---|---|---|---|---|---|---|---|
| SUMMA Sample | 12:03 | 12:27 | 24 mins | | 1L3017 | 2704 | 28.95 | 2.68 |

Tracer Gas – water dam used – no leaks

| | Min Shroud % | Max Shroud % | Sample ( PPM or %) | |
|---|---|---|---|---|
| | — | — | — | |

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: B11193
Date: 6-13-2017 Project Number:
Site Location: VB 11193
Weather: Fair
Field Personnel: H. Dawson, B. Wertz
Recorded By: H. Dawson, B. Wertz

Probe No.: SVP-2-SS ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M:
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 I Casing Volume
☐ Sub-slab <0.1 L
Soil gas probe (L)

⑤ Shut in test prior to pneumatic test completed, in. $H_2O$ held for seconds.

④ Initial Vacuum (prior to pumping) 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.) | 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6-13-17 | 11:09 | | | 1 | | | | | | | 13.2 | | 14.4 |
| 6/14/17 | 16:25 | | | 1 | | | | | | 8.2 | 13.7 | 0.0 | 11.5 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 6-13-2017 | 11:52-17:16 | B11193-061317-SVP-2-SS-10-1 | ~~2000~~ IL2313 | | ~~-29.27~~ | -29.21 | 2.87 |
| 06 14 17 | 17:21 11:50 | B11193-061417-SVP-2-SS-10-2 | IL1692 | 21684 | | 29.28 | 1.48 |
| | | | | | | | |

Comments:

# SUB-SLAB SAMPLING PROBE MEASUREMENTS

Geosyntec consultants

SVP-2-5

| | | | |
|---|---|---|---|
| Sampling Personnel: DF + BW | Recorded By: DF & BW | | |
| Building #: 11193 | Date: 6-9-17 | Weather: | Row / Column |
| Slab Thickness: | | ~~Sub-slab~~ Probe No.: SVP-2-5 | |

**Purging Data**

| | | |
|---|---|---|
| ppbRae 3000 Serial No.: 28846 | Lamp (10.6) / 11.7 eV | Calibrated @ Time 6-9-17 800 |
| ~~PhoCheck PID~~ GEM 2000 Serial No.: 4483 | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 6-9-17 800 |

| Purge # | Start Time | End Time | Elapsed Time | ~~Purge Rate (LPM)~~ (1) Cumul. Vol | VOCs by MiniRae (specify ppbv ~~(ppmv)~~) | ~~VOCs by PhoCheck (specify ppbv ~ ppmv)~~ (CH4, CO2, O2) (2) |
|---|---|---|---|---|---|---|
| 1 | 1205 | 1205 | 25 sec | 1 | 36.5 | — |
| 2 | 1208 | 1208 | 25 sec | 2 | 35.1 | 0.0, 11.9, 6.4 |
| 3 | 1212 | 1212 | 25 sec | 3 | 34.5 | — |
| Additional purge If needed for stabilization | 1215 | 1215 | 25 sec | 4 | — | 0.0, 12.6, 6.3 |
| Sample of Record | | | | | | |
| | | | | | Sample ID No. | |
| Column Sample for HAPSITE | | | | | | |
| Row Sample For HAPSITE | | | | | | |

| | Start Time | End Time | Elapsed Time | Sample ID B11193-060917-SVP-2-5 | Summa Canister ID | Flow Controller # | Initial Vacuum (in. Hg) | Final Vacuum (in. Hg) |
|---|---|---|---|---|---|---|---|---|
| SUMMA Sample | 1220 | 1243 | 23 min | | 1L2552 | 21299 | 29.14 | 2.81 |

**Tracer Gas**

| | Min Shroud % | Max Shroud % | Sample ( PPM or %) | |
|---|---|---|---|---|
| | — | — | — | |

# SUB-SLAB SAMPLING PROBE MEASUREMENTS

Geosyntec consultants

SVP-2-10

| | | | | |
|---|---|---|---|---|
| Sampling Personnel: DF & BW | | Recorded By: DF & BW | | |
| Building #: 1193 | Date: 6-9-17 | Weather: | Row | Column |
| Slab Thickness: | | ~~Sub-slab~~ Probe No.: SVP-2-10 | | |

**Purging Data**

| | | |
|---|---|---|
| ppbRae 3000 Serial No.: R8846 | Lamp (10.6) / 11.7 eV | Calibrated @ Time 6-9-17 8:00 |
| ~~PhoCheck PID~~ Gem 2000 Serial No.: 4483 | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 6-9-17 8:00 |

| Purge # | Start Time | End Time | Elapsed Time | ~~Purge Rate~~ (LPM) (L) Cumulative Volume | VOCs by MiniRae (specify ppbv - (ppmv)) | ~~VOCs by PhoCheck~~ (specify ppbv - ppmv) [$CH_4$, $CO_2$, $O_2$ (%)] |
|---|---|---|---|---|---|---|
| 1 | 12:22 | 12:22 | 25 sec | 1 | 39.4 | — |
| 2 | 12:25 | 12:25 | 25 sec | 2 | 37.8 | 0.0, 12.6, 5.3 |
| 3 | 12:29 | 12:29 | 25 sec | 3 | 37.1 | — |
| Additional purge If needed for stabilization | 12:33 | 12:33 | 25 sec | 4 | — | 0.0, 13.7, 48 |
| Sample of Record | | | | | | |

| | Sample ID No. |
|---|---|
| Column Sample for HAPSITE | |
| Row Sample For HAPSITE | |

| | Start Time | End Time | Elapsed Time | Sample ID 1193-060917-SVP-2-10 | Summa Canister ID | Flow Controller # | Initial Vacuum (in. Hg) | Final Vacuum (in. Hg) |
|---|---|---|---|---|---|---|---|---|
| SUMMA Sample | 12:40 | 12:58 | 18 (min) | | 1L1914 | 2520 | 28.49 | 2.63 |

**Tracer Gas**

| | Min Shroud % | Max Shroud % | Sample ( PPM or %) | |
|---|---|---|---|---|
| | — | — | — | |

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: B11193
Date: _____ Project Number: TR0626
Site Location: Vandenberg B11193
Weather: Fair
Field Personnel: H. Dawson / B. Wertz
Recorded By: H. Dawson

Probe No.: B11193-SVP-3-SS ☑ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: _____ Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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) _____ in. $H_2O$

⑤ Shut in test prior to pneumatic test completed ____ in. $H_2O$ held for ___ 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 He ✓ Shroud (%) Min | Shroud (%) Max | Sample ($ppm_v$, %) (circle one) | VOCs by PID ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6-13-17 | 11:21 | | | 1 | | | | | | | | | 41.00 |
| 6-14-17 | 16:40 | | | | | | | | | 10.7 | 10.9 | 0.0 | ~~3~~ 31.6 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 6-13-2017 | 11:52 - 12:13 | B11193-061317-SVP-3-SS-10-1 | 00000003297 | | ~~27.11~~ | -27.21 | 2.84 |
| 06 14 2017 | 17:21 17:51 | B11193-061417-SVP3-SS-10-2 | IL 2482 | 21201 | | 29.26 | 1.81 |
| | | | | | | | |

Comments:

# SUB-SLAB SAMPLING PROBE MEASUREMENTS

Geosyntec consultants

SVP-3-SS

| | | | |
|---|---|---|---|
| Sampling Personnel: DF & BW | Recorded By: DF | | |
| Building #: 11193 | Date: 6-9-17 | Weather: | Row / Column |
| Slab Thickness: | | Sub-slab Probe No.: SVP-3-SS | |
| Purging Data | | | |
| ppbRae 3000 Serial No.: RB846 | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 6-9-17 8:00 | |
| ~~PhoCheck~~ GEM 2000 PID Serial No.: 4483 | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 6-9-17 8:00 | |

[CH4, CO2, O2 (%)]

| Purge # | Start Time | End Time | Elapsed Time | ~~Purge Rate~~ Cumulative Volume (L) | VOCs by MiniRae (specify ppbv – ~~ppmv~~) | VOCs by PhoCheck (specify ppbv – ppmv) |
|---|---|---|---|---|---|---|
| 1 | 13:45 | 13:45 | ~~20~~ 25 sec | 1 | 42.6 | — |
| 2 | 13:49 | 13:49 | ~~20~~ 25 sec | 2 | 37.4 | 0.0, 2.4, 18.1 |
| 3 | 13:53 | 13:53 | 25 sec | 3 | 39.3 | 0 — |
| Additional purge If needed for stabilization | 13:56 | 13:56 | 25 sec | 4 | — | 0.0, 1.9, 18.1 |
| Sample of Record | | | | | | |
| | | | | | Sample ID No. | |
| Column Sample for HAPSITE | | | | | | |
| Row Sample For HAPSITE | | | | | | |

| | Start Time | End Time | Elapsed Time | Sample ID B11193-060917 SVP-3-SS | Summa Canister ID | Flow Controller # | Initial Vacuum (in. Hg) | Final Vacuum (in. Hg) |
|---|---|---|---|---|---|---|---|---|
| SUMMA Sample | 14:00 | 14:21 | 21 min | | 1L2534 | 21297 | ~~29.44~~ 28.63 | 4.06 |

Tracer Gas — Waterdam used

| Min Shroud % | Max Shroud % | Sample ( PPM or %) |
|---|---|---|
| | | |

# SUB-SLAB SAMPLING PROBE MEASUREMENTS

SVP-3-5

Geosyntec consultants

| | | | |
|---|---|---|---|
| Sampling Personnel: DF to WW | | Recorded By: DF | |
| Building #: 11193 | Date: 6/9/17 | Weather: | Row / Column |
| Slab Thickness: | | ~~Sub-slab Probe~~ No.: SVP-3-5 | |

**Purging Data**

| | | |
|---|---|---|
| ppbRae 3000 Serial No.: R8846 | Lamp: (10.6) / 11.7 eV | Calibrated @ Time 6-9-17 8:00 |
| ~~PhoCheck PID~~ Gem 2000 Serial No.: 4483 | Lamp: 10.6 / 11.7 eV | Calibrated @ Time 6-9-17 8:00 |

| Purge # | Start Time | End Time | Elapsed Time | ~~Purge Rate (LPM)~~ Cumulative Volume (L) | VOCs by MiniRae (specify ppbv ~~ppmv~~) | VOCs by ~~PhoCheck~~ (specify ~~ppbv~~ ppmv) CH4, CO2, O2 (%) |
|---|---|---|---|---|---|---|
| 1 | 1404 | 1404 | 25sec | 1 | 161.8 | — |
| 2 | 1408 | 1408 | 25sec | 2 | 168.1 | — |
| 3 | 1411 | 1411 | 25sec | 3 | 165.6 | 0.0, 9.9, 7.4 |
| Additional purge If needed for stabilization | 1414 | 1414 | 25sec | 4 | — | 0.0, 10.9, 7.2 |
| Sample of Record | | | | | | |
| | | | | | Sample ID No. | |
| Column Sample for HAPSITE | | | | | | |
| Row Sample For HAPSITE | | | | | | |

| | Start Time | End Time | Elapsed Time | Sample ID B11193-060917 SVP-3-5 | Summa Canister ID | Flow Controller # | Initial Vacuum (in. Hg) | Final Vacuum (in. Hg) |
|---|---|---|---|---|---|---|---|---|
| SUMMA Sample | 1420 | 1442 | 22 min | | L2432 | 21534 | 28.15 | 2.92 |

**Tracer Gas**

| | Min Shroud % | Max Shroud % | Sample ( PPM or %) | |
|---|---|---|---|---|
| | — | — | — | |

# SUB-SLAB SAMPLING PROBE MEASUREMENTS

SVP-3-10

Geosyntec consultants

| | | | | |
|---|---|---|---|---|
| Sampling Personnel: DF + WW | | Recorded By: DF | | |
| Building #: 1193 | Date: 6-9-17 | Weather: | Row | Column |
| Slab Thickness: | | ~~Sub-slab Probe~~ No.: SVP-3-10 | | |

**Purging Data**

| | | | |
|---|---|---|---|
| ppbRae 3000 Serial No.: 28846 | Lamp: 10.6 / 11.7 eV | Calibrated @ Time | 6-9-17 800 |
| PhoCheck PID Serial No.: 4483 (GEN 2000) | Lamp: 10.6 / 11.7 eV | Calibrated @ Time | 6-9-17 800 |

([CH4, CO2, O2 (%)])

| Purge # | Start Time | End Time | Elapsed Time | ~~Purge Rate (LPM)~~ Cumulative Volume (L) | VOCs by MiniRae (specify ppbv – ppmv) | ~~VOCs by PhoCheck (specify ppbv – ppmv)~~ |
|---|---|---|---|---|---|---|
| 1 | 1425 | 1425 | 25sec | 1 | 162.5 | — |
| 2 | 1427 | 1427 | 25sec | 2 | 158.5 | — |
| 3 | 1430 | 1430 | 25sec | 3 | 174.0 | 0.0, 10.5, 6.9 |
| Additional purge If needed for stabilization | 1432 | 1432 | 25sec | 4 | — | 0.0, 10.4, 7.3 |
| Sample of Record | | | | | | |
| | | | | | Sample ID No. | |
| Column Sample for HAPSITE | | | | | | |
| Row Sample For HAPSITE | | | | | | |

| | Start Time | End Time | Elapsed Time | Sample ID | Summa Canister ID | Flow Controller # | Initial Vacuum (in. Hg) | Final Vacuum (in. Hg) |
|---|---|---|---|---|---|---|---|---|
| | 1505 (PT) | 1535 | | B1193-060917-SVP-3-10 | IL2338 | 21972 | | |
| SUMMA Sample | ~~14:37~~ | | 30mins | | ~~40869~~ | ~~21535~~ | 28.86 | 0.25 |

**Tracer Gas**

| | Min Shroud % | Max Shroud % | Sample ( PPM or %) | |
|---|---|---|---|---|
| | — | — | — | |

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: B11193
Date: 06-13-2017 Project Number: TR0626
Site Location: Vandenberg B11193
Weather: Fair
Field Personnel: H. Dawson / B. Wertz
Recorded By: H. Dawson / B. Wertz

Probe No.: B11193-061317-SVP-4-SS ☐ Sub-slab probe ☐ Soil gas probe
Mini Rae 2000 Serial No.: _____ Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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 I Casing Volume
☐ Sub-slab <0.1 L
Soil gas probe _____ (L)

④ Initial Vacuum (prior to pumping) _____ in. $H_2O$

⑤ Shut in test prior to pneumatic test completed, ____ in. $H_2O$ held for ___ 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6-13-17 | 11:30 | | | 1 | | 1 | | | | | | ~~420~~ | 428 |
| 6-13-17 | 11:34 | | | 1 | | 2 | | | | | | | 439 |
| 6-14-17 | 17:00 | | | | | | | | | 9.9 | 10.5 | 0.6 | 377 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 06-13-2017 | 11:50<br>12:24 | B11193-061317-SVP-4-SS-10-1 | IL2312 | | | -29.27 | 0.50 |
| 06-14-17 | 17:22<br>17:49 | B11193-061417-SVP-4-SS-10-2 | 03049 | 20577 | | 29.14 | 1.65 |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: VDB 1193 — Probe No.: SVP-4-SS — ☑ Sub-slab probe ☐ Soil gas probe
Date: 061017 — Project Number: TR0626 — Mini Rae 2000 Serial No.: 592-906-370 — Lamp: 10.6 / 11.7 eV
Site Location: 1193 — Landtech GEM 2000 Landfill Gas Meter Serial No. M: GM07654
Weather: SUNNY MILD — MDG 2002 Helium detector Serial No.: 041553
Field Personnel: BRAD — Tracer Gas: ☑ Helium ☐ Other
Recorded By: WW

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)

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

⑥ Start of Pneumatic Test: ____

| ~~Start~~ Elapsed Time (min.) | Pump Flow Rate (LPM) | Well Head Vacuum in. $H_2O$ |
|---|---|---|
| | 0.1 | |
| | 0.2 | |
| 11:50 | 0.5 | 0.1" |
| | | |

④ Initial Vacuum (prior to pumping) ____ 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.) | 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 061017 | | | | | | 0 | | | | 10% | 14% | 0% | 378.2 |
| | 13:05 | | | | | 1 | 0.0 | 0.1 | 20.4 | | | | 378.2 |
| | | | | | | 2 | | | | | | | 446.8 |
| | | | | | | 3 | 0.0 | 0.0 | 20.8 | | | | 444.2 |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| 061017 | 13:17 | 1193-061017-SVP-4-SS | 1L2471 | 21093 | | 28.92 | -2.94 |
| | 13:49 | | | | | | |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: VDB 1493
Date: 061017 Project Number: TR0636
Site Location: VDB 11193
Weather: Sunny Windy
Field Personnel: Wright
Recorded By: WW

Probe No.: SVP-4-5 ☐ Sub-slab probe ☑ Soil gas probe
Mini Rae 2000 Serial No.: 592906338 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____
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) _____ in. $H_2O$

⑤ Shut in test prior to pneumatic test completed. 8 in $H_2O$ 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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 061017 | 2:00 | [redacted] | [redacted] | 1 | | 1 | | | | 10.1 | 1.5 | 0.0 | [redacted] |
| | 14:07 | | | 1 | | 2 | 0.0 | 1.3 | 20.5 | | | | [redacted] |
| | 14:14 | | | 1 | | 3 | 0.0 | 4.7 | 15.9 | | | | 1360 |
| | 1420 | [redacted] | | | | 4 | 0.0 | 13.1 | 4.0 | | | | 1154 |
| | | | | | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| | 1430 | B11193-061017-SVP-4-5 | 1L1901 | | | [redacted] | [redacted] |
| | 14:53 | | | | | 29.12 | 3.94 |
| | | | | | | | |

Comments:

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

① Project Name: VPB 11193
Date: 061017 Project Number: TR0626
Site Location: VDB
Weather: SUNNY WINDY (GUSTS > 30K)
Field Personnel: WORTZ
Recorded By: WEW

Probe No.: SVP-4-10 ☐ Sub-slab probe ☒ Soil gas probe
Mini Rae 2000 Serial No.: 592906356 Lamp: 10.6 / 11.7 eV
Landtech GEM 2000 Landfill Gas Meter Serial No. M:
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) ____ in. $H_2O$

⑤ Shut in test prior to pneumatic test completed 5 in. $H_2O$ 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 | 0.28 |
| | | |

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 ($ppm_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 061017 | | | | | | | | | | | | | |
| | 1551 | | | 1 | | 1 | 0 | 10.8 | 8.3 | | | | 1220 |
| | 1560 | | | 1 | | 2 | | | | | | | 814 |
| | | | | | | | 0 | 13.2 | 4.6 | | | | 942 |
| | BATTERY DIED → | | | | SWITCHED | GEM | 0 | 14.1 | 4.7 | | | | 992 |
| | | | | to PURGE GAS 316 AFTER CAL | | | | | | | | | |

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) |
|---|---|---|---|---|---|---|---|
| ~~061017~~ | ~~1615~~ | ~~B11193-SVP-~~ | ~~1L1931~~ | | | ~~29.12~~ | |
| 061017 | 1616 | B11193-061017-SVP-4-10 | 1L1931 | | | 29.12 | 2.28 |
| | 1642 | | | | | | |

Comments:

# AIR MONITORING FORM

Geosyntec consultants

Site Name VDB 11193 Project ID TR0479

Sampler Name WSR+Z

Sample Location: Building 11193 Floor Outdoor Air & IA At Location A Room

Sample Type: 6 Liter Summa ✓ Weather Conditions Cool Foggy in AM

Analytical Method (circle one): TO-15 SIM and TO-15 Scan ✓

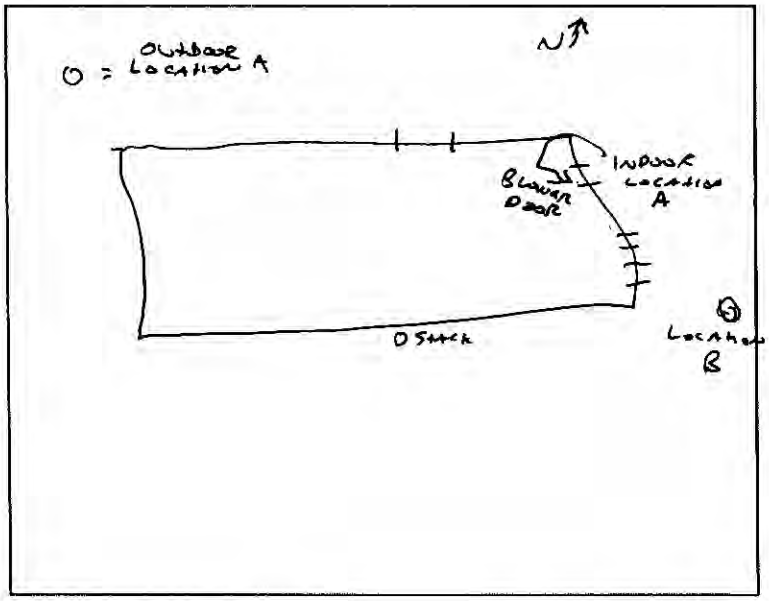
| Sample ID | ~~Canister ID~~ | CANISTER Regulator ID | Start | | | End | | |
|---|---|---|---|---|---|---|---|---|
| | | | Vacuum (in Hg) | Time | Date | Vacuum (in Hg) | Time | Date |
| B11193-062117- | SSV-OA-A | 6L1568 | 29.~~7~~ | 07:25 | 062117 | | | 062117 |
| B11193-062117- | SSV-OA-B | 01853 | 29.27 | 07:25 | 062117 | | | 062117 |
| B11193-062117- | ST-3-IA-A-10 | 6L1735 | 29.34 | 09:05 | 062117 | 2.71 | 09:14 | 062117 |
| B11193-062117 | ST-4-IA-A-10 | 01848 | 29.42 | | 062117 | | | 062117 |

Room Temperature

PID Reading (ppm)

Other Comments (e.g., PID readings, intermediate vacuum readings)

Sketch of Sample Location (s)




Air Monitoring Form.ai

SSV STACK SAMPLES

# SOIL GAS PROBE MEASUREMENTS

Geosyntec consultants

(1) Project Name: VDB 11193 — Probe No.: SSV STACK ☐ Sub-slab probe ☐ Soil gas probe

Date: 06 21 17 — Project Number: TR0429 — Mini Rae 2000 Serial No.: _____ Lamp: 10.6 / 11.7 eV

Site Location: B11193 — Landtech GEM 2000 Landfill Gas Meter Serial No. M: _____

Weather: [redacted] FOGGY COOL - AM — MDG 2002 Helium detector Serial No.: _____

Field Personnel: IM, DM, WW, PD(ASC) — Tracer Gas: ☐ Helium ☐ Other _____

Recorded By: _____

(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)

(5) Shut in test prior to pneumatic test completed,____ in. $H_2O$ held for ___ 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) __ _____ 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.) | 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$_v$) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

(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) |
|---|---|---|---|---|---|---|---|
| 06 21 17 | 9:05 | B1193-062117-SSV-6-59 | 1L2610 | | | 29.19 | 1.97 |
| 06 21 17 | 12:10 | B11193-062117-SSV-7-65 | 1L1926 | | | 28.50 | 2.92 |
| 062117 | 13:35 | B11193-062117-SSV-8-65 | 1L2450 | | | 27.51 | 2.92 |

Comments: B1193-062117-SSV-7 COLLECTED AFTER SHOP VAC HOOK UP

# DAILY FIELD REPORT

Geosyntec consultants
www.geosyntec.com

Project Name: VDB 11193 Date: 06 21 17 Page 2 of ___
Project Number: ___ Primary Activities: ___
Field Personnel: ___ SSV OPTIMIZATION
Recorded By: ___
Weather: ___

| Time | Description of activities - location of work, work performed, equipment & personnel used, incidental information | | |
|---|---|---|---|
| | ~~PZ~~ LOCATION | PID (PPM) | |
| 08:15 | STACK | 8.7 | FLOW 1200 to 890 DECREASING AS ORIFICE OPENED |
| | SSP-3-E | 15.5 | |
| | SSP-E-3 | 86.6 | |
| | SSP-E-2 | 2.7 | |
| | SSP-3-C | 6.8 | |
| | SSP-S-2 | 0.5 | |
| | SVP-2-SS | 5.3 | |
| | SSP-2-E | 1.4 | |
| | SSP-W-3 | 0.8 | |
| | SSP-1-E | 0.3 | |
| | SVP-1-SS | 1.7 | |
| | SSP-1-N2 | 0.3 | |
| | SSP-4-E | 5.8 | |
| | SSV4-SS | 135.4 | |
| | SSP4-B | 425.9 | |
| | | | |
| 10:45 | STACK | 11.4 | FLOW = 65CFM (DM) |
| | | | VAC = |
| | | | |
| 18:15 | PID DOWN SYSTEM OF AIR BLEED | 9.7 | |
| | ~~SAMPLE~~ | | |

Daily Field Report

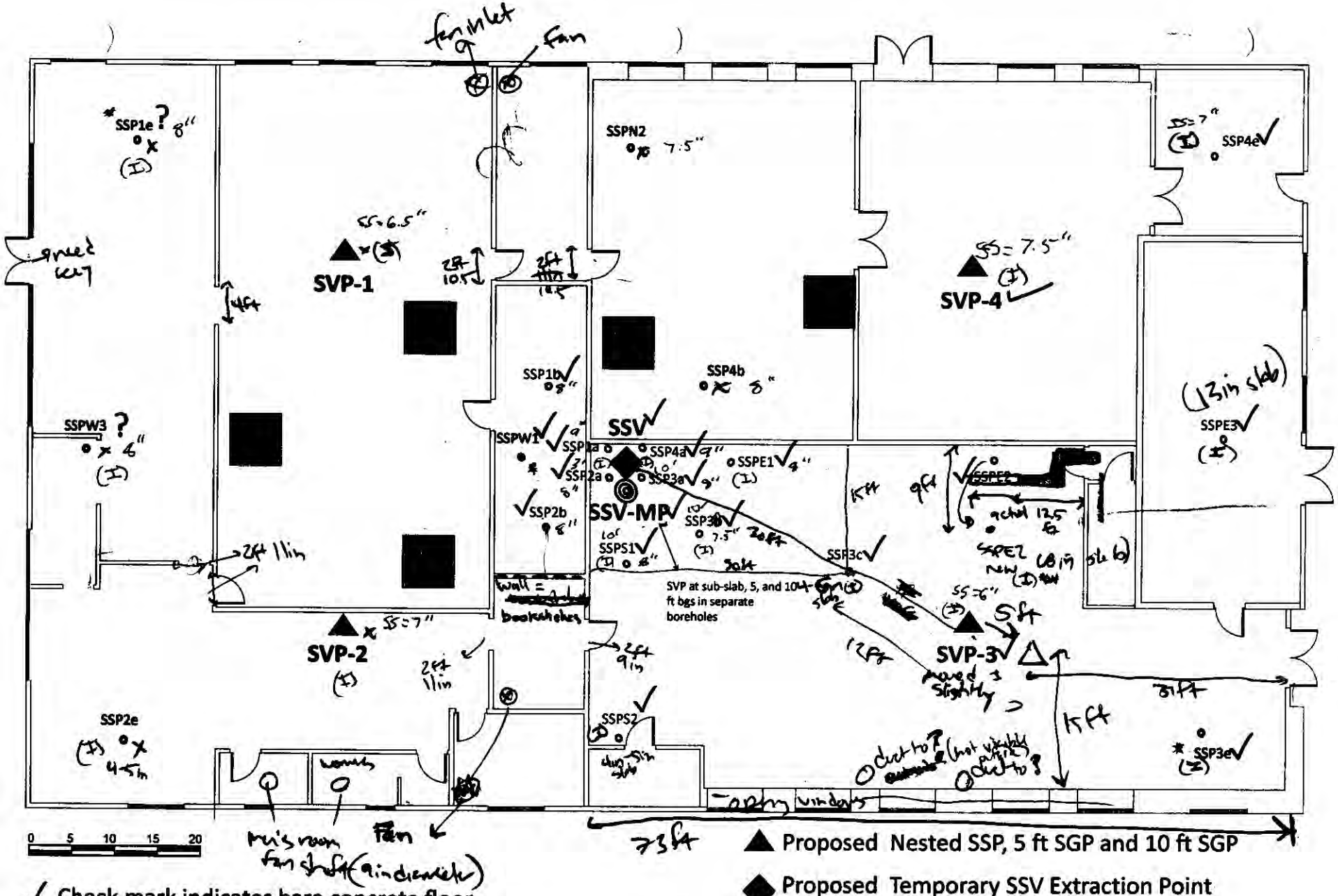
## Darius Mali

**From:** Paul Dahlen <Paul.Dahlen@asu.edu>
**Sent:** Tuesday, August 1, 2017 1:39 PM
**To:** Darius Mali
**Cc:** Yuanming Guo
**Subject:** data from shutdown

Hi Darius,
Sorry this is so late. If you have any questions, holler.
Our subsequent work was not without many problems, among which two autosamplers failed. I also think the SSD had a pretty significant effect on concentrations: During neg and pos pressurization concentrations were not great and a bit erratic. The flux test definitely showed the floor in that room is a significant source of contaminant.
PD

| Date | Time | Activity | Reading | Other |
|---|---|---|---|---|
| 7/13/17 | 1326 | Begin 6L walking composite | | |
| | 1412 | End 6L walking composite | | |
| | 1440 | PID SVP1SS | 0.0 ppm | |
| | 1442 | PID SSPN2 | 0.0 ppm | |
| | 1444 | PID SVP4SS | 2.2 ppm | |
| | 1449 | PID SVP2SS | 0.2 ppm | |
| | 1452 | PID SVP3SS | 4.3 ppm | |
| | 1455 | PID SSPE3 | 3.3 ppm | |
| | 1523 | Sample SVP3SS | | Can 1L1543<br><br>2.7 ppm final PID |
| | 1532 | SSVac | 30.5 | |
| | | PID SSV | 0.3 ppm | |
| | 1544 | SSV sample | | Can 1L2468 |
| | 1600 | SSV Flowrate | 1310 FPM | |

C4.4
Site #4: Building 11193
Figures




✓ Check mark indicates bare concrete floor

? Question mark indicates unknown whether ACM present

Box indicates probe location could be eliminated

Top of Peak of Building = 15ft

x = needs abatement

▲ Proposed Nested SSP, 5 ft SGP and 10 ft SGP

◆ Proposed Temporary SSV Extraction Point

o Proposed Communication Test Point (SSP)

◎ Proposed Nested Test Points at 0.5, 5 and 10 feet

Floor drain

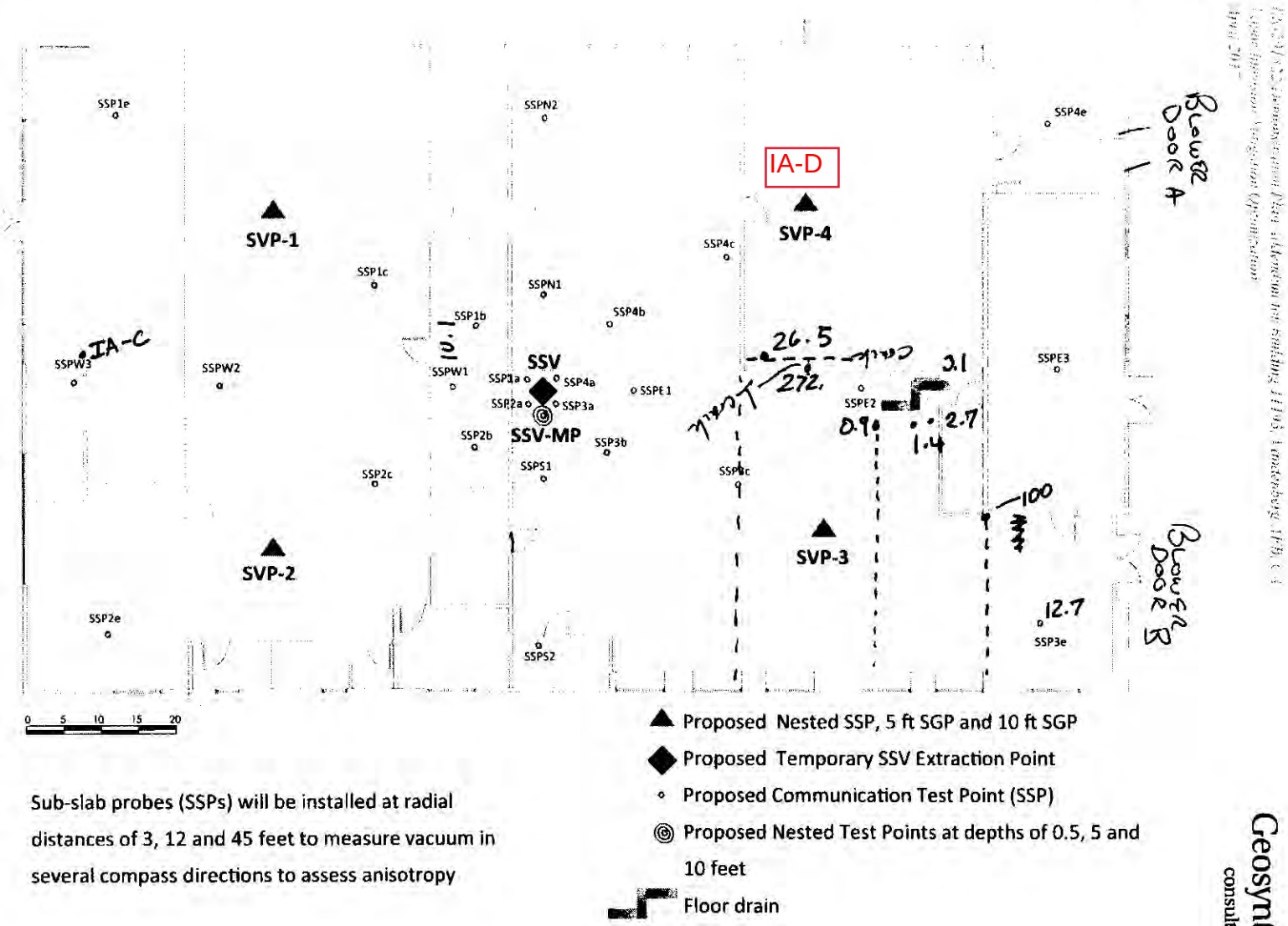
I = installed

** = hole to fill

* preferred DG 700 measure point.

= Pressure [illegible] installed here

H. Dawson 6/13/2017 PID READING @ MAX BLOWER DOOR FAN SPEED ~ -35 Pa ~ 11 200 CFM




Sub-slab probes (SSPs) will be installed at radial distances of 3, 12 and 45 feet to measure vacuum in several compass directions to assess anisotropy

Figure 8. Planned locations for testing instrumentation in Building 11193

SSV FAN TEST
06 16 17
06 18 17




Sub-slab probes (SSPs) will be installed at radial distances of 3, 12 and 45 feet to measure vacuum in several compass directions to assess anisotropy

- Proposed Nested SSP, 5 ft SGP and 10 ft SGP
- Proposed Temporary SSV Extraction Point
- Proposed Communication Test Point (SSP)
- Proposed Nested Test Points at depths of 0.5, 5 and 10 feet
- Floor drain

FAN FLOW ≈ 900 FT/MIN

Figure 8. Planned locations for testing instrumentation in Building 11193



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FAN @ 450 CFM
10" $H_2O$ OVERNIGHT

PID SCREEN
06201 7

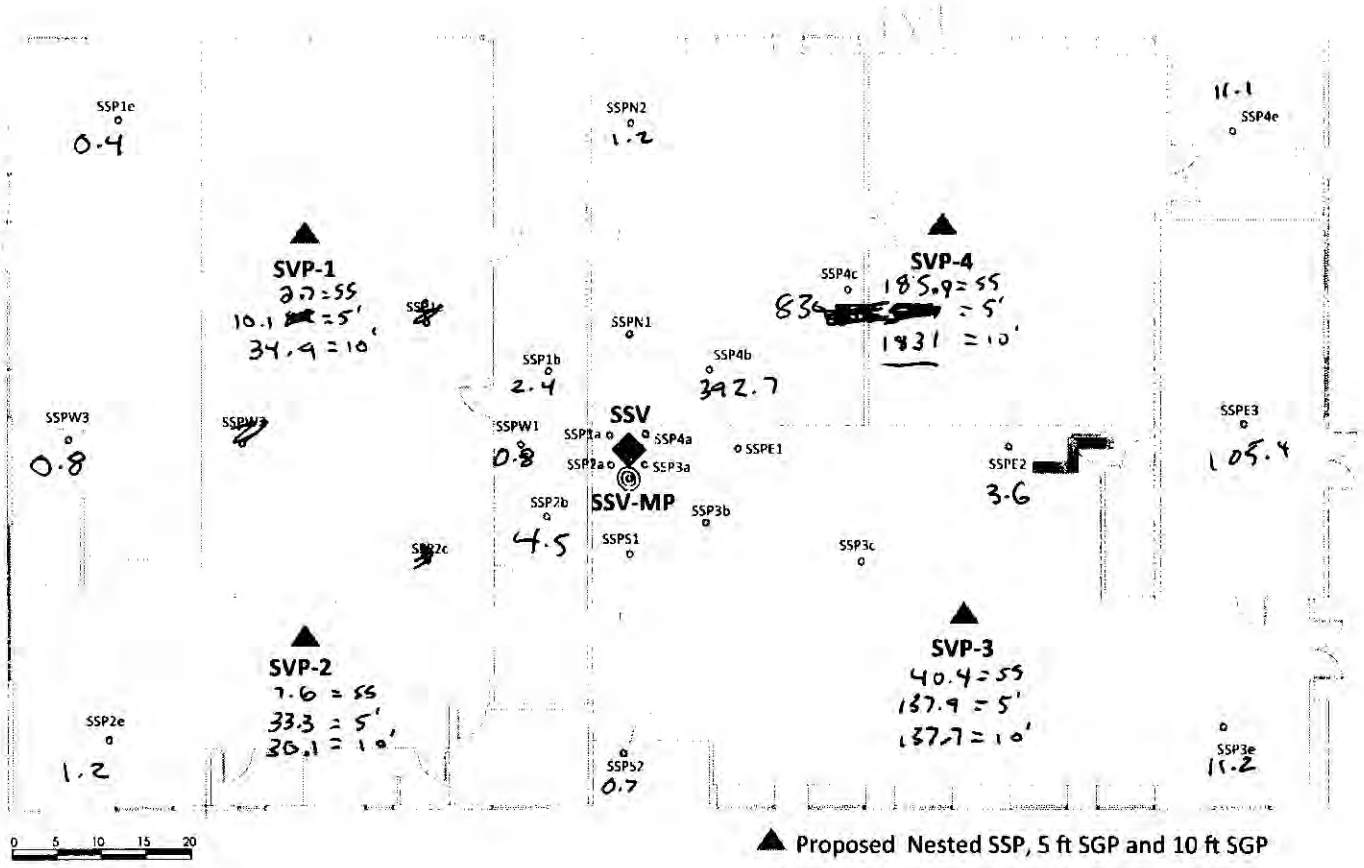



Figure 8. Planned locations for testing instrumentation in Building 11193

Sub-slab probes (SSPs) will be installed at radial distances of 3, 12 and 45 feet to measure vacuum in several compass directions to assess anisotropy

- Proposed Nested SSP, 5 ft SGP and 10 ft SGP
- Proposed Temporary SSV Extraction Point
- Proposed Communication Test Point (SSP)
- Proposed Nested Test Points at depths of 0.5, 5 and 10 feet
- Floor drain

PID READINGS IN PPM

Start 09:25

Stop 11:10



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Geosyntec consultants

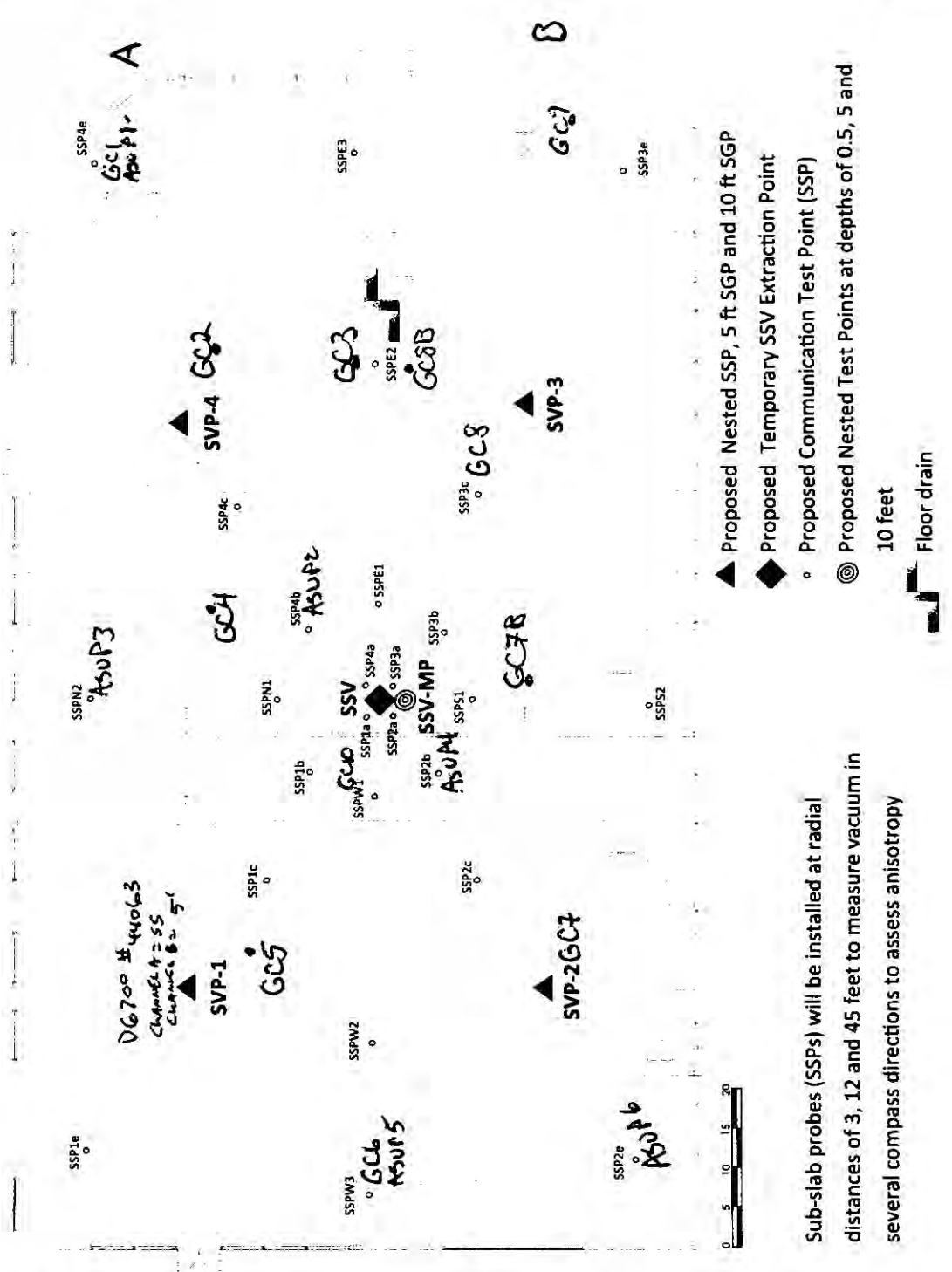



Figure 8. Planned locations for testing instrumentation in Building 11193

Sub-slab probes (SSPs) will be installed at radial distances of 3, 12 and 45 feet to measure vacuum in several compass directions to assess anisotropy

Figure 8. Planned locations for testing instrumentation in Building 11193

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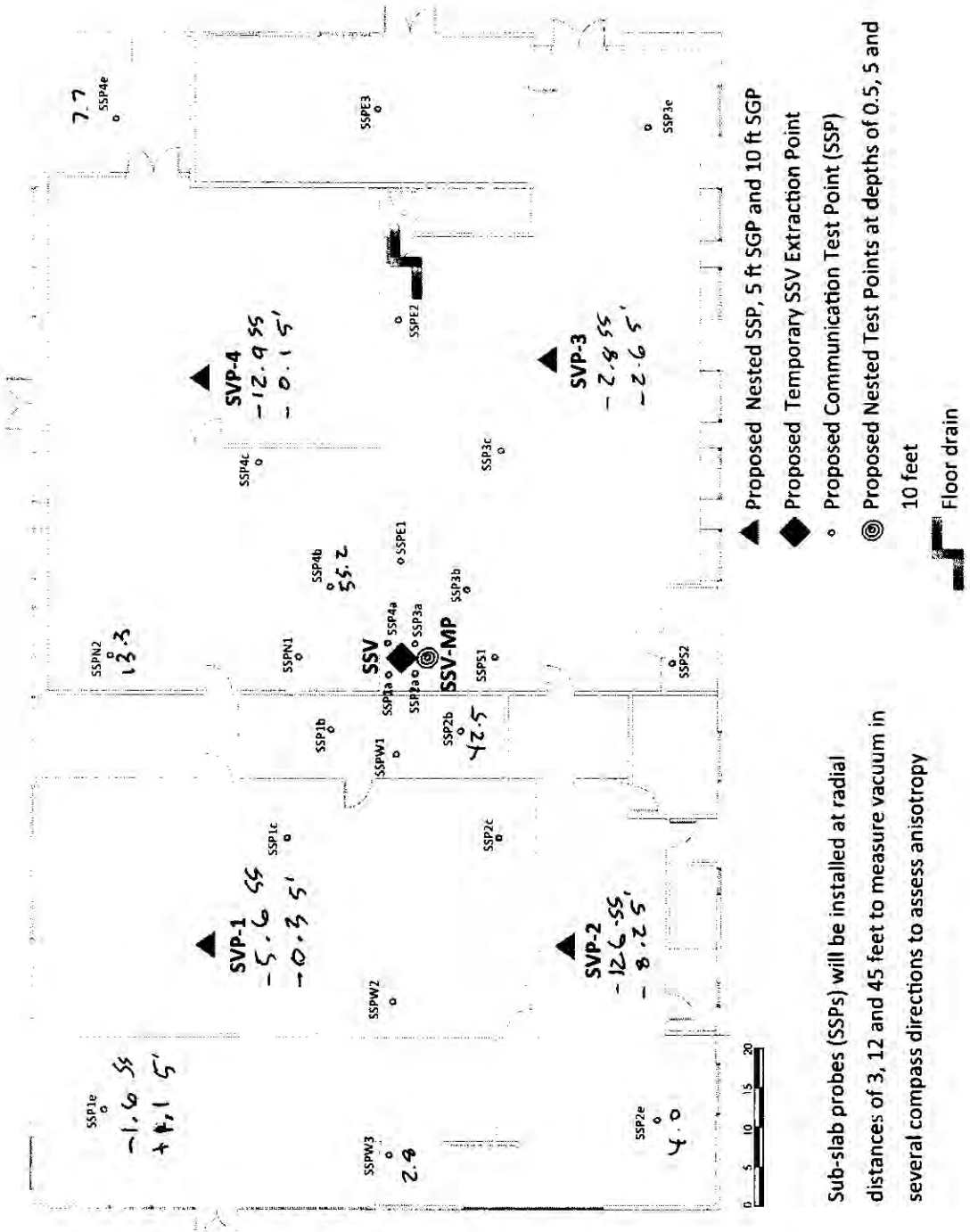



Figure 8. Planned locations for testing instrumentation in Building 11193

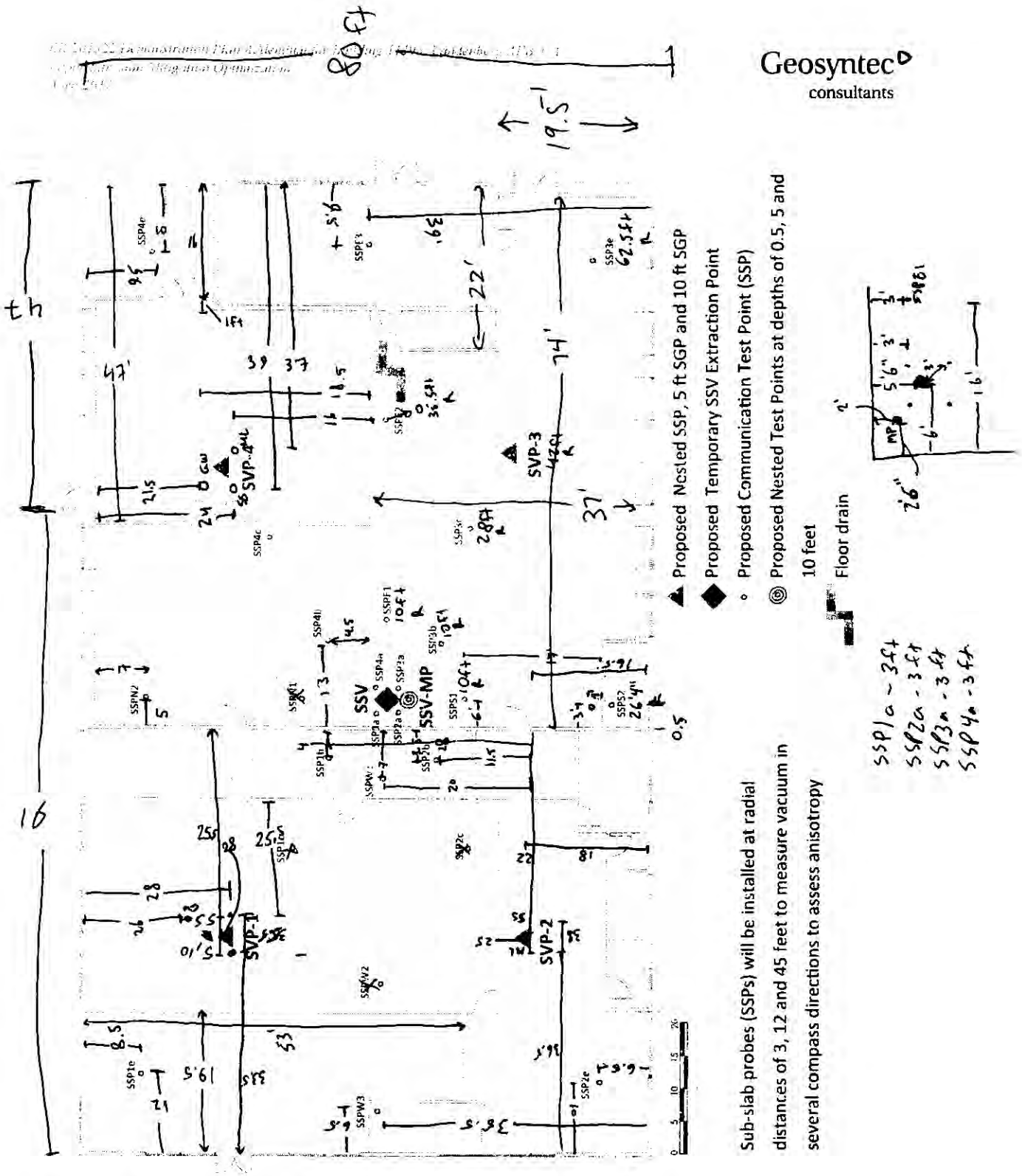



Figure 8. Planned locations for testing instrumentation in Building 11193

STATIC VACUUM ) 450 ft/min (50%)
10" $H_2O$

Cracks

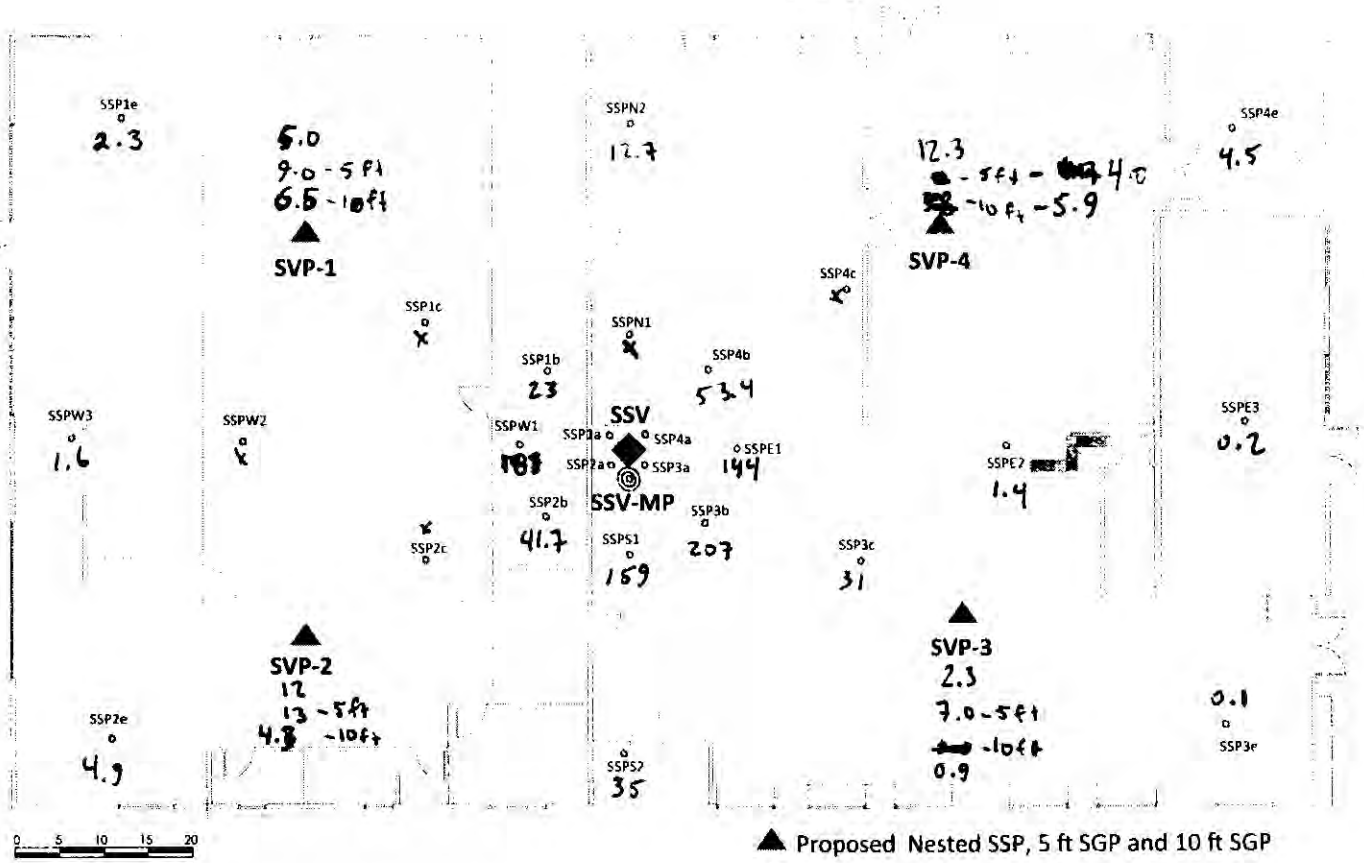



Figure 8. Planned locations for testing instrumentation in Building 11193

▲ Proposed Nested SSP, 5 ft SGP and 10 ft SGP

◆ Proposed Temporary SSV Extraction Point

◦ Proposed Communication Test Point (SSP)

◎ Proposed Nested Test Points at depths of 0.5, 5 and 10 feet

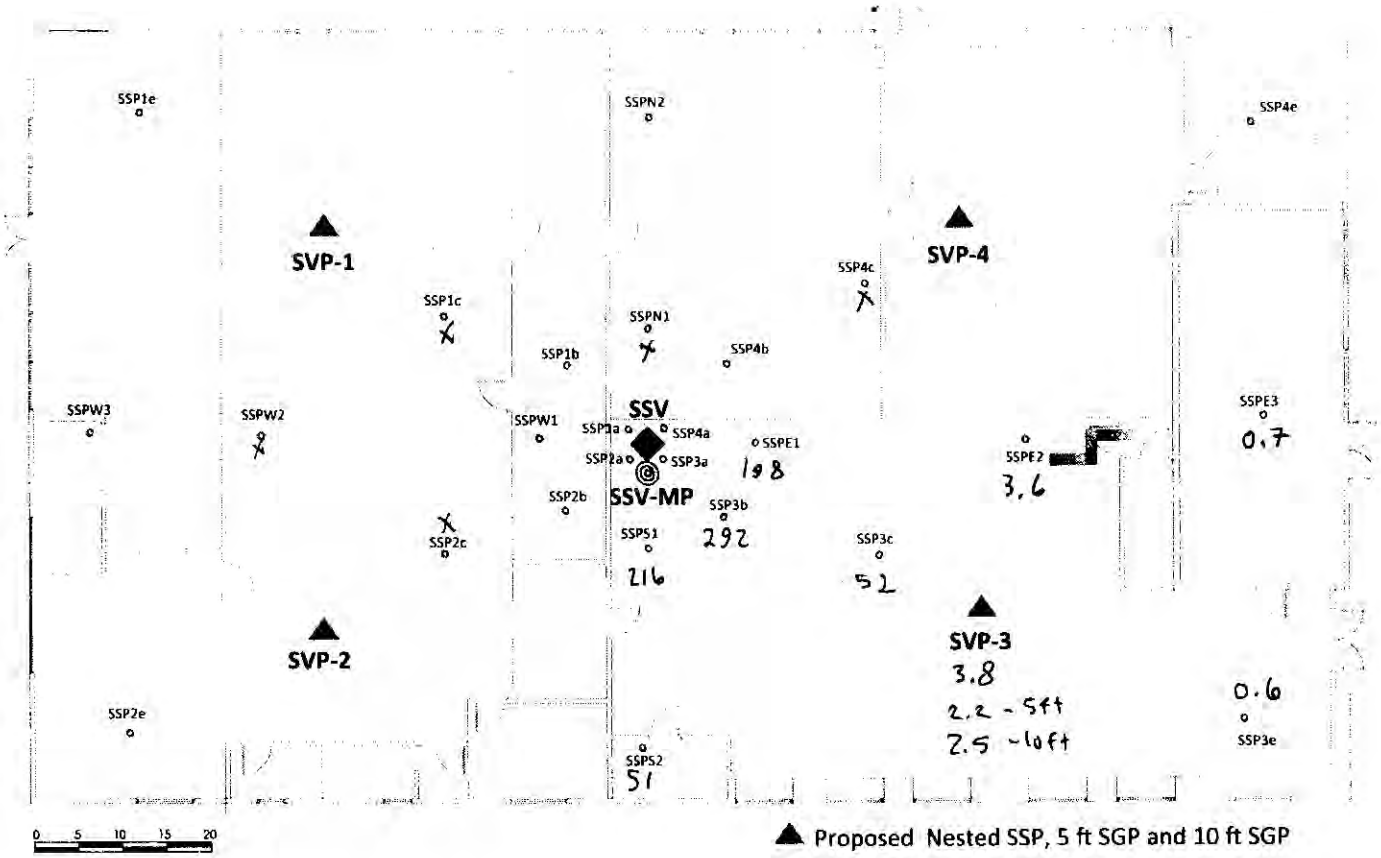
Floor drain

Sub-slab probes (SSPs) will be installed at radial distances of 3, 12 and 45 feet to measure vacuum in several compass directions to assess anisotropy

SSV-MP - 5ft -10.3
- 10ft -11.1

SSP-1A - ~~0.25~~ in Hg → 0.15
SSP-4A - ~~0.24~~ in Hg → 0.19
SSP-2A - 0.15 in Hg
SSP-3A - 0.14

STATIC VACUUMS @ 510ft/min After Crack Sealing
12" $H_2O$




Sub-slab probes (SSPs) will be installed at radial distances of 3, 12 and 45 feet to measure vacuum in several compass directions to assess anisotropy

Figure 8. Planned locations for testing instrumentation in Building 11193

SSV-MP
5ft -8.7
10ft -8.5
SSP1A ~~4.9 mmHg~~ 200Pa + Pa200 = (400 Pa)
SSP2A - 260Pa + 480Pa = (740 Pa)
SSP3A - ~~0.065 Kpa~~ ~~0.013~~ → 530Pa + 230Pa = (760Pa)
(410Pa)



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3 10.3
4 147.8
5 33.9
6 ~~2.8~~ 113.7
7 6.4
8 7.9

Sample location → UW UA

Max Flow Static Vacuum




Sub-slab probes (SSPs) will be installed at radial distances of 3, 12 and 45 feet to measure vacuum in several compass directions to assess anisotropy

▲ Proposed Nested SSP, 5 ft SGP and 10 ft SGP
◆ Proposed Temporary SSV Extraction Point
◦ Proposed Communication Test Point (SSP)
◎ Proposed Nested Test Points at depths of 0.5, 5 and 10 feet
Floor drain

SSP1a - 747.5
SSP2a - 1495
SSP3a - 1625
SSP4a - 1137.5
~~SSP4a - 55~~

MP - 5ft - 30.2
10 ft - 21.8

Figure 8. Planned locations for testing instrumentation in Building 11193



0 → DW OA Sample location

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STATIC VACUUMS Blc ker door/ at -10Pa Building
64 CFM 41" $H_2O$
SSV
Cracks Sealed

06/21/17
11:45




▲ Proposed Nested SSP, 5 ft SGP and 10 ft SGP
◆ Proposed Temporary SSV Extraction Point
◦ Proposed Communication Test Point (SSP)
◎ Proposed Nested Test Points at depths of 0.5, 5 and 10 feet
Floor drain

Sub-slab probes (SSPs) will be installed at radial distances of 3, 12 and 45 feet to measure vacuum in several compass directions to assess anisotropy

Well Head = 2.92 inHg

SSP-1A 0.40 inHg - 0.01 inHg = 0.39 inHg
SSP-2A 0.72 inHg - 0.03 inHg = 0.69 inHg
SSP-3A 0.73 inHg - 0.01 inHg = 0.72 inHg
SSP-4A 0.51 inHg - 0.01 inHg = 0.50 inHg

Figure 8. Planned locations for testing instrumentation in Building 11193

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# APPENDIX D. LABORATORY REPORTS OF ANALYSIS

# Site #1: Building 205

# Former Raritan Arsenal

EMLab P&K
A TestAmerica Company

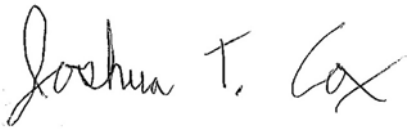
Report for:

**Paul Nicholson**
**Geosyntec Consultants, Inc.**
130 Research Lane Suite 2
Guelph, ON  N1G5A5 Canada

---

Regarding: Project: TR0479; ESTCP
EML ID: 1277255

Approved by:



Operations Manager
Joshua Cox

Dates of Analysis:
Radon in Air: 10-20-2014

Project SOPs: Radon in Air (EM-BC-S-1201)

---

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the items tested.

EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

---

# Radon Test Report

**Geosyntec Consultants, Inc**
**Paul Nicholson**
**130 Research Lane Suite 2**
**Guelph, ON N1G5A5 Canada**

**EMLab ID#:** 1277255
**Project ID:** TR0479
**Date Received:** October 15, 2014
**Date Analyzed:** October 15, 2014
**Certification #:** NRPP#102969AL
NRPP#103751RT

**Methods**: Rad Elec E-PERM Electret Ion Chamber System samples were analyzed via a SPER-1 Electret Reader, Serial Number SIN00702. Short-term radon tests are intended to give you an indication of the radon levels during the measurement period in the areas tested. The results of the radon measurements that you performed are as follows:

**Deployment Information**

Start Test: 9/1/2014 10:40 AM
Finish Test: 10/14/2014 9:15 AM
*Test State: NJ
Elevation (ft): 88

Project Description: **ESTCP**

**Results**

| Electret Serial # | Sample Location | Device Type | Analysis Date | Analyst | Radon pCi/L | (+/-) pCi/L |
|---|---|---|---|---|---|---|
| SGT335 | IA-205-07 | SST | October 15, 2014 | LMK | 2.0 | 0.1 |
| SGT337 | IA-205-06 | SST | October 15, 2014 | LMK | 1.2 | 0.1 |
| SGT348 | IA-205-02 | SST | October 15, 2014 | LMK | 1.9 | 0.1 |
| SGT397 | IA-205-01 | SST | October 15, 2014 | LMK | 1.7 | 0.1 |
| SGT430 | Dup-02 | SST | October 15, 2014 | LMK | 0.4 | 0.1 |
| SGI690 | OA-205-02 | SST | October 15, 2014 | LMK | 0.3 | 0.1 |
| SGI710 | IA-205-08 | SST | October 15, 2014 | LMK | 2.2 | 0.1 |
| SGI764 | IA-205-09 | SST | October 15, 2014 | LMK | 1.8 | 0.1 |
| SGI896 | Dup-01 | SST | October 15, 2014 | LMK | 1.2 | 0.1 |
| SGI903 | IA-205-05 | SST | October 15, 2014 | LMK | 1.1 | 0.1 |
| SGQ579 | HVAC-02 | SST | October 15, 2014 | LMK | 0.8 | 0.1 |
| SGQ636 | HVAC-03 | SST | October 15, 2014 | LMK | 0.9 | 0.1 |

EMLab P&K
A TestAmerica Company

# Radon Test Report

**Geosyntec Consultants, Inc**
**Paul Nicholson**
**130 Research Lane Suite 2**
**Guelph, ON N1G5A5 Canada**

**EMLab ID#:** 1277255
**Project ID:** TR0479
**Date Received:** October 15, 2014
**Date Analyzed:** October 15, 2014
**Certification #:** NRPP#102969AL
NRPP#103751RT

**Methods**: Rad Elec E-PERM Electret Ion Chamber System samples were analyzed via a SPER-1 Electret Reader, Serial Number SIN00702. Short-term radon tests are intended to give you an indication of the radon levels during the measurement period in the areas tested. The results of the radon measurements that you performed are as follows:

**Deployment Information**

Start Test: 9/1/2014 10:40 AM
Finish Test: 10/14/2014 9:15 AM
*Test State: NJ
Elevation (ft): 88

Project Description: **ESTCP**

**Results**

| Electret Serial # | Sample Location | Device Type | Analysis Date | Analyst | Radon pCi/L | (+/-) pCi/L |
|---|---|---|---|---|---|---|
| SGQ641 | HVAC-01 | SST | October 15, 2014 | LMK | 1.0 | 0.1 |
| **SFN832 | OA-205-01 | SST | October 15, 2014 | LMK | 4.4 | 0.2 |
| SGY857 | IA-205-03 | SST | October 15, 2014 | LMK | 2.0 | 0.1 |
| SGY543 | IA-205-04 | SST | October 15, 2014 | LMK | 1.2 | 0.1 |

*EMLab P&K radon certifications do not extend to the State of New Jersey.

**Electret depleted. Unable to reconcile radon levels for that location. Recommend retest if needed.

Authorized Signature/Date:_____

**Certified Radon Analyst**

EMLab P&K
A TestAmerica Company

**What Do My Test Results Mean?**

The concentration of radon is measured in picocuries per liter of air (pCi/L). If your average radon level is less than 4.0 pCi/L, no action is necessary. However, radon levels less than 4.0 pCi/L can still pose some health risk, and in many cases can be reduced. The national average indoor radon level is about 1.3 pCi/L while the average outdoor radon concentration is about 0.4 pCi/L. The higher the radon concentration in the test area, the greater the health risks are to those in the immediate area.

**What Do I Do If My Test Results Are Greater than 4.0 pCi/L?**

If the test results are 4.0 pCi/L or greater, the EPA recommends that you mitigate to reduce the radon concentrations to an acceptable level. There are simple ways to fix a radon problem that aren't too costly, and even very high concentrations can be reduced to acceptable levels.

**What Is the Health Risk Associated with Radon Gas?**

Radon is a radioactive gas that comes from the natural breakdown of uranium in the soil. Radon is estimated to cause many thousands of deaths each year from lung cancer, and in fact, it is the second leading cause of lung cancer after smoking. If you smoke, and the test area has high radon levels, your risk of lung cancer is especially high.

**Where Can I Get Additional Information on Radon?**

For more information, please refer to http://www.epa.gov/radon/index.html

**Data Qualifiers**

The *Data Qualifiers* identify issues or events that are relevant to your analytical results. A data qualifier includes information about the validity, the source of the data whether calculated, entered or estimated, and the value of an observation. In each case the data qualifiers provide significant information vital to the interpretation of the laboratory data.

eurofins | Air Toxics

10/19/2015
Mr. Paul Nicholson
GeoSyntec Consultants
130 Research Lane
Suite 2
Guelph, Ontario  N1G5G3

Project Name: ESTCP
Project #: TR0479
Workorder #: 1510095

Dear Mr. Paul Nicholson

The following report includes the data for the above referenced project for sample(s) received on 10/6/2015 at Air Toxics Ltd.

The data and associated QC analyzed by Passive S.E. WMS are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs.  Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality.  Please feel free the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Ausha Scott

Project Manager

eurofins | Air Toxics

# WORK ORDER #: 1510095

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Research Lane<br>Suite 2<br>Guelph, Ontario N1G5G3 | **BILL TO:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Research Lane<br>Suite 2<br>Guelph, Ontario N1G5G3 |
| **PHONE:** | 519-822-2230 | **P.O. #** | TR0479 |
| **FAX:** | 519-822-3151 | **PROJECT #** | TR0479 ESTCP |
| **DATE RECEIVED:** | 10/06/2015 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 10/19/2015 | | |

| FRACTION # | NAME | TEST |
|---|---|---|
| 01A | HSF-03 | Passive S.E. WMS |
| 02A | Lab Blank | Passive S.E. WMS |
| 03A | LCS | Passive S.E. WMS |
| 03AA | LCSD | Passive S.E. WMS |

CERTIFIED BY: Heidi Mayo DATE: 10/19/15

Technical Director

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

**LABORATORY NARRATIVE**
**Passive SE by Mod EPA TO-17**
**GeoSyntec Consultants**
**Workorder# 1510095**

One WMS-SE sample was received on October 06, 2015. The laboratory analyzed the charcoal sorbent bed of the passive sampler following modified method EPA TO-17. The VOCs were chemically extracted using carbon disulfide and an aliquot of the extract was injected into a GC/MS for identification and quantification of volatile organic compounds (VOCs).

The mass of each target compound adsorbed by the sampler was converted to units of concentration using the sample deployment time and the sampling rate for each VOC. If sampling rates were calculated by the lab or the manufacturer, the concentration result has been flagged as an estimated value. Results are not corrected for desorption efficiency.

The reference method used for this procedure is EPA TO-17, which describes the collection of VOCs in ambient air using sorbents and analysis by GC/MS. Because TO-17 describes active sample collection using a pump and thermal desorption as the preparation step, several modifications are required. Modifications to TO-17 are listed in the table below:

| ***Requirement*** | ***TO-17*** | ***ATL Modifications*** |
|---|---|---|
| Sample Collection | Pump pulls measured air volume through sorbent tube | VOCs in air adsorbed onto sorbent bed passively through diffusion |
| Sample Preparation | Thermal extraction | Solvent extraction |
| Sorbent tube conditioning | Condition newly packed tubes prior to use | Charcoal-based sorbent is a single use media and conditioning is conducted by vendor. |
| Instrumentation | Thermal desorption introduction system | Liquid injection introduction system |
| Internal Standard | Gas-phase internal standard introduced on the tube or focusing trap during analysis | Liquid-phase internal standard introduced on the tube at the time of extraction |
| Media and sample storage | <4 deg C, 30 days | Media shelf life is determined by vendor; sample hold-time is 6 months for the RAD130 and WMS. Sample preservation requirements are storage in a cool, solvent-free refrigerator and optional use of ice during shipping. |
| Internal Standard Recovery | +/-40% of daily CCV area | -50% to +100% of daily CCV area |

**Receiving Notes**

There were no receiving discrepancies.

**Analytical Notes**

To calculate ug/m3 concentrations in the Lab Blank, a sampling duration of 4660 minutes was applied. The assumed temperature used for the uptake rate is listed on the data page. If the field temperatures

were provided, the rate was adjusted in the same manner as the field samples.

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page. Target compound non-detects in the samples that are associated with high bias in QC analyses have not been flagged.

**Definition of Data Qualifying Flags**

Nine qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

C - Estimated concentration due to calculated sampling rate

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# VOC BY PASSIVE SAMPLER - GC/MS

**Client Sample ID: HSF-03**

**Lab ID#: 1510095-01A**

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloroform | 0.050 | 5.6 | 0.072 | 8.1 |
| Trichloroethene | 0.050 | 4.1 | 2.1 | 170 |
| Toluene | 0.050 | 3.5 | 0.051 | 3.5 |

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**Client Sample ID: HSF-03**

**Lab ID#: 1510095-01A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **10101207sim** | **Date of Collection: 10/1/15 4:35:00 PM** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/12/15 12:22 PM** | |
| | | **Date of Extraction: 10/12/15** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 36 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 36 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 31 | Not Detected | Not Detected |
| Acetone | 0.20 | 33 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 6.7 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 13 | Not Detected | Not Detected |
| Hexane | 0.20 | 29 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 6.7 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 7.2 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 5.6 | Not Detected | Not Detected |
| Chloroform | 0.050 | 5.6 | 0.072 | 8.1 |
| Cyclohexane | 0.050 | 5.4 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 7.2 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 6.0 | Not Detected | Not Detected |
| Benzene | 0.20 | 20 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 4.9 | Not Detected | Not Detected |
| Heptane | 0.050 | 5.1 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 4.1 | 2.1 | 170 |
| 4-Methyl-2-pentanone | 0.10 | 8.6 | Not Detected | Not Detected |
| Toluene | 0.050 | 3.5 | 0.051 | 3.5 |
| 1,1,2-Trichloroethane | 0.050 | 4.1 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 2.8 | Not Detected | Not Detected |
| Chlorobenzene | 0.050 | 3.0 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 2.6 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 2.6 | Not Detected | Not Detected |
| o-Xylene | 0.050 | 2.4 | Not Detected | Not Detected |
| Styrene | 0.050 | 2.4 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 2.4 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 1.9 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 1.7 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 1.5 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.050 | 1.5 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 1.4 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.050 | 1.3 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 2.4 | Not Detected | Not Detected |

Temperature = 60F , duration time = 4660 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

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**Client Sample ID: HSF-03**

**Lab ID#: 1510095-01A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **10101207sim** | **Date of Collection: 10/1/15 4:35:00 PM** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/12/15 12:22 PM** |
| | | **Date of Extraction: 10/12/15** |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 105 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1510095-02A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **10101206sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/12/15 11:59 AM** | |
| | | **Date of Extraction: 10/12/15** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 36 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 36 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 31 | Not Detected | Not Detected |
| Acetone | 0.20 | 33 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 6.7 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 13 | Not Detected | Not Detected |
| Hexane | 0.20 | 29 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 6.7 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 7.2 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 5.6 | Not Detected | Not Detected |
| Chloroform | 0.050 | 5.6 | Not Detected | Not Detected |
| Cyclohexane | 0.050 | 5.4 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 7.2 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 6.0 | Not Detected | Not Detected |
| Benzene | 0.20 | 20 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 4.9 | Not Detected | Not Detected |
| Heptane | 0.050 | 5.1 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 4.1 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 0.10 | 8.6 | Not Detected | Not Detected |
| Toluene | 0.050 | 3.5 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 0.050 | 4.1 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 2.8 | Not Detected | Not Detected |
| Chlorobenzene | 0.050 | 3.0 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 2.6 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 2.6 | Not Detected | Not Detected |
| o-Xylene | 0.050 | 2.4 | Not Detected | Not Detected |
| Styrene | 0.050 | 2.4 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 2.4 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 1.9 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 1.7 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 1.5 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.050 | 1.5 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 1.4 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.050 | 1.3 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 2.4 | Not Detected | Not Detected |

Temperature = 60F , duration time = 4660 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

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**Client Sample ID: Lab Blank**

**Lab ID#: 1510095-02A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **10101206sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/12/15 11:59 AM** | |
| | | **Date of Extraction: 10/12/15** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 104 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1510095-03A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **10101203sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/12/15 10:41 AM** | |
| | | **Date of Extraction: 10/12/15** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Chloromethane | 183 Q | 50-140 |
| Vinyl Chloride | 116 | 50-140 |
| 1,1-Dichloroethene | 123 | 70-130 |
| Acetone | 103 | 70-130 |
| Methyl tert-butyl ether | 115 | 70-130 |
| trans-1,2-Dichloroethene | 114 | 70-130 |
| Hexane | 123 | 70-130 |
| 1,1-Dichloroethane | 100 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 92 | 70-130 |
| cis-1,2-Dichloroethene | 99 | 70-130 |
| Chloroform | 118 | 70-130 |
| Cyclohexane | 87 | 70-130 |
| 1,1,1-Trichloroethane | 96 | 70-130 |
| Carbon Tetrachloride | 106 | 70-130 |
| Benzene | 119 | 70-130 |
| 1,2-Dichloroethane | 93 | 70-130 |
| Heptane | 134 Q | 70-130 |
| Trichloroethene | 106 | 70-130 |
| 4-Methyl-2-pentanone | 90 | 70-130 |
| Toluene | 84 | 70-130 |
| 1,1,2-Trichloroethane | 100 | 70-130 |
| Tetrachloroethene | 104 | 70-130 |
| Chlorobenzene | 78 | 70-130 |
| Ethyl Benzene | 87 | 70-130 |
| m,p-Xylene | 102 | 70-130 |
| o-Xylene | 91 | 70-130 |
| Styrene | 71 | 20-100 |
| 1,1,2,2-Tetrachloroethane | 99 | 60-130 |
| Propylbenzene | 118 | 70-130 |
| 1,3,5-Trimethylbenzene | 84 | 70-130 |
| 1,2,4-Trimethylbenzene | 88 | 70-130 |
| 1,3-Dichlorobenzene | 70 | 60-130 |
| 1,4-Dichlorobenzene | 88 | 60-130 |
| 1,2-Dichlorobenzene | 70 | 60-130 |
| Naphthalene | 21 | 5-80 |

Q = Exceeds Quality Control limits.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 104 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1510095-03A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **10101203sim** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/12/15 10:41 AM** |
| | | **Date of Extraction: 10/12/15** |

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**Client Sample ID: LCSD**

**Lab ID#: 1510095-03AA**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **10101204sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/12/15 11:04 AM** | |
| | | **Date of Extraction: 10/12/15** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Chloromethane | 195 Q | 50-140 |
| Vinyl Chloride | 121 | 50-140 |
| 1,1-Dichloroethene | 122 | 70-130 |
| Acetone | 106 | 70-130 |
| Methyl tert-butyl ether | 130 | 70-130 |
| trans-1,2-Dichloroethene | 106 | 70-130 |
| Hexane | 128 | 70-130 |
| 1,1-Dichloroethane | 101 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 93 | 70-130 |
| cis-1,2-Dichloroethene | 98 | 70-130 |
| Chloroform | 109 | 70-130 |
| Cyclohexane | 100 | 70-130 |
| 1,1,1-Trichloroethane | 108 | 70-130 |
| Carbon Tetrachloride | 96 | 70-130 |
| Benzene | 101 | 70-130 |
| 1,2-Dichloroethane | 90 | 70-130 |
| Heptane | 113 | 70-130 |
| Trichloroethene | 106 | 70-130 |
| 4-Methyl-2-pentanone | 90 | 70-130 |
| Toluene | 84 | 70-130 |
| 1,1,2-Trichloroethane | 98 | 70-130 |
| Tetrachloroethene | 102 | 70-130 |
| Chlorobenzene | 80 | 70-130 |
| Ethyl Benzene | 88 | 70-130 |
| m,p-Xylene | 99 | 70-130 |
| o-Xylene | 88 | 70-130 |
| Styrene | 70 | 20-100 |
| 1,1,2,2-Tetrachloroethane | 97 | 60-130 |
| Propylbenzene | 115 | 70-130 |
| 1,3,5-Trimethylbenzene | 82 | 70-130 |
| 1,2,4-Trimethylbenzene | 87 | 70-130 |
| 1,3-Dichlorobenzene | 68 | 60-130 |
| 1,4-Dichlorobenzene | 87 | 60-130 |
| 1,2-Dichlorobenzene | 68 | 60-130 |
| Naphthalene | 21 | 5-80 |

Q = Exceeds Quality Control limits.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 103 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1510095-03AA**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **10101204sim** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/12/15 11:04 AM** |
| | | **Date of Extraction: 10/12/15** |

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11/6/2015
Mr. Paul Nicholson
GeoSyntec Consultants
130 Research Lane
Suite 2
Guelph, Ontario  N1G5G3

Project Name: ESTCP
Project #: TR0479
Workorder #: 1510557

Dear Mr. Paul Nicholson

The following report includes the data for the above referenced project for sample(s) received on 10/29/2015 at Air Toxics Ltd.

The data and associated QC analyzed by Passive S.E. WMS are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs.  Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality.  Please feel free the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott

Project Manager

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# WORK ORDER #: 1510557

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Research Lane<br>Suite 2<br>Guelph, Ontario N1G5G3 | **BILL TO:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Research Lane<br>Suite 2<br>Guelph, Ontario N1G5G3 |
| **PHONE:** | 519-822-2230 | **P.O. #** | TR0479 |
| **FAX:** | 519-822-3151 | **PROJECT #** | TR0479 ESTCP |
| **DATE RECEIVED:** | 10/29/2015 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 11/06/2015 | | |

| FRACTION # | NAME | TEST |
|---|---|---|
| 01A | HSF-03 | Passive S.E. WMS |
| 02A | SF-01 | Passive S.E. WMS |
| 03A | SF-02 | Passive S.E. WMS |
| 04A | SF-03 | Passive S.E. WMS |
| 05A | Lab Blank | Passive S.E. WMS |
| 06A | LCS | Passive S.E. WMS |
| 06AA | LCSD | Passive S.E. WMS |

CERTIFIED BY:  DATE: 11/06/15

Technical Director

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180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

**LABORATORY NARRATIVE**
**Passive SE by Mod EPA TO-17**
**GeoSyntec Consultants**
**Workorder# 1510557**

Four WMS-SE samples were received on October 29, 2015. The laboratory analyzed the charcoal sorbent bed of the passive sampler following modified method EPA TO-17. The VOCs were chemically extracted using carbon disulfide and an aliquot of the extract was injected into a GC/MS for identification and quantification of volatile organic compounds (VOCs).

The mass of each target compound adsorbed by the sampler was converted to units of concentration using the sample deployment time and the sampling rate for each VOC. If sampling rates were calculated by the lab or the manufacturer, the concentration result has been flagged as an estimated value. Results are not corrected for desorption efficiency.

The reference method used for this procedure is EPA TO-17, which describes the collection of VOCs in ambient air using sorbents and analysis by GC/MS. Because TO-17 describes active sample collection using a pump and thermal desorption as the preparation step, several modifications are required. Modifications to TO-17 are listed in the table below:

| ***Requirement*** | ***TO-17*** | ***ATL Modifications*** |
|---|---|---|
| Sample Collection | Pump pulls measured air volume through sorbent tube | VOCs in air adsorbed onto sorbent bed passively through diffusion |
| Sample Preparation | Thermal extraction | Solvent extraction |
| Sorbent tube conditioning | Condition newly packed tubes prior to use | Charcoal-based sorbent is a single use media and conditioning is conducted by vendor. |
| Instrumentation | Thermal desorption introduction system | Liquid injection introduction system |
| Internal Standard | Gas-phase internal standard introduced on the tube or focusing trap during analysis | Liquid-phase internal standard introduced on the tube at the time of extraction |
| Media and sample storage | <4 deg C, 30 days | Media shelf life is determined by vendor; sample hold-time is 6 months for the RAD130 and WMS. Sample preservation requirements are storage in a cool, solvent-free refrigerator and optional use of ice during shipping. |
| Internal Standard Recovery | +/-40% of daily CCV area | -50% to +100% of daily CCV area |

**Receiving Notes**

There were no receiving discrepancies.

**Analytical Notes**

To calculate ug/m3 concentrations in the Lab Blank, a sampling duration of 40499 minutes was applied. The assumed temperature used for the uptake rate is listed on the data page. If the field

temperatures were provided, the rate was adjusted in the same manner as the field samples.

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page.

**Definition of Data Qualifying Flags**

Nine qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

C - Estimated concentration due to calculated sampling rate

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# VOC BY PASSIVE SAMPLER - GC/MS

**Client Sample ID: HSF-03**

**Lab ID#: 1510557-01A**

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloroform | 0.050 | 0.65 | 0.55 | 7.2 |
| Carbon Tetrachloride | 0.050 | 0.68 | 0.052 | 0.71 |
| Trichloroethene | 0.050 | 0.47 | 14 | 130 |
| Toluene | 0.050 | 0.40 | 0.074 | 0.59 |
| Tetrachloroethene | 0.050 | 0.32 | 0.27 | 1.7 |

**Client Sample ID: SF-01**

**Lab ID#: 1510557-02A**

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Toluene | 0.050 | 0.40 | 0.16 | 1.3 |
| m,p-Xylene | 0.050 | 0.30 | 0.12 | 0.75 |
| 1,2,4-Trimethylbenzene | 0.050 | 0.18 | 0.064 | 0.22 |

**Client Sample ID: SF-02**

**Lab ID#: 1510557-03A**

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Toluene | 0.050 | 0.40 | 0.15 | 1.2 |
| m,p-Xylene | 0.050 | 0.30 | 0.10 | 0.61 |
| 1,2,4-Trimethylbenzene | 0.050 | 0.18 | 0.061 | 0.22 |

**Client Sample ID: SF-03**

**Lab ID#: 1510557-04A**

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Toluene | 0.050 | 0.40 | 0.14 | 1.1 |
| m,p-Xylene | 0.050 | 0.30 | 0.080 | 0.48 |

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**Client Sample ID: HSF-03**

**Lab ID#: 1510557-01A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c103010sim** | **Date of Collection: 10/26/15 1:53:00 PM** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 12:28 PM** | |
| | | **Date of Extraction: 10/30/15** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 4.1 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 4.1 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 3.5 | Not Detected | Not Detected |
| Acetone | 0.20 | 3.8 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 0.77 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 1.5 | Not Detected | Not Detected |
| Hexane | 0.20 | 3.3 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 0.77 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 0.82 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 0.65 | Not Detected | Not Detected |
| Chloroform | 0.050 | 0.65 | 0.55 | 7.2 |
| Cyclohexane | 0.050 | 0.62 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 0.82 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 0.68 | 0.052 | 0.71 |
| Benzene | 0.20 | 2.2 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 0.56 | Not Detected | Not Detected |
| Heptane | 0.050 | 0.59 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 0.47 | 14 | 130 |
| 4-Methyl-2-pentanone | 0.10 | 0.99 | Not Detected | Not Detected |
| Toluene | 0.050 | 0.40 | 0.074 | 0.59 |
| 1,1,2-Trichloroethane | 0.050 | 0.47 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 0.32 | 0.27 | 1.7 |
| Chlorobenzene | 0.050 | 0.34 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 0.29 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 0.30 | Not Detected | Not Detected |
| o-Xylene | 0.050 | 0.27 | Not Detected | Not Detected |
| Styrene | 0.050 | 0.27 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 0.27 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 0.22 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 0.20 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 0.18 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.050 | 0.15 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 0.28 | Not Detected | Not Detected |

Temperature = 60.0F , duration time = 40498 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

eurofins | Air Toxics

**Client Sample ID: HSF-03**

**Lab ID#: 1510557-01A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c103010sim** | **Date of Collection: 10/26/15 1:53:00 PM** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 12:28 PM** |
| | | **Date of Extraction: 10/30/15** |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 106 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: SF-01**

**Lab ID#: 1510557-02A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c103011sim** | **Date of Collection: 10/26/15 1:57:00 PM** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 12:52 PM** | |
| | | **Date of Extraction: 10/30/15** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 4.1 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 4.1 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 3.5 | Not Detected | Not Detected |
| Acetone | 0.20 | 3.8 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 0.77 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 1.5 | Not Detected | Not Detected |
| Hexane | 0.20 | 3.3 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 0.77 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 0.82 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 0.65 | Not Detected | Not Detected |
| Chloroform | 0.050 | 0.65 | Not Detected | Not Detected |
| Cyclohexane | 0.050 | 0.62 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 0.82 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 0.68 | Not Detected | Not Detected |
| Benzene | 0.20 | 2.2 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 0.56 | Not Detected | Not Detected |
| Heptane | 0.050 | 0.59 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 0.47 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 0.10 | 0.99 | Not Detected | Not Detected |
| Toluene | 0.050 | 0.40 | 0.16 | 1.3 |
| 1,1,2-Trichloroethane | 0.050 | 0.47 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 0.32 | Not Detected | Not Detected |
| Chlorobenzene | 0.050 | 0.34 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 0.29 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 0.30 | 0.12 | 0.75 |
| o-Xylene | 0.050 | 0.27 | Not Detected | Not Detected |
| Styrene | 0.050 | 0.27 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 0.27 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 0.22 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 0.20 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 0.18 | 0.064 | 0.22 |
| 1,3-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.050 | 0.15 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 0.28 | Not Detected | Not Detected |

Temperature = 60.0F , duration time = 40499 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

eurofins | Air Toxics

**Client Sample ID: SF-01**

**Lab ID#: 1510557-02A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c103011sim** | **Date of Collection: 10/26/15 1:57:00 PM** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 12:52 PM** |
| | | **Date of Extraction: 10/30/15** |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 105 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: SF-02**

**Lab ID#: 1510557-03A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c103012sim** | **Date of Collection: 10/26/15 2:02:00 PM** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 01:16 PM** | |
| | | **Date of Extraction: 10/30/15** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 4.1 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 4.1 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 3.5 | Not Detected | Not Detected |
| Acetone | 0.20 | 3.8 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 0.77 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 1.5 | Not Detected | Not Detected |
| Hexane | 0.20 | 3.3 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 0.77 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 0.82 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 0.65 | Not Detected | Not Detected |
| Chloroform | 0.050 | 0.65 | Not Detected | Not Detected |
| Cyclohexane | 0.050 | 0.62 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 0.82 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 0.68 | Not Detected | Not Detected |
| Benzene | 0.20 | 2.2 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 0.56 | Not Detected | Not Detected |
| Heptane | 0.050 | 0.59 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 0.47 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 0.10 | 0.99 | Not Detected | Not Detected |
| Toluene | 0.050 | 0.40 | 0.15 | 1.2 |
| 1,1,2-Trichloroethane | 0.050 | 0.47 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 0.32 | Not Detected | Not Detected |
| Chlorobenzene | 0.050 | 0.34 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 0.29 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 0.30 | 0.10 | 0.61 |
| o-Xylene | 0.050 | 0.27 | Not Detected | Not Detected |
| Styrene | 0.050 | 0.27 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 0.27 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 0.22 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 0.20 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 0.18 | 0.061 | 0.22 |
| 1,3-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.050 | 0.15 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 0.28 | Not Detected | Not Detected |

Temperature = 60.0F , duration time = 40497 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

eurofins | Air Toxics

**Client Sample ID: SF-02**

**Lab ID#: 1510557-03A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c103012sim** | **Date of Collection: 10/26/15 2:02:00 PM** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 01:16 PM** |
| | | **Date of Extraction: 10/30/15** |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 103 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: SF-03**

**Lab ID#: 1510557-04A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c103013sim** | **Date of Collection: 10/26/15 2:05:00 PM** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 01:40 PM** | |
| | | **Date of Extraction: 10/30/15** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 4.1 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 4.1 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 3.5 | Not Detected | Not Detected |
| Acetone | 0.20 | 3.8 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 0.77 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 1.5 | Not Detected | Not Detected |
| Hexane | 0.20 | 3.3 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 0.77 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 0.82 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 0.65 | Not Detected | Not Detected |
| Chloroform | 0.050 | 0.65 | Not Detected | Not Detected |
| Cyclohexane | 0.050 | 0.62 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 0.82 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 0.68 | Not Detected | Not Detected |
| Benzene | 0.20 | 2.2 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 0.56 | Not Detected | Not Detected |
| Heptane | 0.050 | 0.59 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 0.47 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 0.10 | 0.99 | Not Detected | Not Detected |
| Toluene | 0.050 | 0.40 | 0.14 | 1.1 |
| 1,1,2-Trichloroethane | 0.050 | 0.47 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 0.32 | Not Detected | Not Detected |
| Chlorobenzene | 0.050 | 0.34 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 0.29 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 0.30 | 0.080 | 0.48 |
| o-Xylene | 0.050 | 0.27 | Not Detected | Not Detected |
| Styrene | 0.050 | 0.27 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 0.27 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 0.22 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 0.20 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 0.18 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.050 | 0.15 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 0.28 | Not Detected | Not Detected |

Temperature = 60.0F , duration time = 40494 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

eurofins | Air Toxics

**Client Sample ID: SF-03**

**Lab ID#: 1510557-04A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c103013sim** | **Date of Collection: 10/26/15 2:05:00 PM** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 01:40 PM** |
| | | **Date of Extraction: 10/30/15** |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1510557-05A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c103007sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 11:15 AM** | |
| | | **Date of Extraction: 10/30/15** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 4.1 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 4.1 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 3.5 | Not Detected | Not Detected |
| Acetone | 0.20 | 3.8 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 0.77 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 1.5 | Not Detected | Not Detected |
| Hexane | 0.20 | 3.3 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 0.77 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 0.82 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 0.65 | Not Detected | Not Detected |
| Chloroform | 0.050 | 0.65 | Not Detected | Not Detected |
| Cyclohexane | 0.050 | 0.62 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 0.82 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 0.68 | Not Detected | Not Detected |
| Benzene | 0.20 | 2.2 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 0.56 | Not Detected | Not Detected |
| Heptane | 0.050 | 0.59 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 0.47 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 0.10 | 0.99 | Not Detected | Not Detected |
| Toluene | 0.050 | 0.40 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 0.050 | 0.47 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 0.32 | Not Detected | Not Detected |
| Chlorobenzene | 0.050 | 0.34 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 0.29 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 0.30 | Not Detected | Not Detected |
| o-Xylene | 0.050 | 0.27 | Not Detected | Not Detected |
| Styrene | 0.050 | 0.27 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 0.27 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 0.22 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 0.20 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 0.18 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 0.17 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.050 | 0.15 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 0.28 | Not Detected | Not Detected |

Temperature = 60.0F , duration time = 40499 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1510557-05A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c103007sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 11:15 AM** | |
| | | **Date of Extraction: 10/30/15** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 102 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1510557-06A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c103004sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 09:24 AM** | |
| | | **Date of Extraction: 10/30/15** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Chloromethane | 164 Q | 50-140 |
| Vinyl Chloride | 124 | 50-140 |
| 1,1-Dichloroethene | 102 | 70-130 |
| Acetone | 95 | 70-130 |
| Methyl tert-butyl ether | 94 | 70-130 |
| trans-1,2-Dichloroethene | 87 | 70-130 |
| Hexane | 80 | 70-130 |
| 1,1-Dichloroethane | 96 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 93 | 70-130 |
| cis-1,2-Dichloroethene | 89 | 70-130 |
| Chloroform | 94 | 70-130 |
| Cyclohexane | 97 | 70-130 |
| 1,1,1-Trichloroethane | 91 | 70-130 |
| Carbon Tetrachloride | 94 | 70-130 |
| Benzene | 98 | 70-130 |
| 1,2-Dichloroethane | 95 | 70-130 |
| Heptane | 98 | 70-130 |
| Trichloroethene | 88 | 70-130 |
| 4-Methyl-2-pentanone | 86 | 70-130 |
| Toluene | 81 | 70-130 |
| 1,1,2-Trichloroethane | 87 | 70-130 |
| Tetrachloroethene | 82 | 70-130 |
| Chlorobenzene | 70 | 70-130 |
| Ethyl Benzene | 83 | 70-130 |
| m,p-Xylene | 83 | 70-130 |
| o-Xylene | 82 | 70-130 |
| Styrene | 55 | 20-100 |
| 1,1,2,2-Tetrachloroethane | 71 | 60-130 |
| Propylbenzene | 76 | 70-130 |
| 1,3,5-Trimethylbenzene | 95 | 70-130 |
| 1,2,4-Trimethylbenzene | 83 | 70-130 |
| 1,3-Dichlorobenzene | 65 | 60-130 |
| 1,4-Dichlorobenzene | 62 | 60-130 |
| 1,2-Dichlorobenzene | 57 Q | 60-130 |
| Naphthalene | 21 | 5-80 |

Q = Exceeds Quality Control limits.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 101 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1510557-06A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c103004sim** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 09:24 AM** |
| | | **Date of Extraction: 10/30/15** |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1510557-06AA**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c103005sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 09:48 AM** | |
| | | **Date of Extraction: 10/30/15** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Chloromethane | 154 Q | 50-140 |
| Vinyl Chloride | 127 | 50-140 |
| 1,1-Dichloroethene | 108 | 70-130 |
| Acetone | 99 | 70-130 |
| Methyl tert-butyl ether | 96 | 70-130 |
| trans-1,2-Dichloroethene | 86 | 70-130 |
| Hexane | 93 | 70-130 |
| 1,1-Dichloroethane | 95 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 92 | 70-130 |
| cis-1,2-Dichloroethene | 90 | 70-130 |
| Chloroform | 106 | 70-130 |
| Cyclohexane | 95 | 70-130 |
| 1,1,1-Trichloroethane | 93 | 70-130 |
| Carbon Tetrachloride | 91 | 70-130 |
| Benzene | 98 | 70-130 |
| 1,2-Dichloroethane | 112 | 70-130 |
| Heptane | 110 | 70-130 |
| Trichloroethene | 91 | 70-130 |
| 4-Methyl-2-pentanone | 88 | 70-130 |
| Toluene | 84 | 70-130 |
| 1,1,2-Trichloroethane | 89 | 70-130 |
| Tetrachloroethene | 83 | 70-130 |
| Chlorobenzene | 72 | 70-130 |
| Ethyl Benzene | 86 | 70-130 |
| m,p-Xylene | 85 | 70-130 |
| o-Xylene | 85 | 70-130 |
| Styrene | 56 | 20-100 |
| 1,1,2,2-Tetrachloroethane | 76 | 60-130 |
| Propylbenzene | 81 | 70-130 |
| 1,3,5-Trimethylbenzene | 96 | 70-130 |
| 1,2,4-Trimethylbenzene | 85 | 70-130 |
| 1,3-Dichlorobenzene | 67 | 60-130 |
| 1,4-Dichlorobenzene | 66 | 60-130 |
| 1,2-Dichlorobenzene | 59 Q | 60-130 |
| Naphthalene | 20 | 5-80 |

Q = Exceeds Quality Control limits.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 102 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1510557-06AA**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c103005sim** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 10/30/15 09:48 AM** |
| | | **Date of Extraction: 10/30/15** |

EMLab P&K
A TestAmerica Company

# Radon Test Report

**Geosyntec Consultants, Inc.**
**Paul Nicholson**
**130 Research Lane Suite 2**
**Guelph, ON N1G563 Canada**

**EMLab ID#:** 1432472
**Project ID:** TR0479
**Date Received:** September 30, 2015
**Date Analyzed:** September 30, 2015
**Certification #:** NRPP#102969AL
NRPP#103751RT

**Methods**: Rad Elec E-PERM Electret Ion Chamber System samples were analyzed via a SPER-1 Electret Reader, Serial Number SIN00702. Short-term radon tests are intended to give you an indication of the radon levels during the measurement period in the areas tested. The results of the radon measurements that you performed are as follows:

**Deployment Information**

Start Test: 8/28/2015 6:17 PM
Finish Test: 9/28/2015 10:00 AM
Test State: **NJ** *
Elevation (ft): 88

**Project Description:** ESTCP

**Results**

| Electret Serial # | Sample Location | Device Type | Analysis Date | Analyst | Radon pCi/L | (+/-) pCi/L |
|---|---|---|---|---|---|---|
| SIE430 | OA-01 | SST | September 30, 2015 | TEG | 4.5 | 0.2 |
| SIE383 | SF-02 | SST | September 30, 2015 | TEG | 1.2 | 0.1 |
| SIE349 | DUP-02 | SST | September 30, 2015 | TEG | 0.8 | 0.1 |
| SIE382 | OA-02 | SST | September 30, 2015 | TEG | 6.3 | 0.3 |
| SIE527 | IA-07 | SST | September 30, 2015 | TEG | 3.0 | 0.2 |
| SGY543 | IA-09 | SST | September 30, 2015 | TEG | 3.3 | 0.2 |
| SGT467 | IA-05 | SST | September 30, 2015 | TEG | 1.4 | 0.1 |
| SGT475 | IA-06 | SST | September 30, 2015 | TEG | 1.3 | 0.1 |
| SGT443 | IA-04 | SST | September 30, 2015 | TEG | 1.5 | 0.1 |
| SGT406 | IA-03 | SST | September 30, 2015 | TEG | 2.4 | 0.2 |
| SGT403 | IA-08 | SST | September 30, 2015 | TEG | 3.4 | 0.2 |
| SGI758 | SF-01 | SST | September 30, 2015 | TEG | 1.2 | 0.1 |

EMLab P&K
A TestAmerica Company

# Radon Test Report

**Geosyntec Consultants, Inc.**
**Paul Nicholson**
**130 Research Lane Suite 2**
**Guelph, ON N1G563 Canada**

**EMLab ID#:** 1432472
**Project ID:** TR0479
**Date Received:** September 30, 2015
**Date Analyzed:** September 30, 2015
**Certification #:** NRPP#102969AL
NRPP#103751RT

**Methods**: Rad Elec E-PERM Electret Ion Chamber System samples were analyzed via a SPER-1 Electret Reader, Serial Number SIN00702. Short-term radon tests are intended to give you an indication of the radon levels during the measurement period in the areas tested. The results of the radon measurements that you performed are as follows:

**Deployment Information**

Start Test: 8/28/2015 6:17 PM
Finish Test: 9/28/2015 10:00 AM
Test State: **NJ** *
Elevation (ft): 88

**Project Description:** ESTCP

**Results**

| Electret Serial # | Sample Location | Device Type | Analysis Date | Analyst | Radon pCi/L | (+/-) pCi/L |
|---|---|---|---|---|---|---|
| SGI751 | SF-03 | SST | September 30, 2015 | TEG | 1.4 | 0.1 |
| SGI688 | DUP-03 | SST | September 30, 2015 | TEG | 1.3 | 0.1 |
| SFO781 | IA-01 | SST | September 30, 2015 | TEG | 0.9 | 0.1 |
| SFO748 | IA-02 | SST | September 30, 2015 | TEG | 1.6 | 0.1 |
| SFN855 | DUP-01 | SST | September 30, 2015 | TEG | 1.4 | 0.1 |

***EMLab P&K radon certifications do not extend to the State of New Jersey**

Authorized Signature/Date:_____

**Certified Radon Analyst**

EMLab P&K
A TestAmerica Company

**What Do My Test Results Mean?**

The concentration of radon is measured in picocuries per liter of air (pCi/L). If your average radon level is less than 4.0 pCi/L, no action is necessary. However, radon levels less than 4.0 pCi/L can still pose some health risk, and in many cases can be reduced. The national average indoor radon level is about 1.3 pCi/L while the average outdoor radon concentration is about 0.4 pCi/L. The higher the radon concentration in the test area, the greater the health risks are to those in the immediate area.

**What Do I Do If My Test Results Are Greater than 4.0 pCi/L?**

If the test results are 4.0 pCi/L or greater, the EPA recommends that you mitigate to reduce the radon concentrations to an acceptable level. There are simple ways to fix a radon problem that aren't too costly, and even very high concentrations can be reduced to acceptable levels.

**What Is the Health Risk Associated with Radon Gas?**

Radon is a radioactive gas that comes from the natural breakdown of uranium in the soil. Radon is estimated to cause many thousands of deaths each year from lung cancer, and in fact, it is the second leading cause of lung cancer after smoking. If you smoke, and the test area has high radon levels, your risk of lung cancer is especially high.

**Where Can I Get Additional Information on Radon?**

For more information, please refer to http://www.epa.gov/radon/index.html

**Data Qualifiers**

The *Data Qualifiers* identify issues or events that are relevant to your analytical results. A data qualifier includes information about the validity, the source of the data whether calculated, entered or estimated, and the value of an observation. In each case the data qualifiers provide significant information vital to the interpretation of the laboratory data.

# Radon Analysis (EPA Method GS: Grab Sample/Scintillation Cell counting)

**For Geosyntec** **Client Project Number: Tr0479 ESTCP**

**Project Name:** Sample Dates: 8/16/15

Samples Collected by: Darius Mali Sample containers: Tedlar bags

Site: Edison, NJ Assumed Site Pressure **1.00** atm

Analysts: Doug Hammond based on an elevation of 39 ft

Phone: 310-490-7896 Time Zone adjustment: add to decay time

email: dhammond@usc.edu **3** hours Collect (EDT)

Run (PDT)

| | **Summary** | Collection | | Analysis | | | | Lab Duplicates | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Date | time | Date | time | Vol run | Conc. | ±1 sig | mean | ±1sdom | Notes |
| | | | (EDT) | | (PDT) | (cc) | pCi/L | pCi/L | pCi/L | pCi/L | |
| Received 8/22/15 | | | | | | | | | | | |
| 1 | Yellow East Side B205 | 8/16/15 | 13:05 | 8/22/15 | 18:53 | 120 | 2.28 | 0.14 | | | |
| 2 | Purple B205 | 8/16/15 | 12:30 | 8/22/15 | 18:45 | 120 | 0.87 | 0.10 | | | |
| 3 | Green East Side B205 | 8/16/15 | 12:46 | 8/22/15 | 18:49 | 120 | 1.11 | 0.11 | | | |
| 4 | UP01 B200 | 8/16/15 | 14:06 | 8/24/15 | 7:42 | 40 | 108 | 5 | 124 | 8 | |
| | Lab Dupe | 8/16/15 | 8:05 | 8/24/15 | 7:43 | 40 | 128 | 6 | | | |
| | Lab Dupe | 8/16/15 | 8:05 | 8/25/15 | 7:48 | 40 | 135 | 7 | | | |

Uncertainty given in pCi/liter is based on counting statistics for low activity samples. For high activity samples uncertainty is ±5%.

The Lower Limit of Detection for Rn (95% confidence level as recommended by EPA 402-R-95-012, Oct. 97) is 0.14 pCi/liter.

Results are reported based on standardization with NIST-traceable radon sources.

These results are for application of naturally-occurring radon as a tracer of soil vapor intrusion, but are not intended for evaluation of radon hazards.

Results corrected to in situ pressure as noted above

## Raw Data, Calculation factors, and Analytical Details

| | | Collection | | Analysis | | | | | | | | | | | | count | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Sample ID** | Date | Time | Date | Time | Count in | He | Air/He | Vol run | Press | obs | sig | Decay T | Decay | Concentration | | stats |
| | | | (EDT) | | (PDT) | cell/ch | eff | eff | (cc) | factor | dpm | dpm | (hours) | factor | dpm/liter | pCi/liter | pCi/liter ±1 sig | Notes |
| Received 8/22/15 | | | | | | | | | | | | | | | | | | |
| 1 | Yellow East Side B205 | 8/16/15 | 13:05 | 8/22/15 | 18:53 | 83/33 | 0.806 | 0.97 | 120 | 1.00 | 0.15 | 0.01 | 152.8 | 3.172 | 5.07 | 2.28 | 0.14 | |
| 2 | Purple B205 | 8/16/15 | 12:30 | 8/22/15 | 18:45 | 82/32 | 0.733 | 0.97 | 120 | 1.00 | 0.05 | 0.01 | 153.3 | 3.183 | 1.94 | 0.87 | 0.10 | |
| 3 | Green East Side B205 | 8/16/15 | 12:46 | 8/22/15 | 18:49 | 81/31 | 0.818 | 0.97 | 120 | 1.00 | 0.07 | 0.01 | 153.1 | 3.178 | 2.47 | 1.11 | 0.11 | |
| 4 | UP01 B200 | 8/16/15 | 14:06 | 8/24/15 | 7:42 | 74/34 | 0.885 | 0.99 | 40 | 1.00 | 2.03 | 0.07 | 188.6 | 4.157 | 241 | 108 | 4 | |
| | Lab Dupe | 8/16/15 | 8:05 | 8/24/15 | 7:43 | Z17/11 | 0.798 | 0.99 | 40 | 1.00 | 2.07 | 0.07 | 194.6 | 4.351 | 285 | 128 | 4 | |
| | Lab Dupe | 8/16/15 | 8:05 | 8/25/15 | 7:48 | Z17/11 | 0.819 | 0.99 | 40 | 1.00 | 1.86 | 0.06 | 218.7 | 5.219 | 299 | 135 | 4 | |

Decay correctiions based on Rn decay constant of 0.1813 per day Radon Conc = {(0.4504)(1000)(obs dpm)(decay factor)(Press factor)}/{(cc used)(He eff)(Air/He)}

Conversion from dpm based on 0.4504 pCi/dpm (in pCi/liter)

Blanks are negligible.

**Definitions:**

| | | | |
|---|---|---|---|
| Cell/ch: | Counting cell and channel used | sig dpm | uncertainty (± 1 sig) in dpm based on counting statistics |
| He eff: | Cell and counter efficiency using helium matrix | Decay T: | time elapsed from sampling to analysis |
| Air/He: | Correction for matrix counting gas density | Decay factor: | Correction factor for decay from collection to analysis |
| Sample vol: | Volume analyzed (cc) | dpm/liter: | Radon concentration in disintigrations per minute per liter of sample |
| Press factor: | Correction to in situ pressure based on collection altitude | piC/liter: | Radon concentration in picoCuries per liter |
| obs dpm: | observed radon activity (disintigrations per minute) when analyzed | count stats: | uncertainty in observed radon based on counting statistics |

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

# ANALYTICAL REPORT

Job Number: 200-23612-1

SDG Number: 200-23612

Job Description: ESTCP

For:
Geosyntec Consultants, Inc.
130 Research Lane
Suite 2
Guelph, Ontario N1G5G3

Attention: Mr. Paul Nicholson



Approved for release.
Don C Dawicki
Manager of Project Management
8/14/2014 1:58 PM

Don C Dawicki, Manager of Project Management
30 Community Drive, South Burlington, VT, 05403
(802)660-1990
don.dawicki@testamericainc.com
08/14/2014

The test results in this report relate only to sample(s) as received by the laboratory. These test results were derived under a quality system that adheres to the requirements of NELAC. Pursuant to NELAC, this report may not be produced in full without written approval from the laboratory

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## CASE NARRATIVE

## Client: Geosyntec Consultants, Inc.

## Project: ESTCP

## Report Number: 200-23612-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

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

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

**RECEIPT**

The samples were received on 08/12/2014; the samples arrived in good condition.

The container label for the following sample(s) did not match the information listed on the Chain-of-Custody (COC): 205-VP3a (200-23612-2), 205-VP3a-DUP (200-23612-3), 205-VP3b (200-23612-1), 205-VP3c (200-23612-4), 205-VP3c-DUP (200-23612-5). The container labels do not list a sample time. Logged in per sample end time on COC.

Insufficient sample volume was provided for the following sample for the EPA 3C analysis: 205-VP3c-DUP (200-23612-5). The tedlar was received with no volume remaining due to a rupture in the bag.

**FIXED GASES**

Samples 205-VP3b, 205-VP3a, 205-VP3a-DUP, 205-VP3c, CALGAS1000 and CALGAS2000 were analyzed for Fixed Gases in accordance with EPA Method 3C. The samples were analyzed on 08/12/2014.

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

AIR - GC VOA MANUAL INTEGRATION SUMMARY

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Instrument ID: CH0001.i Analysis Batch Number: 72381

Lab Sample ID: IC 200-72381/4 Client Sample ID:

Date Analyzed: 05/19/14 14:07 Lab File ID: 3cic1051914B.d-avg GC Column: CTR-1 ID: 3.175(mm)

| COMPOUND NAME | RETENTION TIME | MANUAL INTEGRATION | | |
|---|---|---|---|---|
| | | REASON | ANALYST | DATE |
| Oxygen | 3.81 | Baseline Event | lyonsb | 05/20/14 10:49 |
| Methane | 6.58 | Baseline Event | lyonsb | 05/19/14 15:04 |

Lab Sample ID: IC 200-72381/5 Client Sample ID:

Date Analyzed: 05/19/14 14:39 Lab File ID: 3cic2051914A.d-avg GC Column: CTR-1 ID: 3.175(mm)

| COMPOUND NAME | RETENTION TIME | MANUAL INTEGRATION | | |
|---|---|---|---|---|
| | | REASON | ANALYST | DATE |
| Methane | 6.52 | Baseline Event | lyonsb | 05/20/14 11:19 |
| Carbon monoxide | 7.04 | Baseline Event | lyonsb | 05/20/14 11:19 |

Lab Sample ID: IC 200-72381/9 Client Sample ID:

Date Analyzed: 05/19/14 18:37 Lab File ID: 3cic10051914A.d-avg GC Column: CTR-1 ID: 3.175(mm)

| COMPOUND NAME | RETENTION TIME | MANUAL INTEGRATION | | |
|---|---|---|---|---|
| | | REASON | ANALYST | DATE |
| Carbon monoxide | 7.02 | Baseline Event | lyonsb | 05/20/14 10:19 |

## SAMPLE SUMMARY

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

| Lab Sample ID | Client Sample ID | Client Matrix | Date/Time Sampled | Date/Time Received |
|---|---|---|---|---|
| 200-23612-1 | 205-VP3b | Air | 08/10/2014 0905 | 08/12/2014 1034 |
| 200-23612-2 | 205-VP3a | Air | 08/10/2014 0910 | 08/12/2014 1034 |
| 200-23612-2DU | 205-VP3a | Air | 08/10/2014 0910 | 08/12/2014 1034 |
| 200-23612-3 | 205-VP3a-DUP | Air | 08/10/2014 0915 | 08/12/2014 1034 |
| 200-23612-4 | 205-VP3c | Air | 08/10/2014 0920 | 08/12/2014 1034 |
| 200-23612-6 | CALGAS1000 | Air | 08/10/2014 0930 | 08/12/2014 1034 |
| 200-23612-7 | CALGAS2000 | Air | 08/10/2014 0935 | 08/12/2014 1034 |

## EXECUTIVE SUMMARY - Detections

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

| Lab Sample ID / Analyte | Client Sample ID | Result | Qualifier | Reporting Limit | Units | Method |
|---|---|---|---|---|---|---|
| **200-23612-1** | **205-VP3B** | | | | | |
| Carbon dioxide | | 0.51 | | 0.050 | % v/v | EPA 3C |
| Nitrogen | | 75 | | 0.50 | % v/v | EPA 3C |
| Oxygen | | 21 | | 0.050 | % v/v | EPA 3C |
| **200-23612-2** | **205-VP3A** | | | | | |
| Carbon dioxide | | 0.47 | | 0.050 | % v/v | EPA 3C |
| Nitrogen | | 75 | | 0.50 | % v/v | EPA 3C |
| Oxygen | | 21 | | 0.050 | % v/v | EPA 3C |
| **200-23612-3** | **205-VP3A-DUP** | | | | | |
| Carbon dioxide | | 0.61 | | 0.050 | % v/v | EPA 3C |
| Nitrogen | | 75 | | 0.50 | % v/v | EPA 3C |
| Oxygen | | 21 | | 0.050 | % v/v | EPA 3C |
| **200-23612-4** | **205-VP3C** | | | | | |
| Carbon dioxide | | 0.22 | | 0.050 | % v/v | EPA 3C |
| Nitrogen | | 75 | | 0.50 | % v/v | EPA 3C |
| Oxygen | | 21 | | 0.050 | % v/v | EPA 3C |
| **200-23612-6** | **CALGAS1000** | | | | | |
| Carbon dioxide | | 0.12 | | 0.050 | % v/v | EPA 3C |
| Nitrogen | | 95 | | 0.50 | % v/v | EPA 3C |
| Oxygen | | 0.42 | | 0.050 | % v/v | EPA 3C |
| **200-23612-7** | **CALGAS2000** | | | | | |
| Carbon dioxide | | 0.21 | | 0.050 | % v/v | EPA 3C |
| Nitrogen | | 95 | | 0.50 | % v/v | EPA 3C |
| Oxygen | | 0.35 | | 0.050 | % v/v | EPA 3C |

# METHOD SUMMARY

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

| Description | Lab Location | Method | Preparation Method |
|---|---|---|---|
| **Matrix:** Air | | | |
| Fixed Gases from Stationary Sources | TAL BUR | EPA EPA 3C | |
| Collection via Tedlar Bag | | | Tedlar Bag |

**Lab References:**

TAL BUR = TestAmerica Burlington

**Method References:**

EPA = US Environmental Protection Agency

## METHOD / ANALYST SUMMARY

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

| Method | Analyst | Analyst ID |
|---|---|---|
| EPA EPA 3C | Lyons, Benjamin P | BPL |

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

**Client Sample ID:** **205-VP3b**

Lab Sample ID: 200-23612-1
Client Matrix: Air

Date Sampled: 08/10/2014 0905
Date Received: 08/12/2014 1034

**EPA 3C Fixed Gases from Stationary Sources**

| | | | | | |
|---|---|---|---|---|---|
| Analysis Method: | EPA 3C | Analysis Batch: | 200-75942 | Instrument ID: | CH0001.i |
| | N/A | Prep Batch: | N/A | Lab File ID: | 200-23612-a-1a.d-avg |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Analysis Date: | 08/12/2014 1531 | | | Final Weight/Volume: | 2 mL |
| Prep Date: | N/A | | | Injection Volume: | 2 mL |

| Analyte | Result (% v/v) | Qualifier | RL | RL |
|---|---|---|---|---|
| Carbon dioxide | 0.51 | | 0.050 | 0.050 |
| Methane | 0.040 | U | 0.040 | 0.040 |
| Nitrogen | 75 | | 0.50 | 0.50 |
| Oxygen | 21 | | 0.050 | 0.050 |
| Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

**Client Sample ID:** **205-VP3a**

Lab Sample ID: 200-23612-2
Client Matrix: Air

Date Sampled: 08/10/2014 0910
Date Received: 08/12/2014 1034

**EPA 3C Fixed Gases from Stationary Sources**

| | | | | | |
|---|---|---|---|---|---|
| Analysis Method: | EPA 3C | Analysis Batch: | 200-75942 | Instrument ID: | CH0001.i |
| | N/A | Prep Batch: | N/A | Lab File ID: | 200-23612-a-2001.d-avg |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Analysis Date: | 08/12/2014 1702 | | | Final Weight/Volume: | 2 mL |
| Prep Date: | N/A | | | Injection Volume: | 2 mL |

| Analyte | Result (% v/v) | Qualifier | RL | RL |
|---|---|---|---|---|
| Carbon dioxide | 0.47 | | 0.050 | 0.050 |
| Methane | 0.040 | U | 0.040 | 0.040 |
| Nitrogen | 75 | | 0.50 | 0.50 |
| Oxygen | 21 | | 0.050 | 0.050 |
| Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

**Client Sample ID:** **205-VP3a-DUP**

Lab Sample ID: 200-23612-3
Client Matrix: Air

Date Sampled: 08/10/2014 0915
Date Received: 08/12/2014 1034

**EPA 3C Fixed Gases from Stationary Sources**

| | | | | | |
|---|---|---|---|---|---|
| Analysis Method: | EPA 3C | Analysis Batch: | 200-75942 | Instrument ID: | CH0001.i |
| | N/A | Prep Batch: | N/A | Lab File ID: | 200-23612-a-3001.d-avg |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Analysis Date: | 08/12/2014 1838 | | | Final Weight/Volume: | 2 mL |
| Prep Date: | N/A | | | Injection Volume: | 2 mL |

| Analyte | Result (% v/v) | Qualifier | RL | RL |
|---|---|---|---|---|
| Carbon dioxide | 0.61 | | 0.050 | 0.050 |
| Methane | 0.040 | U | 0.040 | 0.040 |
| Nitrogen | 75 | | 0.50 | 0.50 |
| Oxygen | 21 | | 0.050 | 0.050 |
| Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

**Client Sample ID:** **205-VP3c**

Lab Sample ID: 200-23612-4
Client Matrix: Air

Date Sampled: 08/10/2014 0920
Date Received: 08/12/2014 1034

**EPA 3C Fixed Gases from Stationary Sources**

| | | | | | |
|---|---|---|---|---|---|
| Analysis Method: | EPA 3C | Analysis Batch: | 200-75942 | Instrument ID: | CH0001.i |
| | N/A | Prep Batch: | N/A | Lab File ID: | 200-23612-a-4001.d-avg |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Analysis Date: | 08/12/2014 1925 | | | Final Weight/Volume: | 2 mL |
| Prep Date: | N/A | | | Injection Volume: | 2 mL |

| Analyte | Result (% v/v) | Qualifier | RL | RL |
|---|---|---|---|---|
| Carbon dioxide | 0.22 | | 0.050 | 0.050 |
| Methane | 0.040 | U | 0.040 | 0.040 |
| Nitrogen | 75 | | 0.50 | 0.50 |
| Oxygen | 21 | | 0.050 | 0.050 |
| Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

**Client Sample ID:** **CALGAS1000**

Lab Sample ID: 200-23612-6
Client Matrix: Air

Date Sampled: 08/10/2014 0930
Date Received: 08/12/2014 1034

**EPA 3C Fixed Gases from Stationary Sources**

| | | | | | |
|---|---|---|---|---|---|
| Analysis Method: | EPA 3C | Analysis Batch: | 200-75942 | Instrument ID: | CH0001.i |
| | N/A | Prep Batch: | N/A | Lab File ID: | 200-23612-a-6001.d-avg |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Analysis Date: | 08/12/2014 2100 | | | Final Weight/Volume: | 2 mL |
| Prep Date: | N/A | | | Injection Volume: | 2 mL |

| Analyte | Result (% v/v) | Qualifier | RL | RL |
|---|---|---|---|---|
| Carbon dioxide | 0.12 | | 0.050 | 0.050 |
| Methane | 0.040 | U | 0.040 | 0.040 |
| Nitrogen | 95 | | 0.50 | 0.50 |
| Oxygen | 0.42 | | 0.050 | 0.050 |
| Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

**Client Sample ID:** **CALGAS2000**

Lab Sample ID: 200-23612-7
Client Matrix: Air

Date Sampled: 08/10/2014 0935
Date Received: 08/12/2014 1034

**EPA 3C Fixed Gases from Stationary Sources**

| | | | | | |
|---|---|---|---|---|---|
| Analysis Method: | EPA 3C | Analysis Batch: | 200-75942 | Instrument ID: | CH0001.i |
| | N/A | Prep Batch: | N/A | Lab File ID: | 200-23612-a-7001.d-avg |
| Dilution: | 1.0 | | | Initial Weight/Volume: | 2 mL |
| Analysis Date: | 08/12/2014 2148 | | | Final Weight/Volume: | 2 mL |
| Prep Date: | N/A | | | Injection Volume: | 2 mL |

| Analyte | Result (% v/v) | Qualifier | RL | RL |
|---|---|---|---|---|
| Carbon dioxide | 0.21 | | 0.050 | 0.050 |
| Methane | 0.040 | U | 0.040 | 0.040 |
| Nitrogen | 95 | | 0.50 | 0.50 |
| Oxygen | 0.35 | | 0.050 | 0.050 |
| Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

**Method Blank - Batch: 200-75942**

**Method: EPA 3C**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | MB 200-75942/3 | Analysis Batch: | 200-75942 | Instrument ID: | CH0001.i |
| Client Matrix: | Air | Prep Batch: | N/A | Lab File ID: | mb081114001.d-avg |
| Dilution: | 1.0 | Leach Batch: | N/A | Initial Weight/Volume: | 2 mL |
| Analysis Date: | 08/12/2014 1457 | Units: | % v/v | Final Weight/Volume: | 2 mL |
| Prep Date: | N/A | | | Injection Volume: | 2 mL |
| Leach Date: | N/A | | | | |

| Analyte | Result | Qual | RL | RL |
|---|---|---|---|---|
| Carbon dioxide | 0.050 | U | 0.050 | 0.050 |
| Methane | 0.040 | U | 0.040 | 0.040 |
| Nitrogen | 0.50 | U | 0.50 | 0.50 |
| Oxygen | 0.050 | U | 0.050 | 0.050 |
| Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

**Lab Control Sample - Batch: 200-75942**

**Method: EPA 3C**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | LCS 200-75942/2 | Analysis Batch: | 200-75942 | Instrument ID: | CH0001.i |
| Client Matrix: | Air | Prep Batch: | N/A | Lab File ID: | 3clcs81114a.d-avg |
| Dilution: | 1.0 | Leach Batch: | N/A | Initial Weight/Volume: | 2 mL |
| Analysis Date: | 08/12/2014 1242 | Units: | % v/v | Final Weight/Volume: | 2 mL |
| Prep Date: | N/A | | | Injection Volume: | 2 mL |
| Leach Date: | N/A | | | | |

| Analyte | Spike Amount | Result | % Rec. | Limit | Qual |
|---|---|---|---|---|---|
| Carbon dioxide | 5.00 | 5.08 | 102 | 70 - 130 | |
| Methane | 4.00 | 3.66 | 91 | 70 - 130 | |
| Nitrogen | 5.00 | 4.81 | 96 | 70 - 130 | |
| Oxygen | 5.00 | 4.73 | 95 | 70 - 130 | |
| Carbon monoxide | 5.00 | 5.41 | 108 | 70 - 130 | |

**Duplicate - Batch: 200-75942**

**Method: EPA 3C**
**Preparation: N/A**

| | | | | | |
|---|---|---|---|---|---|
| Lab Sample ID: | 200-23612-2 | Analysis Batch: | 200-75942 | Instrument ID: | CH0001.i |
| Client Matrix: | Air | Prep Batch: | N/A | Lab File ID: | 200-23612-a-2002.d-avg |
| Dilution: | 1.0 | Leach Batch: | N/A | Initial Weight/Volume: | 2 mL |
| Analysis Date: | 08/12/2014 1718 | Units: | % v/v | Final Weight/Volume: | 2 mL |
| Prep Date: | N/A | | | Injection Volume: | 2 mL |
| Leach Date: | N/A | | | | |

| Analyte | Sample Result/Qual | | Result | RPD | Limit | Qual |
|---|---|---|---|---|---|---|
| Carbon dioxide | 0.47 | | 0.468 | 0.6 | 5 | |
| Methane | 0.040 | U | 0.040 | NC | 5 | U |
| Nitrogen | 75 | | 74.8 | 0.4 | 5 | |
| Oxygen | 21 | | 20.9 | 0.4 | 5 | |
| Carbon monoxide | 1.0 | U | 1.0 | NC | 5 | U |

## DATA REPORTING QUALIFIERS

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

| Lab Section | Qualifier | Description |
|---|---|---|
| Air - GC VOA | | |
| | U | Indicates the analyte was analyzed for but not detected. |

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
Sdg Number: 200-23612

## QC Association Summary

| Lab Sample ID | Client Sample ID | Report Basis | Client Matrix | Method | Prep Batch |
|---|---|---|---|---|---|
| **Air - GC VOA** | | | | | |
| **Analysis Batch:200-75942** | | | | | |
| LCS 200-75942/2 | Lab Control Sample | T | Air | EPA 3C | |
| MB 200-75942/3 | Method Blank | T | Air | EPA 3C | |
| 200-23612-1 | 205-VP3b | T | Air | EPA 3C | |
| 200-23612-2 | 205-VP3a | T | Air | EPA 3C | |
| 200-23612-2DU | Duplicate | T | Air | EPA 3C | |
| 200-23612-3 | 205-VP3a-DUP | T | Air | EPA 3C | |
| 200-23612-4 | 205-VP3c | T | Air | EPA 3C | |
| 200-23612-6 | CALGAS1000 | T | Air | EPA 3C | |
| 200-23612-7 | CALGAS2000 | T | Air | EPA 3C | |

**Report Basis**
T = Total

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
SDG: 200-23612

## Laboratory Chronicle

**Lab ID:** 200-23612-1 **Client ID:** 205-VP3b

Sample Date/Time: 08/10/2014 09:05 Received Date/Time: 08/12/2014 10:34

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|---|---|---|---|---|---|---|---|---|
| A:EPA 3C | 200-23612-A-1 | | 200-75942 | | 08/12/2014 15:31 | 1 | TAL BUR | BPL |

**Lab ID:** 200-23612-2 **Client ID:** 205-VP3a

Sample Date/Time: 08/10/2014 09:10 Received Date/Time: 08/12/2014 10:34

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|---|---|---|---|---|---|---|---|---|
| A:EPA 3C | 200-23612-A-2 | | 200-75942 | | 08/12/2014 17:02 | 1 | TAL BUR | BPL |

**Lab ID:** 200-23612-2 **Client ID:** 205-VP3a

Sample Date/Time: 08/10/2014 09:10 Received Date/Time: 08/12/2014 10:34

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|---|---|---|---|---|---|---|---|---|
| A:EPA 3C | 200-23612-A-2 DU | | 200-75942 | | 08/12/2014 17:18 | 1 | TAL BUR | BPL |

**Lab ID:** 200-23612-3 **Client ID:** 205-VP3a-DUP

Sample Date/Time: 08/10/2014 09:15 Received Date/Time: 08/12/2014 10:34

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|---|---|---|---|---|---|---|---|---|
| A:EPA 3C | 200-23612-A-3 | | 200-75942 | | 08/12/2014 18:38 | 1 | TAL BUR | BPL |

**Lab ID:** 200-23612-4 **Client ID:** 205-VP3c

Sample Date/Time: 08/10/2014 09:20 Received Date/Time: 08/12/2014 10:34

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|---|---|---|---|---|---|---|---|---|
| A:EPA 3C | 200-23612-A-4 | | 200-75942 | | 08/12/2014 19:25 | 1 | TAL BUR | BPL |

**Lab ID:** 200-23612-6 **Client ID:** CALGAS1000

Sample Date/Time: 08/10/2014 09:30 Received Date/Time: 08/12/2014 10:34

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|---|---|---|---|---|---|---|---|---|
| A:EPA 3C | 200-23612-A-6 | | 200-75942 | | 08/12/2014 21:00 | 1 | TAL BUR | BPL |

**Lab ID:** 200-23612-7 **Client ID:** CALGAS2000

Sample Date/Time: 08/10/2014 09:35 Received Date/Time: 08/12/2014 10:34

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|---|---|---|---|---|---|---|---|---|
| A:EPA 3C | 200-23612-A-7 | | 200-75942 | | 08/12/2014 21:48 | 1 | TAL BUR | BPL |

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
SDG: 200-23612

## Laboratory Chronicle

**Lab ID:** **MB** **Client ID:** **N/A**

Sample Date/Time: N/A Received Date/Time: N/A

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|---|---|---|---|---|---|---|---|---|
| A:EPA 3C | MB 200-75942/3 | | 200-75942 | | 08/12/2014 14:57 | 1 | TAL BUR | BPL |

**Lab ID:** **LCS** **Client ID:** **N/A**

Sample Date/Time: N/A Received Date/Time: N/A

| Method | Bottle ID | Run | Analysis Batch | Prep Batch | Date Prepared / Analyzed | Dil | Lab | Analyst |
|---|---|---|---|---|---|---|---|---|
| A:EPA 3C | LCS 200-75942/2 | | 200-75942 | | 08/12/2014 12:42 | 1 | TAL BUR | BPL |

**Lab References:**
TAL BUR = TestAmerica Burlington

# Certification Summary

Client: Geosyntec Consultants, Inc.
Project/Site: ESTCP

TestAmerica Job ID: 200-23612-1
SDG: 200-23612

| Laboratory | Authority | Program | EPA Region | Certification ID |
|---|---|---|---|---|
| TestAmerica Burlington | Connecticut | State Program | 1 | PH-0751 |
| TestAmerica Burlington | DE Haz. Subst. Cleanup Act (HSCA) | State Program | 3 | NA |
| TestAmerica Burlington | Florida | NELAP | 4 | E87467 |
| TestAmerica Burlington | L-A-B | DoD ELAP | | L2336 |
| TestAmerica Burlington | Maine | State Program | 1 | VT00008 |
| TestAmerica Burlington | Minnesota | NELAP | 5 | 050-999-436 |
| TestAmerica Burlington | New Hampshire | NELAP | 1 | 2006 |
| TestAmerica Burlington | New Jersey | NELAP | 2 | VT972 |
| TestAmerica Burlington | New York | NELAP | 2 | 10391 |
| TestAmerica Burlington | Pennsylvania | NELAP | 3 | 68-00489 |
| TestAmerica Burlington | Rhode Island | State Program | 1 | LAO00298 |
| TestAmerica Burlington | US Fish & Wildlife | Federal | | LE-058448-0 |
| TestAmerica Burlington | USDA | Federal | | P330-11-00093 |
| TestAmerica Burlington | Vermont | State Program | 1 | VT-4000 |
| TestAmerica Burlington | Virginia | NELAP | 3 | 460209 |

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

# Method EPA 3C

## Fixed Gases from Stationary Sources by Method EPA - 3C

FORM III
AIR - GC VOA LAB CONTROL SAMPLE RECOVERY

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Matrix: Air Level: Low Lab File ID: 3clcs81114a.d-avg

Lab ID: LCS 200-75942/2 Client ID:

| COMPOUND | SPIKE ADDED (% v/v) | LCS CONCENTRATION (% v/v) | LCS % REC | QC LIMITS REC | # |
|---|---|---|---|---|---|
| Carbon dioxide | 5.00 | 5.08 | 102 | 70-130 | |
| Methane | 4.00 | 3.66 | 91 | 70-130 | |
| Nitrogen | 5.00 | 4.81 | 96 | 70-130 | |
| Oxygen | 5.00 | 4.73 | 95 | 70-130 | |
| Carbon monoxide | 5.00 | 5.41 | 108 | 70-130 | |

# Column to be used to flag recovery and RPD values

FORM III EPA 3C

FORM IV
AIR - GC VOA METHOD BLANK SUMMARY

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Lab File ID: mb081114001.d-avg Lab Sample ID: MB 200-75942/3

Matrix: Air Heated Purge:(Y/N) N

Instrument ID: CH0001.i Date Analyzed: 08/12/2014 14:57

GC Column: CTR-1 ID: 3.175(mm)

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES:

| CLIENT SAMPLE ID | LAB SAMPLE ID | LAB FILE ID | DATE ANALYZED |
|---|---|---|---|
| | LCS 200-75942/2 | 3clcs81114a.d-avg | 08/12/2014 12:42 |
| 205-VP3b | 200-23612-1 | 200-23612-a-1a.d-avg | 08/12/2014 15:31 |
| 205-VP3a | 200-23612-2 | 200-23612-a-2001.d-avg | 08/12/2014 17:02 |
| 205-VP3a DU | 200-23612-2 DU | 200-23612-a-2002.d-avg | 08/12/2014 17:18 |
| 205-VP3a-DUP | 200-23612-3 | 200-23612-a-3001.d-avg | 08/12/2014 18:38 |
| 205-VP3c | 200-23612-4 | 200-23612-a-4001.d-avg | 08/12/2014 19:25 |
| CALGAS1000 | 200-23612-6 | 200-23612-a-6001.d-avg | 08/12/2014 21:00 |
| CALGAS2000 | 200-23612-7 | 200-23612-a-7001.d-avg | 08/12/2014 21:48 |

FORM I
AIR - GC VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Client Sample ID: 205-VP3b Lab Sample ID: 200-23612-1

Matrix: Air Lab File ID: 200-23612-a-1a.d-avg

Analysis Method: EPA 3C Date Collected: 08/10/2014 09:05

Sample wt/vol: 2(mL) Date Analyzed: 08/12/2014 15:31

Soil Aliquot Vol: Dilution Factor: 1

Soil Extract Vol.: GC Column: ID:

% Moisture: Level: (low/med) Low

Analysis Batch No.: 75942 Units: % v/v

| CAS NO. | COMPOUND NAME | RESULT | Q | RL | RL |
|---|---|---|---|---|---|
| 124-38-9 | Carbon dioxide | 0.51 | | 0.050 | 0.050 |
| 74-82-8 | Methane | 0.040 | U | 0.040 | 0.040 |
| 7727-37-9 | Nitrogen | 75 | | 0.50 | 0.50 |
| 7782-44-7 | Oxygen | 21 | | 0.050 | 0.050 |
| 630-08-0 | Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-1a.d
Lims ID: 200-23612-A-1 Lab Sample ID: 200-23612-1
Client ID: 205-VP3b
Sample Type: Client
Inject. Date: 12-Aug-2014 15:31:13 ALS Bottle#: 0 Worklist Smp#: 11
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-1
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

First Level Reviewer: lyonsb Date: 12-Aug-2014 16:51:38

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.727 | 1.722 | 0.005 | 17214 | 0.5152 | |
| 2 Oxygen | 3.812 | 3.824 | -0.012 | 720164 | 20.7 | |
| 3 Nitrogen | 4.670 | 4.719 | -0.049 | 2807230 | 74.8 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-1b.d
Lims ID: 200-23612-A-1 Lab Sample ID: 200-23612-1
Client ID: 205-VP3b
Sample Type: Client
Inject. Date: 12-Aug-2014 15:47:06 ALS Bottle#: 0 Worklist Smp#: 12
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-1
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.717 | 1.722 | -0.005 | 16943 | 0.5071 | |
| 2 Oxygen | 3.784 | 3.824 | -0.040 | 724506 | 20.9 | |
| 3 Nitrogen | 4.627 | 4.719 | -0.092 | 2817575 | 75.1 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-1a-75924-ai_3c
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-1b-75924-ai_3c

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 17214 | 16943 | 17078.5 | 1.59 |
| Oxygen | 720164 | 724506 | 722335 | 0.6 |
| Nitrogen | 2807230 | 2817575 | 2812402.5 | 0.37 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

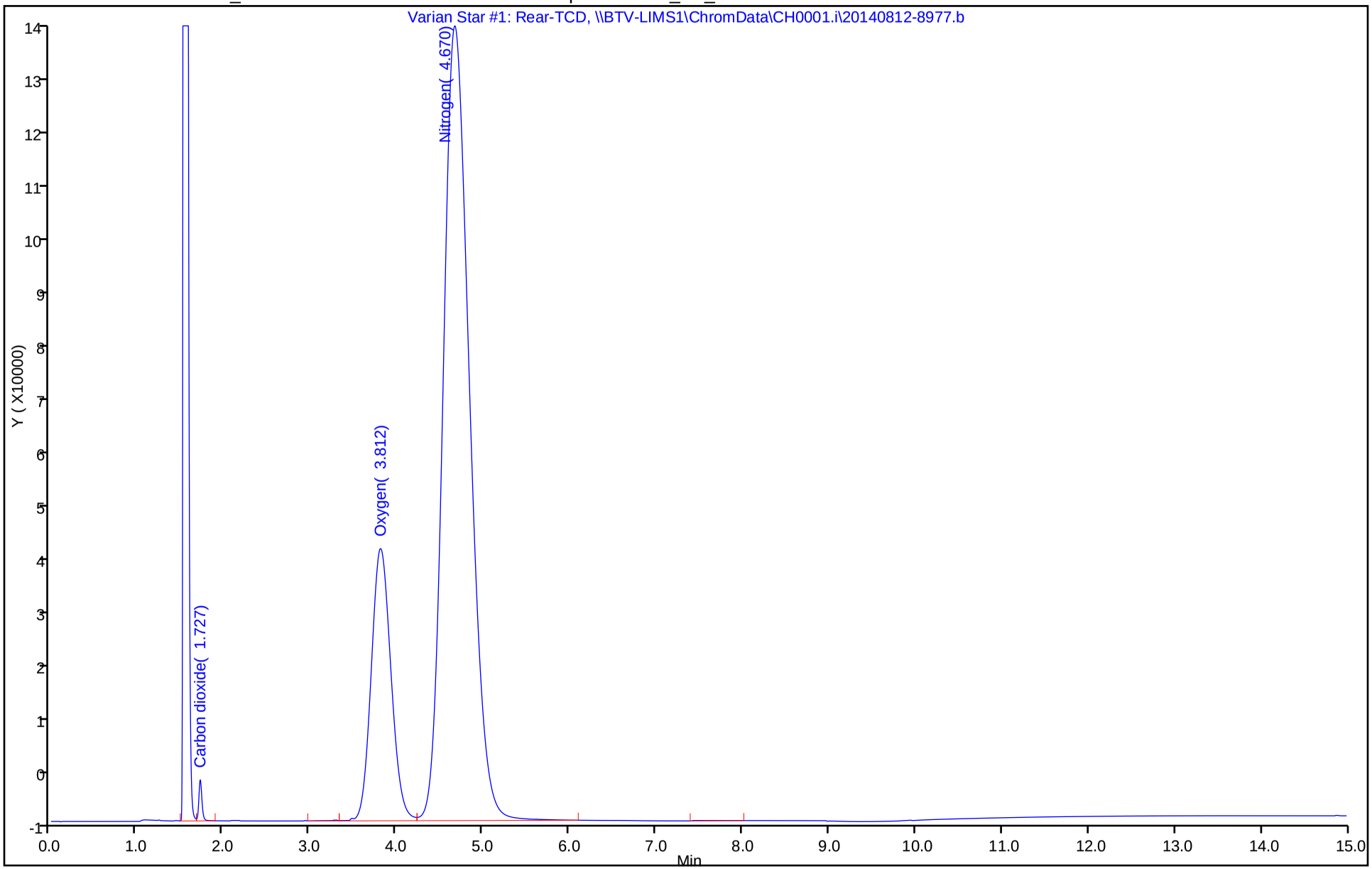
| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0.52 | 0.51 | 0.51 | 1.59 |
| Oxygen | 20.74 | 20.86 | 20.8 | 0.6 |
| Nitrogen | 74.78 | 75.05 | 74.91 | 0.37 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 13-Aug-2014 09:41:11 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

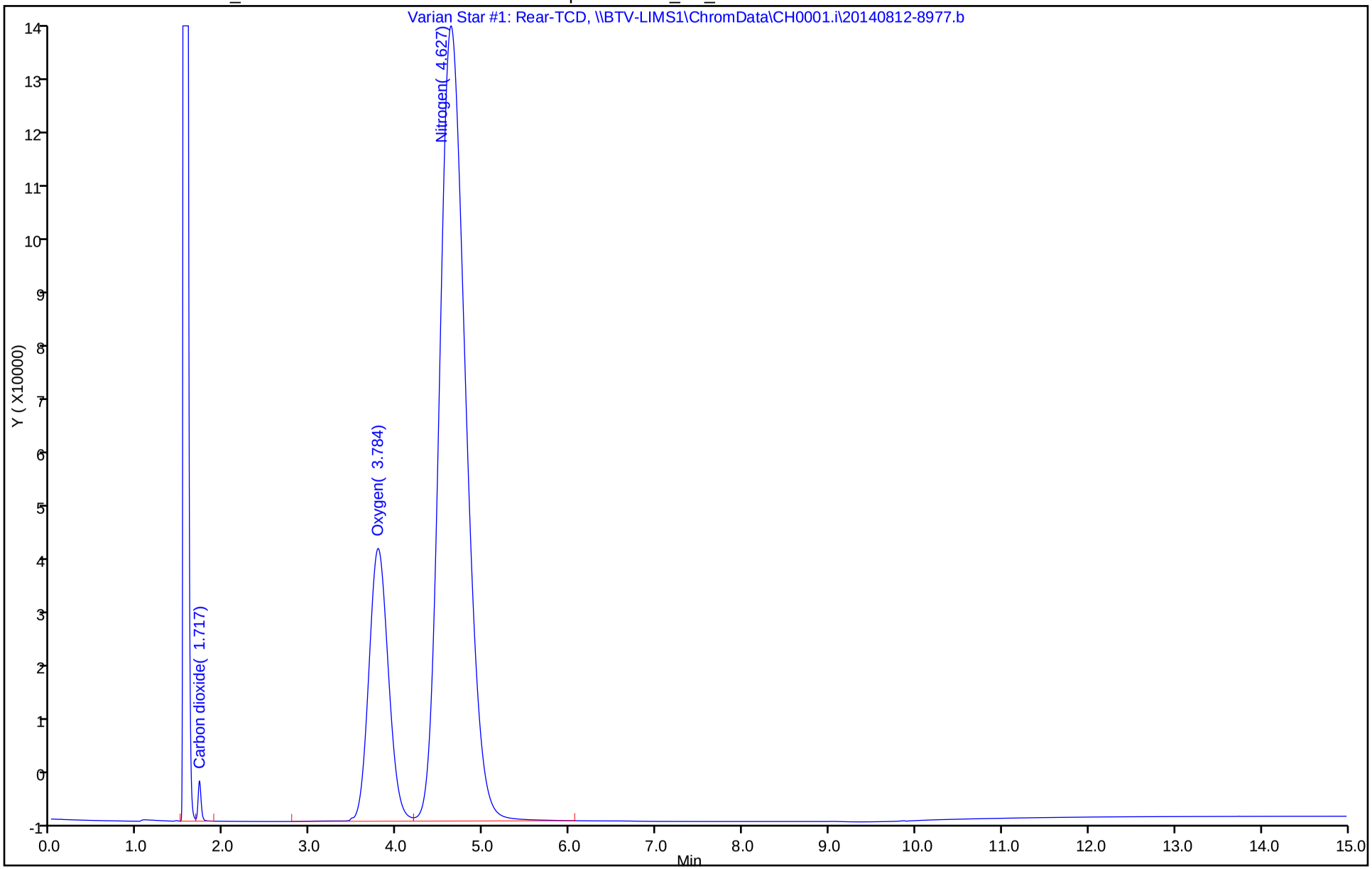
| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-1a.d | | | | |
| Injection Date: | 12-Aug-2014 15:31:13 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-1 | Lab Sample ID: | 200-23612-1 | Worklist Smp#: | 11 |
| Client ID: | 205-VP3b | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 13-Aug-2014 09:41:11 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-1b.d | | | | |
| Injection Date: | 12-Aug-2014 15:47:06 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-1 | Lab Sample ID: | 200-23612-1 | Worklist Smp#: | 12 |
| Client ID: | 205-VP3b | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM I
AIR - GC VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Client Sample ID: 205-VP3a Lab Sample ID: 200-23612-2

Matrix: Air Lab File ID: 200-23612-a-2001.d-avg

Analysis Method: EPA 3C Date Collected: 08/10/2014 09:10

Sample wt/vol: 2(mL) Date Analyzed: 08/12/2014 17:02

Soil Aliquot Vol: Dilution Factor: 1

Soil Extract Vol.: GC Column: ID:

% Moisture: Level: (low/med) Low

Analysis Batch No.: 75942 Units: % v/v

| CAS NO. | COMPOUND NAME | RESULT | Q | RL | RL |
|---|---|---|---|---|---|
| 124-38-9 | Carbon dioxide | 0.47 | | 0.050 | 0.050 |
| 74-82-8 | Methane | 0.040 | U | 0.040 | 0.040 |
| 7727-37-9 | Nitrogen | 75 | | 0.50 | 0.50 |
| 7782-44-7 | Oxygen | 21 | | 0.050 | 0.050 |
| 630-08-0 | Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-2001.d
Lims ID: 200-23612-A-2 Lab Sample ID: 200-23612-2
Client ID: 205-VP3a
Sample Type: Client
Inject. Date: 12-Aug-2014 17:02:15 ALS Bottle#: 0 Worklist Smp#: 21
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-2
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:16 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.727 | 1.722 | 0.005 | 15659 | 0.4686 | |
| 2 Oxygen | 3.818 | 3.824 | -0.006 | 723149 | 20.8 | |
| 3 Nitrogen | 4.682 | 4.719 | -0.037 | 2799013 | 74.6 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-2.d
Lims ID: 200-23612-A-2 Lab Sample ID: 200-23612-2
Client ID: 205-VP3a
Sample Type: Client
Inject. Date: 12-Aug-2014 16:18:51 ALS Bottle#: 0 Worklist Smp#: 14
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-2
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:16 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

First Level Reviewer: lyonsb Date: 12-Aug-2014 16:52:15

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.720 | 1.722 | -0.002 | 15781 | 0.4723 | |
| 2 Oxygen | 3.795 | 3.824 | -0.029 | 731063 | 21.1 | |
| 3 Nitrogen | 4.642 | 4.719 | -0.077 | 2838697 | 75.6 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-2001-75924-ai_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-2-75924-ai_3c_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 15659 | 15781 | 15720 | 0.78 |
| Oxygen | 723149 | 731063 | 727106 | 1.09 |
| Nitrogen | 2799013 | 2838697 | 2818855 | 1.41 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

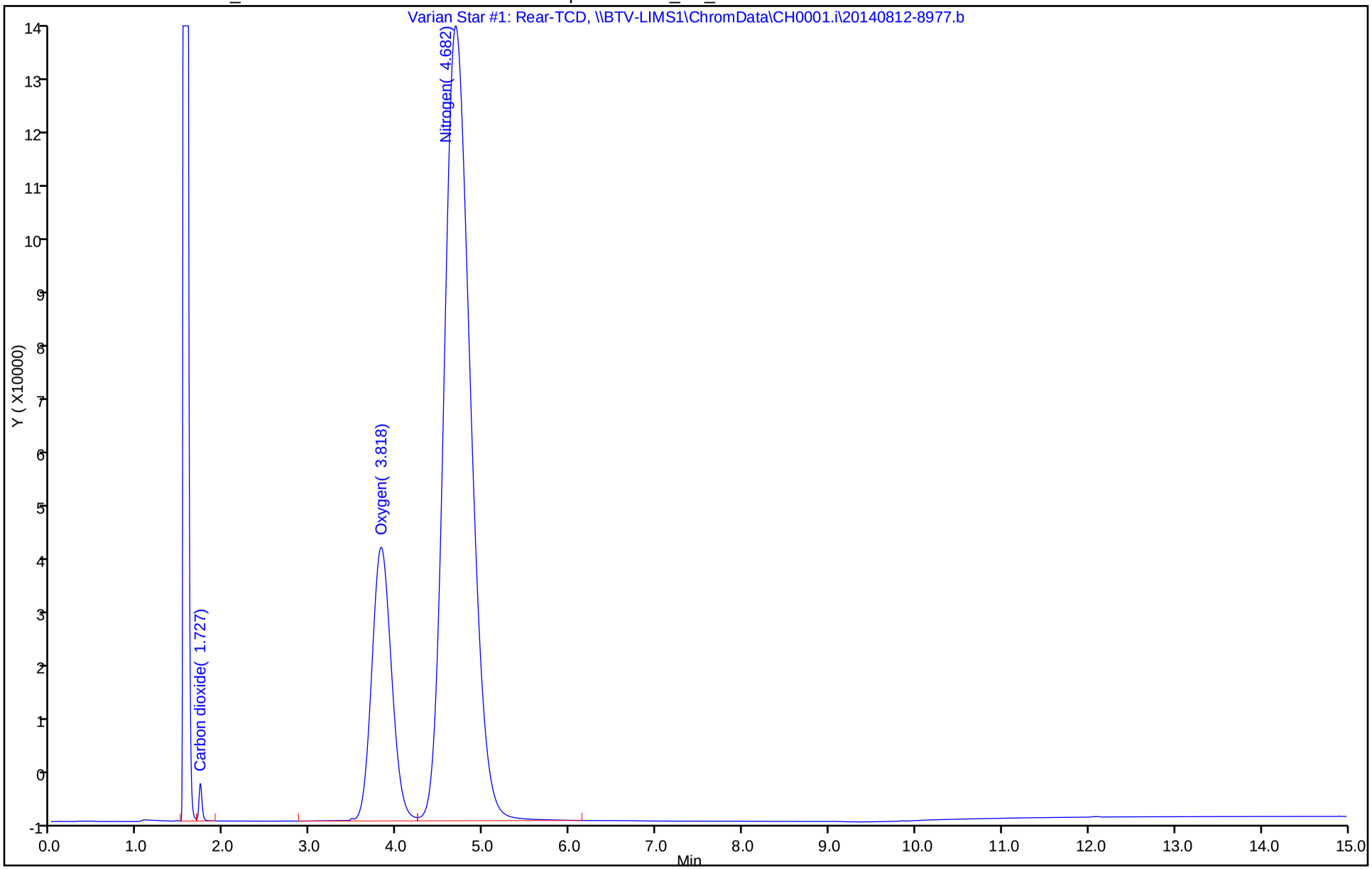
| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0.47 | 0.47 | 0.47 | 0.78 |
| Oxygen | 20.82 | 21.05 | 20.94 | 1.09 |
| Nitrogen | 74.56 | 75.62 | 75.09 | 1.41 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 13-Aug-2014 09:56:05 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

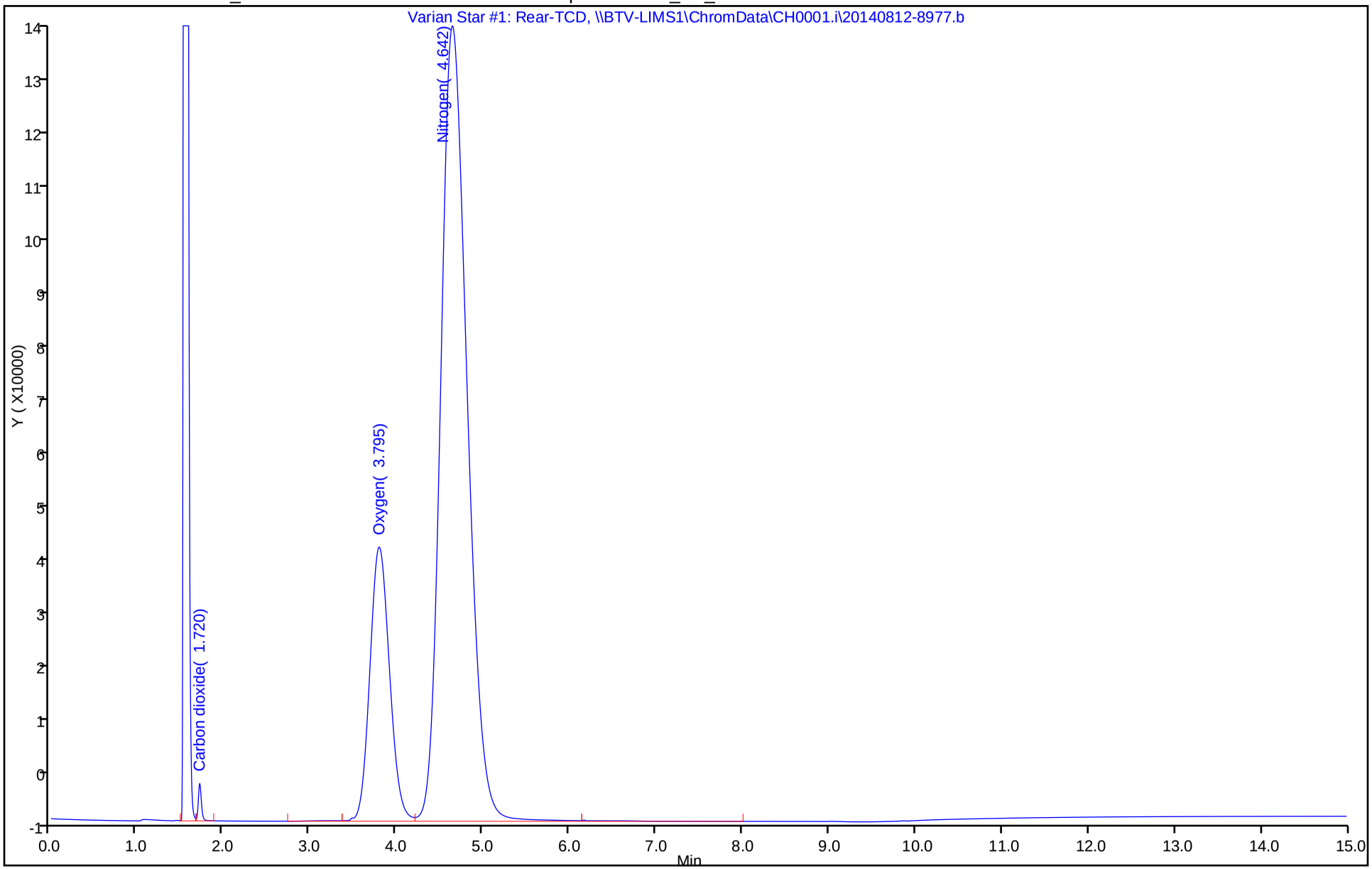
| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-2001.d | | | | |
| Injection Date: | 12-Aug-2014 17:02:15 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-2 | Lab Sample ID: | 200-23612-2 | Worklist Smp#: | 21 |
| Client ID: | 205-VP3a | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 13-Aug-2014 09:56:03 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-2.d | | | | |
| Injection Date: | 12-Aug-2014 16:18:51 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-2 | Lab Sample ID: | 200-23612-2 | Worklist Smp#: | 14 |
| Client ID: | 205-VP3a | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM I
AIR - GC VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Client Sample ID: 205-VP3a-DUP Lab Sample ID: 200-23612-3

Matrix: Air Lab File ID: 200-23612-a-3001.d-avg

Analysis Method: EPA 3C Date Collected: 08/10/2014 09:15

Sample wt/vol: 2(mL) Date Analyzed: 08/12/2014 18:38

Soil Aliquot Vol: Dilution Factor: 1

Soil Extract Vol.: GC Column: ID:

% Moisture: Level: (low/med) Low

Analysis Batch No.: 75942 Units: % v/v

| CAS NO. | COMPOUND NAME | RESULT | Q | RL | RL |
|---|---|---|---|---|---|
| 124-38-9 | Carbon dioxide | 0.61 | | 0.050 | 0.050 |
| 74-82-8 | Methane | 0.040 | U | 0.040 | 0.040 |
| 7727-37-9 | Nitrogen | 75 | | 0.50 | 0.50 |
| 7782-44-7 | Oxygen | 21 | | 0.050 | 0.050 |
| 630-08-0 | Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-3001.d
Lims ID: 200-23612-A-3 Lab Sample ID: 200-23612-3
Client ID: 205-VP3a-DUP
Sample Type: Client
Inject. Date: 12-Aug-2014 18:38:13 ALS Bottle#: 0 Worklist Smp#: 17
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-3
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.717 | 1.722 | -0.005 | 20197 | 0.6045 | |
| 2 Oxygen | 3.785 | 3.824 | -0.039 | 717041 | 20.6 | |
| 3 Nitrogen | 4.628 | 4.719 | -0.091 | 2802006 | 74.6 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-3.d
Lims ID: 200-23612-A-3 Lab Sample ID: 200-23612-3
Client ID: 205-VP3a-DUP
Sample Type: Client
Inject. Date: 12-Aug-2014 18:22:22 ALS Bottle#: 0 Worklist Smp#: 16
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-3
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.720 | 1.722 | -0.002 | 20313 | 0.6079 | |
| 2 Oxygen | 3.795 | 3.824 | -0.029 | 719669 | 20.7 | |
| 3 Nitrogen | 4.642 | 4.719 | -0.077 | 2812006 | 74.9 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-3001-75924-ai_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-3-75924-ai_3c_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 20197 | 20313 | 20255 | 0.57 |
| Oxygen | 717041 | 719669 | 718355 | 0.37 |
| Nitrogen | 2802006 | 2812006 | 2807006 | 0.36 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

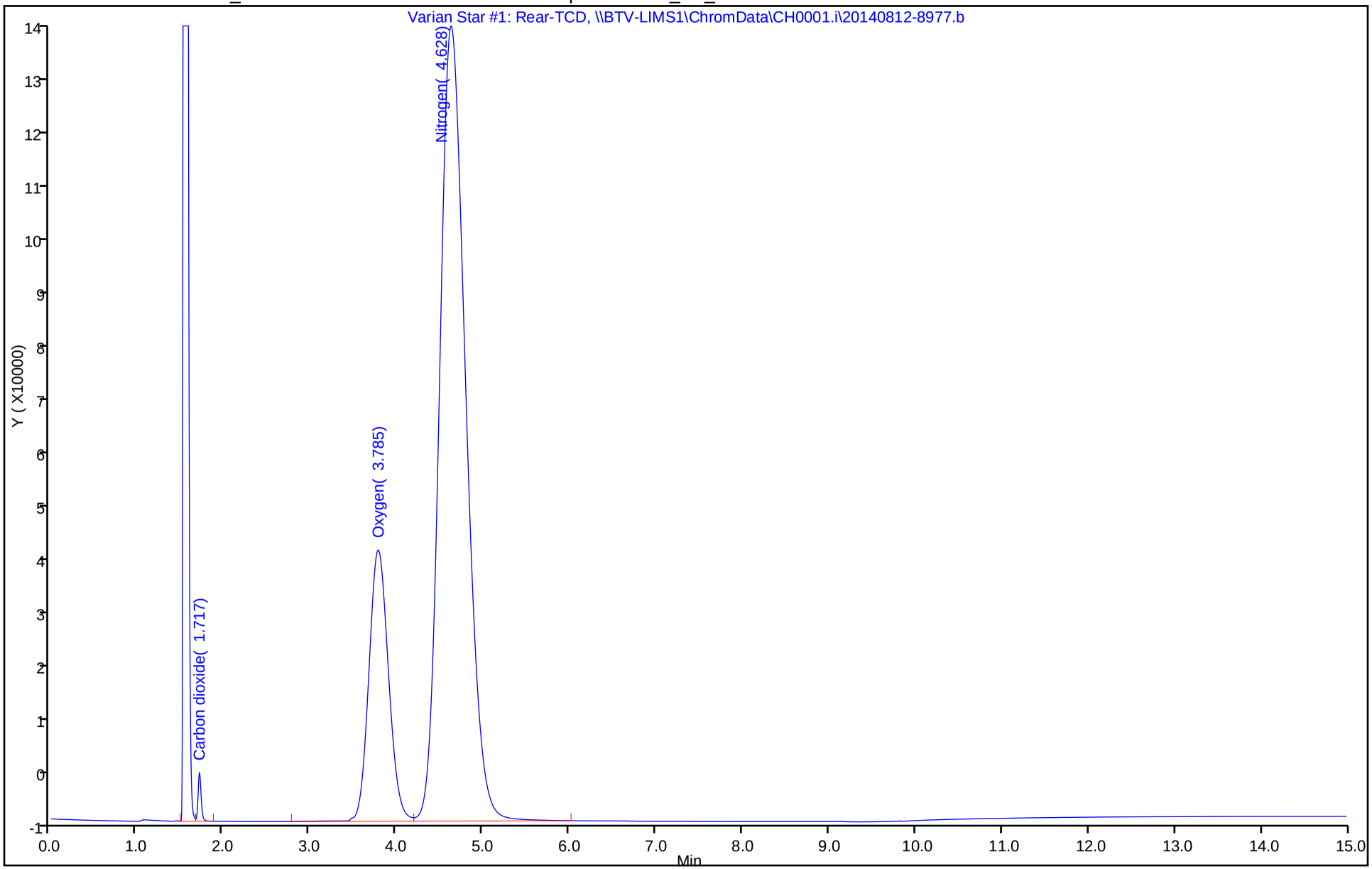
| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0.6 | 0.61 | 0.61 | 0.57 |
| Oxygen | 20.65 | 20.72 | 20.69 | 0.37 |
| Nitrogen | 74.64 | 74.9 | 74.77 | 0.36 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 13-Aug-2014 09:41:09 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

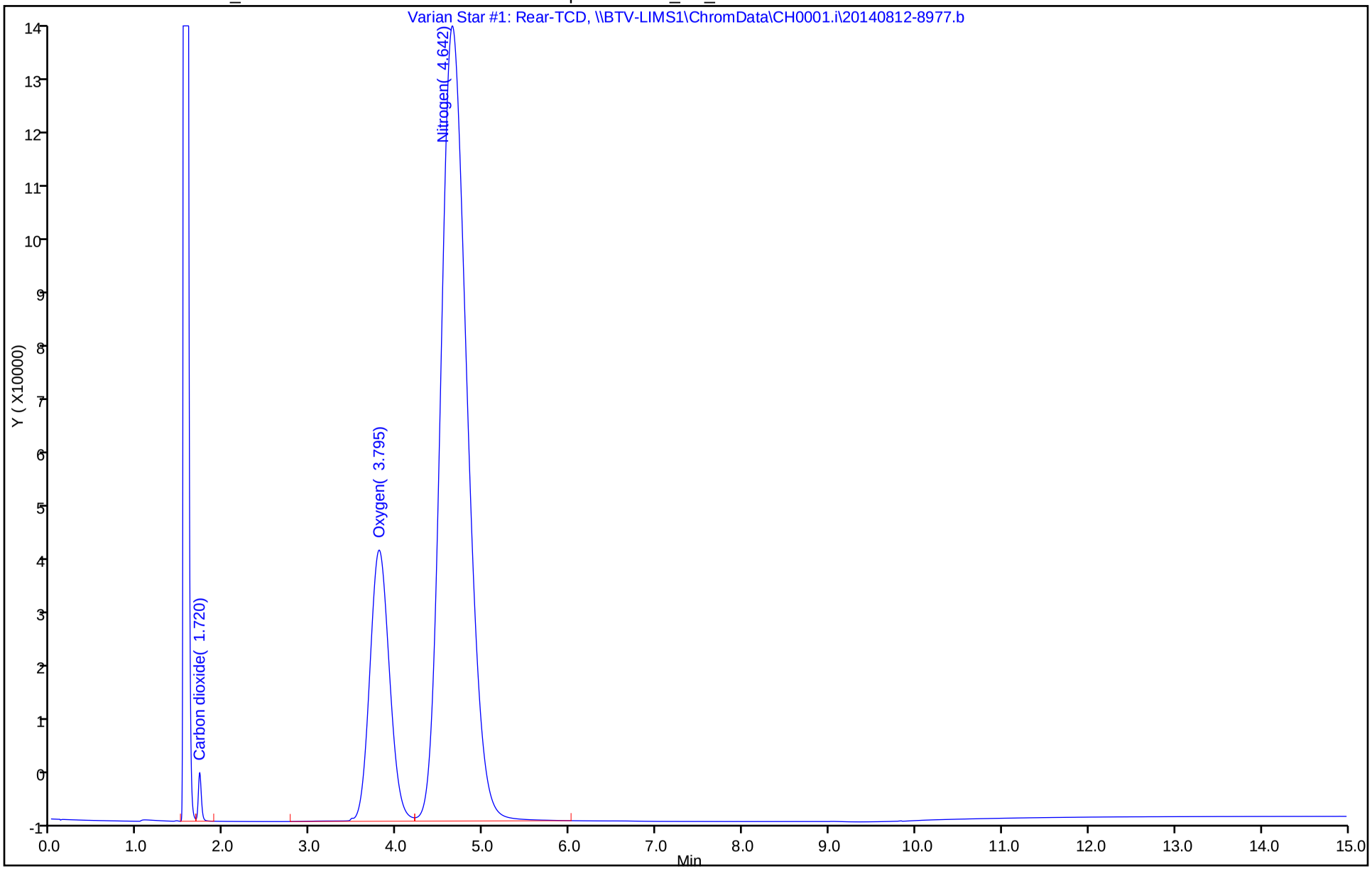
| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-3001.d | | | | |
| Injection Date: | 12-Aug-2014 18:38:13 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-3 | Lab Sample ID: | 200-23612-3 | Worklist Smp#: | 17 |
| Client ID: | 205-VP3a-DUP | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 13-Aug-2014 09:41:08 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-3.d | | | | |
| Injection Date: | 12-Aug-2014 18:22:22 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-3 | Lab Sample ID: | 200-23612-3 | Worklist Smp#: | 16 |
| Client ID: | 205-VP3a-DUP | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM I
AIR - GC VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Client Sample ID: 205-VP3c Lab Sample ID: 200-23612-4

Matrix: Air Lab File ID: 200-23612-a-4001.d-avg

Analysis Method: EPA 3C Date Collected: 08/10/2014 09:20

Sample wt/vol: 2(mL) Date Analyzed: 08/12/2014 19:25

Soil Aliquot Vol: Dilution Factor: 1

Soil Extract Vol.: GC Column: ID:

% Moisture: Level: (low/med) Low

Analysis Batch No.: 75942 Units: % v/v

| CAS NO. | COMPOUND NAME | RESULT | Q | RL | RL |
|---|---|---|---|---|---|
| 124-38-9 | Carbon dioxide | 0.22 | | 0.050 | 0.050 |
| 74-82-8 | Methane | 0.040 | U | 0.040 | 0.040 |
| 7727-37-9 | Nitrogen | 75 | | 0.50 | 0.50 |
| 7782-44-7 | Oxygen | 21 | | 0.050 | 0.050 |
| 630-08-0 | Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-4001.d
Lims ID: 200-23612-A-4 Lab Sample ID: 200-23612-4
Client ID: 205-VP3c
Sample Type: Client
Inject. Date: 12-Aug-2014 19:25:47 ALS Bottle#: 0 Worklist Smp#: 22
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-4
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

First Level Reviewer: lyonsb Date: 13-Aug-2014 09:38:22

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.717 | 1.722 | -0.005 | 7403 | 0.2216 | |
| 2 Oxygen | 3.785 | 3.824 | -0.039 | 732861 | 21.1 | |
| 3 Nitrogen | 4.628 | 4.719 | -0.091 | 2804862 | 74.7 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-4.d
Lims ID: 200-23612-A-4 Lab Sample ID: 200-23612-4
Client ID: 205-VP3c
Sample Type: Client
Inject. Date: 12-Aug-2014 19:09:56 ALS Bottle#: 0 Worklist Smp#: 19
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-4
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.720 | 1.722 | -0.002 | 7424 | 0.2222 | |
| 2 Oxygen | 3.797 | 3.824 | -0.027 | 737143 | 21.2 | |
| 3 Nitrogen | 4.645 | 4.719 | -0.074 | 2828688 | 75.3 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-4001-75924-ai_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-4-75924-ai_3c_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 7403 | 7424 | 7413.5 | 0.28 |
| Oxygen | 732861 | 737143 | 735002 | 0.58 |
| Nitrogen | 2804862 | 2828688 | 2816775 | 0.85 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

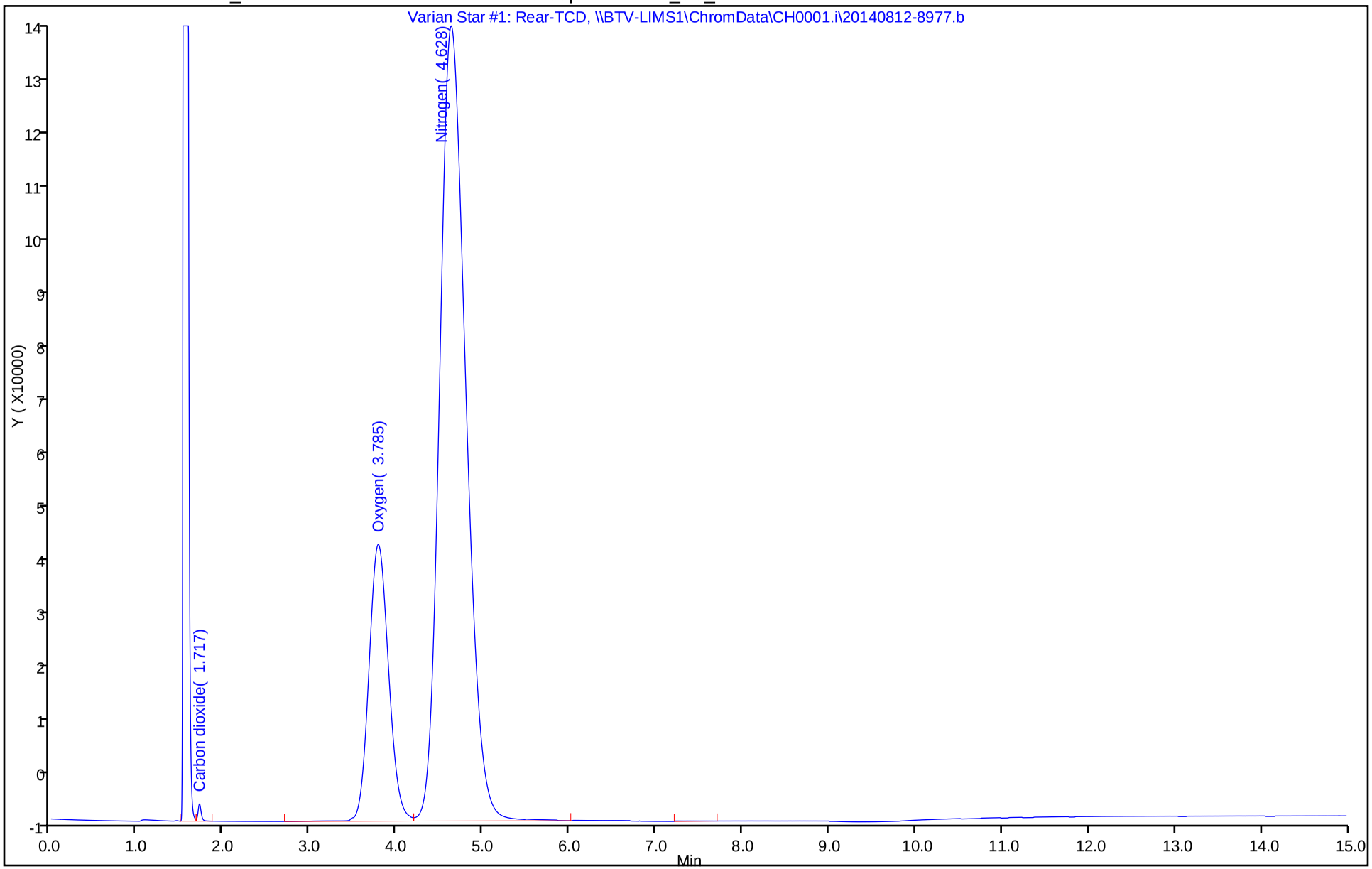
| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0.22 | 0.22 | 0.22 | 0.28 |
| Oxygen | 21.1 | 21.23 | 21.17 | 0.58 |
| Nitrogen | 74.71 | 75.35 | 75.03 | 0.85 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 13-Aug-2014 09:41:08 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

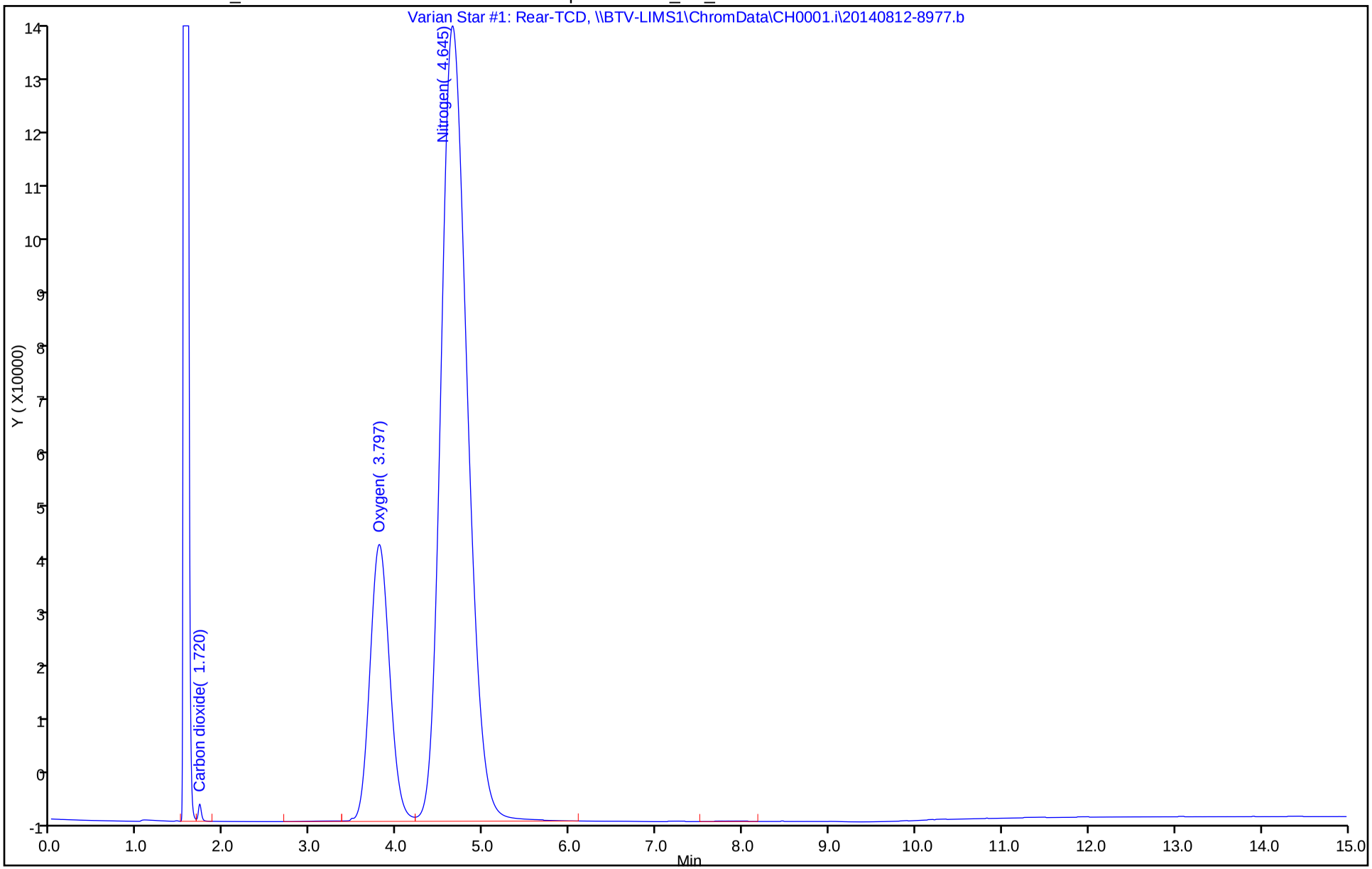
| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-4001.d | | | | |
| Injection Date: | 12-Aug-2014 19:25:47 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-4 | Lab Sample ID: | 200-23612-4 | Worklist Smp#: | 22 |
| Client ID: | 205-VP3c | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 13-Aug-2014 09:41:08 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-4.d | | | | |
| Injection Date: | 12-Aug-2014 19:09:56 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-4 | Lab Sample ID: | 200-23612-4 | Worklist Smp#: | 19 |
| Client ID: | 205-VP3c | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM I
AIR - GC VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Client Sample ID: CALGAS1000 Lab Sample ID: 200-23612-6

Matrix: Air Lab File ID: 200-23612-a-6001.d-avg

Analysis Method: EPA 3C Date Collected: 08/10/2014 09:30

Sample wt/vol: 2(mL) Date Analyzed: 08/12/2014 21:00

Soil Aliquot Vol: Dilution Factor: 1

Soil Extract Vol.: GC Column: ID:

% Moisture: Level: (low/med) Low

Analysis Batch No.: 75942 Units: % v/v

| CAS NO. | COMPOUND NAME | RESULT | Q | RL | RL |
|---|---|---|---|---|---|
| 124-38-9 | Carbon dioxide | 0.12 | | 0.050 | 0.050 |
| 74-82-8 | Methane | 0.040 | U | 0.040 | 0.040 |
| 7727-37-9 | Nitrogen | 95 | | 0.50 | 0.50 |
| 7782-44-7 | Oxygen | 0.42 | | 0.050 | 0.050 |
| 630-08-0 | Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-6001.d
Lims ID: 200-23612-A-6 Lab Sample ID: 200-23612-6
Client ID: CALGAS1000
Sample Type: Client
Inject. Date: 12-Aug-2014 21:00:57 ALS Bottle#: 0 Worklist Smp#: 25
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-6
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.717 | 1.722 | -0.005 | 3918 | 0.1173 | |
| 2 Oxygen | 3.797 | 3.824 | -0.027 | 14923 | 0.4297 | |
| 3 Nitrogen | 4.617 | 4.719 | -0.102 | 3589081 | 95.6 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-6.d
Lims ID: 200-23612-A-6 Lab Sample ID: 200-23612-6
Client ID: CALGAS1000
Sample Type: Client
Inject. Date: 12-Aug-2014 20:45:04 ALS Bottle#: 0 Worklist Smp#: 24
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-6
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.720 | 1.722 | -0.002 | 3896 | 0.1166 | |
| 2 Oxygen | 3.805 | 3.824 | -0.019 | 14278 | 0.4112 | |
| 3 Nitrogen | 4.622 | 4.719 | -0.097 | 3548053 | 94.5 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-6001-75924-ai_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-6-75924-ai_3c_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 3918 | 3896 | 3907 | 0.56 |
| Oxygen | 14923 | 14278 | 14600.5 | 4.42 |
| Nitrogen | 3589081 | 3548053 | 3568567 | 1.15 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

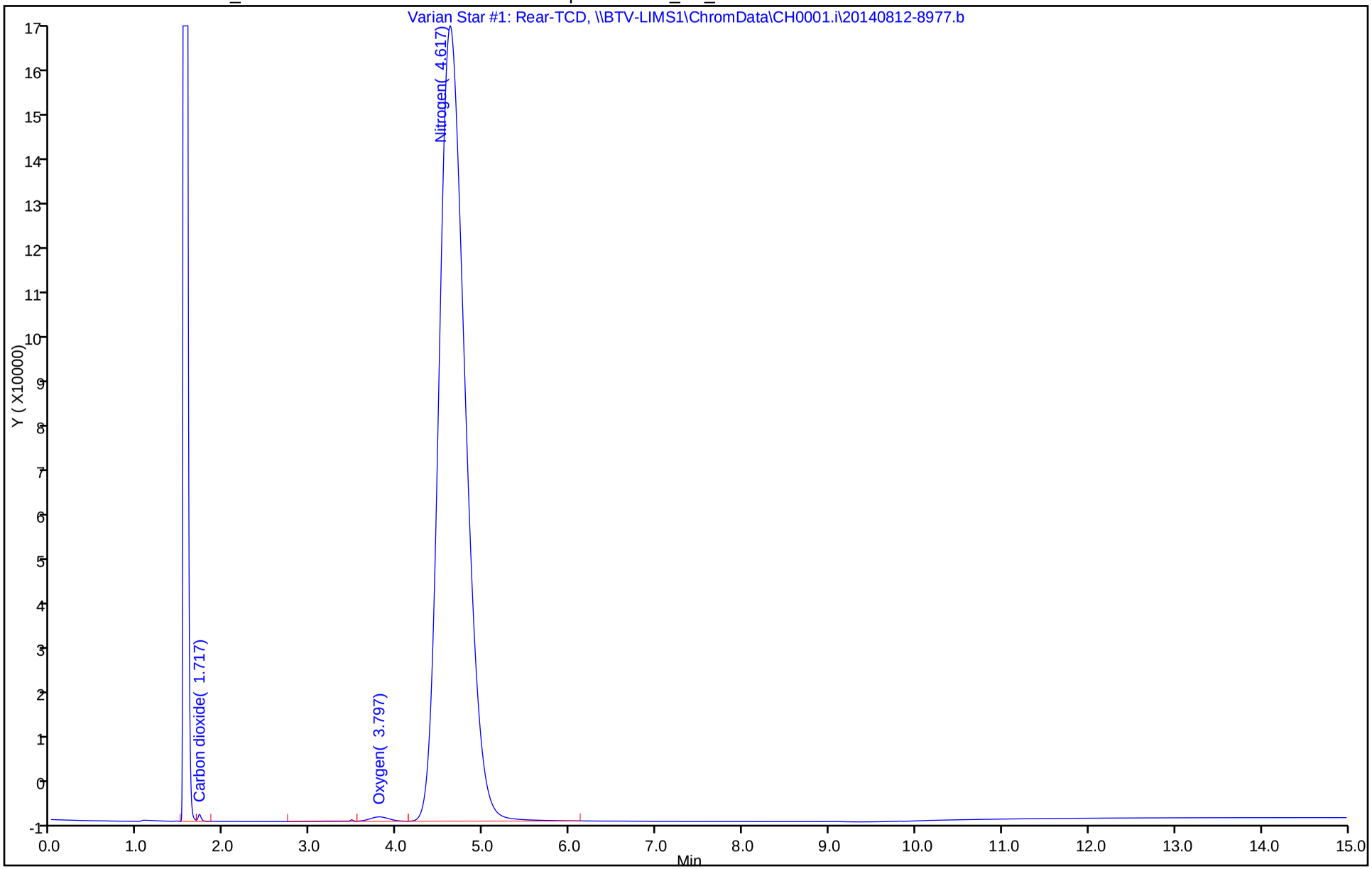
| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0.12 | 0.12 | 0.12 | 0.56 |
| Oxygen | 0.43 | 0.41 | 0.42 | 4.42 |
| Nitrogen | 95.6 | 94.51 | 95.06 | 1.15 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 13-Aug-2014 09:41:07 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

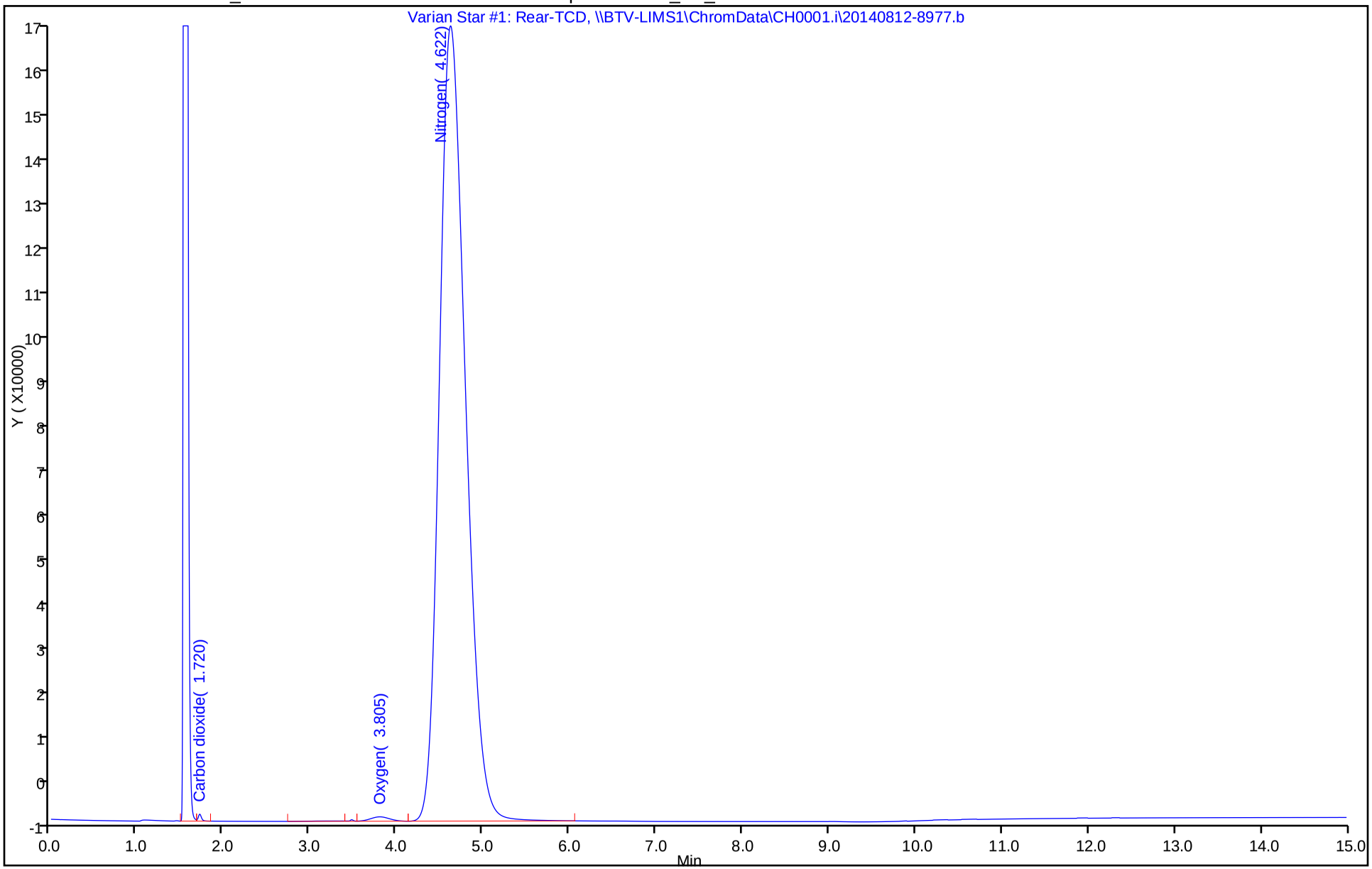
| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-6001.d | | | | |
| Injection Date: | 12-Aug-2014 21:00:57 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-6 | Lab Sample ID: | 200-23612-6 | Worklist Smp#: | 25 |
| Client ID: | CALGAS1000 | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 13-Aug-2014 09:41:06 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-6.d | | | | |
| Injection Date: | 12-Aug-2014 20:45:04 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-6 | Lab Sample ID: | 200-23612-6 | Worklist Smp#: | 24 |
| Client ID: | CALGAS1000 | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM I
AIR - GC VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Client Sample ID: CALGAS2000 Lab Sample ID: 200-23612-7

Matrix: Air Lab File ID: 200-23612-a-7001.d-avg

Analysis Method: EPA 3C Date Collected: 08/10/2014 09:35

Sample wt/vol: 2(mL) Date Analyzed: 08/12/2014 21:48

Soil Aliquot Vol: Dilution Factor: 1

Soil Extract Vol.: GC Column: ID:

% Moisture: Level: (low/med) Low

Analysis Batch No.: 75942 Units: % v/v

| CAS NO. | COMPOUND NAME | RESULT | Q | RL | RL |
|---|---|---|---|---|---|
| 124-38-9 | Carbon dioxide | 0.21 | | 0.050 | 0.050 |
| 74-82-8 | Methane | 0.040 | U | 0.040 | 0.040 |
| 7727-37-9 | Nitrogen | 95 | | 0.50 | 0.50 |
| 7782-44-7 | Oxygen | 0.35 | | 0.050 | 0.050 |
| 630-08-0 | Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-7001.d
Lims ID: 200-23612-A-7 Lab Sample ID: 200-23612-7
Client ID: CALGAS2000
Sample Type: Client
Inject. Date: 12-Aug-2014 21:48:31 ALS Bottle#: 0 Worklist Smp#: 29
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-7
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.719 | 1.722 | -0.003 | 6946 | 0.2079 | |
| 2 Oxygen | 3.800 | 3.824 | -0.024 | 12312 | 0.3545 | |
| 3 Nitrogen | 4.619 | 4.719 | -0.100 | 3561793 | 94.9 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-7.d
Lims ID: 200-23612-A-7 Lab Sample ID: 200-23612-7
Client ID: CALGAS2000
Sample Type: Client
Inject. Date: 12-Aug-2014 21:32:40 ALS Bottle#: 0 Worklist Smp#: 28
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-7
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 09:41:03 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.717 | 1.722 | -0.005 | 6913 | 0.2069 | |
| 2 Oxygen | 3.794 | 3.824 | -0.030 | 12180 | 0.3507 | |
| 3 Nitrogen | 4.612 | 4.719 | -0.107 | 3563259 | 94.9 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-7001-75924-ai_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-7-75924-ai_3c_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 6946 | 6913 | 6929.5 | 0.48 |
| Oxygen | 12312 | 12180 | 12246 | 1.08 |
| Nitrogen | 3561793 | 3563259 | 3562526 | 0.04 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0.21 | 0.21 | 0.21 | 0.48 |
| Oxygen | 0.35 | 0.35 | 0.35 | 1.08 |
| Nitrogen | 94.88 | 94.92 | 94.9 | 0.04 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

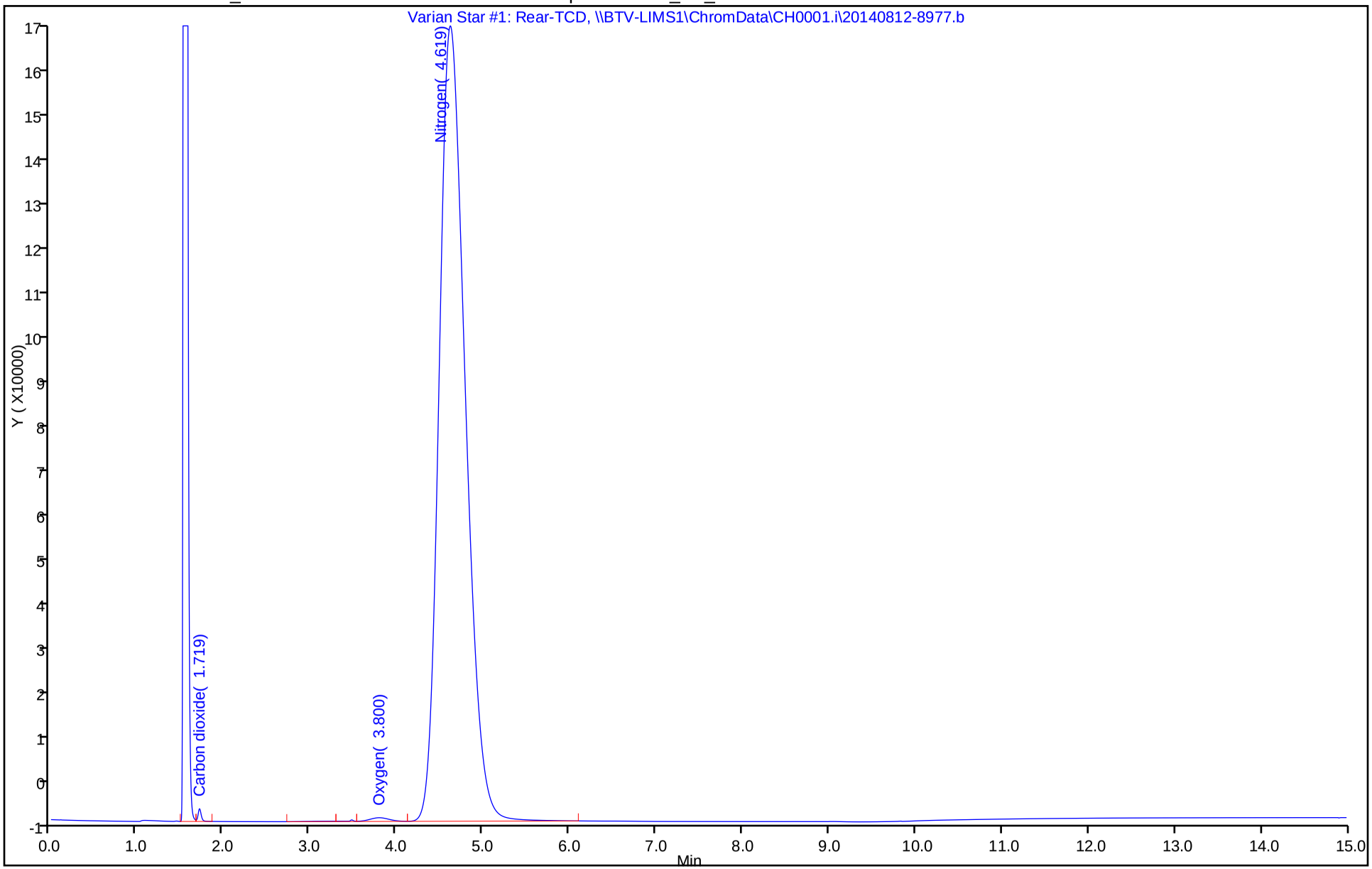
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 13-Aug-2014 09:41:05 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-7001.d

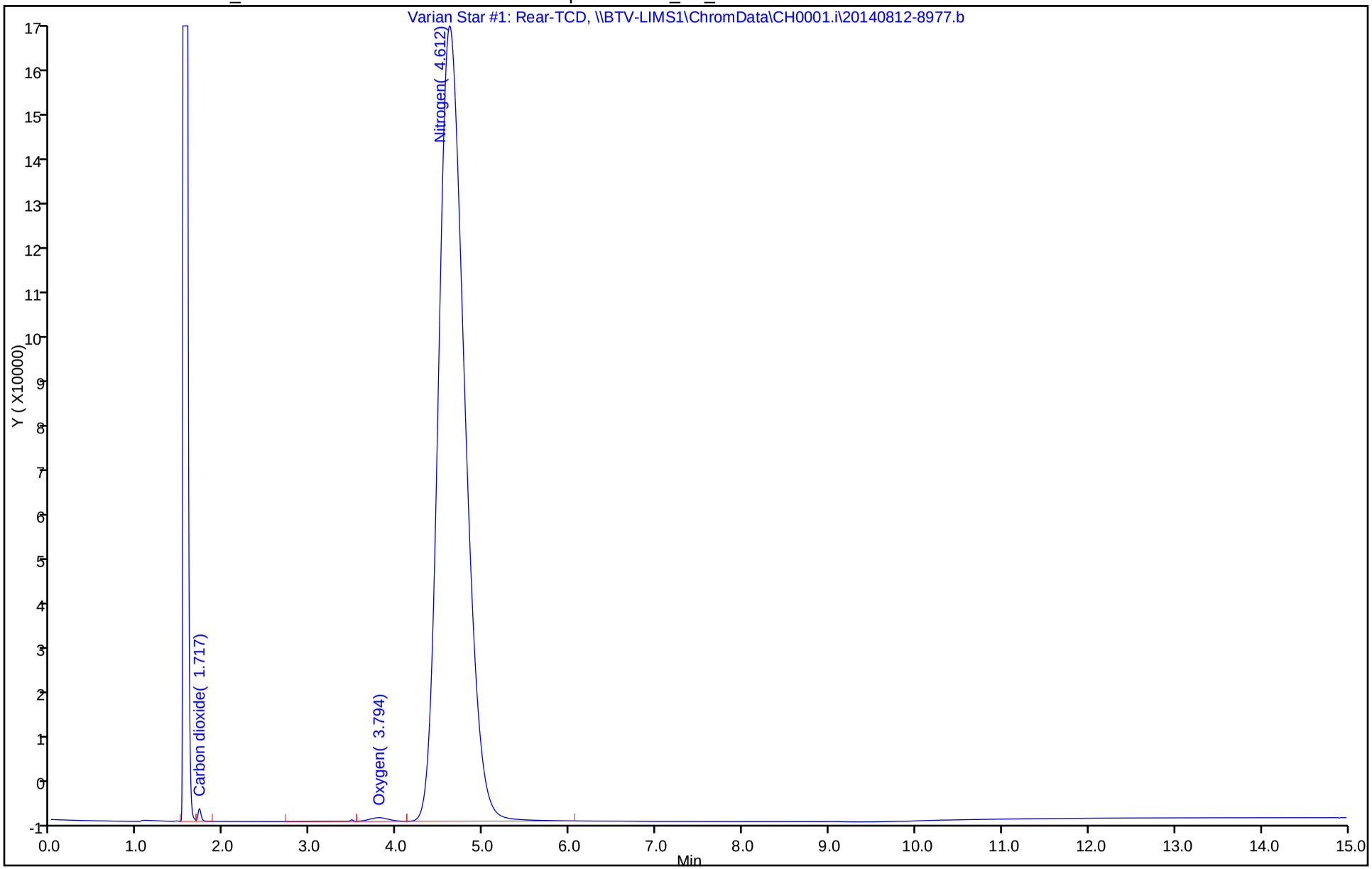
| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 12-Aug-2014 21:48:31 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-7 | Lab Sample ID: | 200-23612-7 | Worklist Smp#: | 29 |
| Client ID: | CALGAS2000 | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 13-Aug-2014 09:41:04 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-7.d | | | | |
| Injection Date: | 12-Aug-2014 21:32:40 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-7 | Lab Sample ID: | 200-23612-7 | Worklist Smp#: | 28 |
| Client ID: | CALGAS2000 | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM VI
AIR - GC VOA INITIAL CALIBRATION DATA
EXTERNAL STANDARD RETENTION TIME SUMMARY

Lab Name: TestAmerica Burlington Job No.: 200-23612-1 Analy Batch No.: 72381

SDG No.: 200-23612

Instrument ID: CH0001.i GC Column: CTR-1 ID: 3.175(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/19/2014 11:18 Calibration End Date: 05/20/2014 10:29 Calibration ID: 26890

Calibration Files:

| LEVEL: | LAB SAMPLE ID: | LAB FILE ID: |
|---|---|---|
| Level 1 | IC 200-72381/4 | 3cic1051914B.d-avg |
| Level 2 | IC 200-72381/9 | 3cic10051914A.d-avg |
| Level 3 | IC 200-72381/5 | 3cic2051914A.d-avg |
| Level 4 | IC 200-72381/6 | 3cic3051914B.d-avg |
| Level 5 | ICIS 200-72381/1 | 3cicis051914B.d-avg |
| Level 6 | IC 200-72381/10 | 3cic09051914A.d-avg |
| Level 7 | IC 200-72381/7 | 3cic5051914B.d-avg |
| Level 8 | IC 200-72381/3 | 3cic8051914B.d-avg |
| Level 9 | IC 200-72381/2 | 3cic6051914B.d-avg |
| Level 10 | IC 200-72381/8 | 3cic7051914B.d-avg |

| ANALYTE | LVL 1 | LVL 2 | LVL 3 | LVL 4 | LVL 5 | LVL 6 | LVL 7 | LVL 8 | LVL 9 | LVL 10 | RT WINDOW | AVG RT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carbon dioxide | 1.722 | | 1.722 | 1.718 | 1.722 | | | | 1.690 | | 1.472 - 1.972 | 1.715 |
| Oxygen | 3.814 | | 3.829 | 3.815 | 3.825 | | 3.800 | | | | 3.575 - 4.075 | 3.817 |
| Nitrogen | | | 4.717 | 4.698 | 4.717 | | 4.647 | | | 4.630 | 4.467 - 4.967 | 4.682 |
| Methane | 6.579 | | 6.524 | 6.503 | 6.531 | | | 6.426 | | | 6.281 - 6.781 | 6.513 |
| Carbon monoxide | | 7.024 | 7.036 | 7.020 | 7.062 | 7.086 | | | | | 6.812 - 7.312 | 7.046 |

FORM VI
AIR - GC VOA INITIAL CALIBRATION DATA
EXTERNAL STANDARD CURVE EVALUATION

Lab Name: TestAmerica Burlington Job No.: 200-23612-1 Analy Batch No.: 72381

SDG No.: 200-23612

Instrument ID: CH0001.i GC Column: CTR-1 ID: 3.175(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/19/2014 11:18 Calibration End Date: 05/20/2014 10:29 Calibration ID: 26890

Calibration Files:

| LEVEL: | LAB SAMPLE ID: | LAB FILE ID: |
|---|---|---|
| Level 1 | IC 200-72381/4 | 3cic1051914B.d-avg |
| Level 2 | IC 200-72381/9 | 3cic10051914A.d-avg |
| Level 3 | IC 200-72381/5 | 3cic2051914A.d-avg |
| Level 4 | IC 200-72381/6 | 3cic3051914B.d-avg |
| Level 5 | ICIS 200-72381/1 | 3cicis051914B.d-avg |
| Level 6 | IC 200-72381/10 | 3cic09051914A.d-avg |
| Level 7 | IC 200-72381/7 | 3cic5051914B.d-avg |
| Level 8 | IC 200-72381/3 | 3cic8051914B.d-avg |
| Level 9 | IC 200-72381/2 | 3cic6051914B.d-avg |
| Level 10 | IC 200-72381/8 | 3cic7051914B.d-avg |

| ANALYTE | CF | | | | CURVE TYPE | COEFFICIENT | | | # | MIN CF | %RSD | # | MAX %RSD | R^2 OR COD | # | MIN R^2 OR COD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | LVL 1<br>LVL 5<br>LVL 9 | LVL 2<br>LVL 6<br>LVL 10 | LVL 3<br>LVL 7 | LVL 4<br>LVL 8 | | B | M1 | M2 | | | | | | | | |
| Carbon dioxide | 33340<br>33742<br>32442 | | 35161 | 32311 | Ave | | 33413.4918 | | | | 3.1 | | 20.0 | | | |
| Oxygen | 43840<br>32792 | | 34615<br>31304 | 32146 | Ave | | 34726.7810 | | | | 13.0 | | 20.0 | | | |
| Nitrogen | 36096 | 35833 | 42923<br>36559 | 37114 | Ave | | 37541.2509 | | | | 7.2 | | 20.0 | | | |
| Methane | 37638<br>27589 | | 30244 | 25700<br>31327 | Ave | | 30353.6191 | | | | 14.0 | | 20.0 | | | |
| Carbon monoxide | 37860 | 28505<br>33901 | 37230 | 36755 | Ave | | 35076.1545 | | | | 10.0 | | 20.0 | | | |

Note: The m1 coefficient is the same as Ave CF for an Ave curve type.

FORM VI
AIR - GC VOA INITIAL CALIBRATION DATA
EXTERNAL STANDARD RESPONSE AND CONCENTRATION

Lab Name: TestAmerica Burlington Job No.: 200-23612-1 Analy Batch No.: 72381

SDG No.: 200-23612

Instrument ID: CH0001.i GC Column: CTR-1 ID: 3.175(mm) Heated Purge: (Y/N) N

Calibration Start Date: 05/19/2014 11:18 Calibration End Date: 05/20/2014 10:29 Calibration ID: 26890

Calibration Files:

| LEVEL: | LAB SAMPLE ID: | LAB FILE ID: |
|---|---|---|
| Level 1 | IC 200-72381/4 | 3cic1051914B.d-avg |
| Level 2 | IC 200-72381/9 | 3cic10051914A.d-avg |
| Level 3 | IC 200-72381/5 | 3cic2051914A.d-avg |
| Level 4 | IC 200-72381/6 | 3cic3051914B.d-avg |
| Level 5 | ICIS 200-72381/1 | 3cicis051914B.d-avg |
| Level 6 | IC 200-72381/10 | 3cic09051914A.d-avg |
| Level 7 | IC 200-72381/7 | 3cic5051914B.d-avg |
| Level 8 | IC 200-72381/3 | 3cic8051914B.d-avg |
| Level 9 | IC 200-72381/2 | 3cic6051914B.d-avg |
| Level 10 | IC 200-72381/8 | 3cic7051914B.d-avg |

| ANALYTE | CURVE TYPE | RESPONSE | | | | | CONCENTRATION (% V/V) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LVL 1<br>LVL 6 | LVL 2<br>LVL 7 | LVL 3<br>LVL 8 | LVL 4<br>LVL 9 | LVL 5<br>LVL 10 | LVL 1<br>LVL 6 | LVL 2<br>LVL 7 | LVL 3<br>LVL 8 | LVL 4<br>LVL 9 | LVL 5<br>LVL 10 |
| Carbon dioxide | Ave | 1667 | | 17581 | 80778<br>3244211 | 168709 | 0.0500 | | 0.500 | 2.50<br>100 | 5.00 |
| Oxygen | Ave | 2192 | 688684 | 17308 | 80364 | 163961 | 0.0500 | 22.0 | 0.500 | 2.50 | 5.00 |
| Nitrogen | Ave | | 2851579 | 21462 | 92785 | 180480<br>3583277 | | 78.0 | 0.500 | 2.50 | 5.00<br>100 |
| Methane | Ave | 1506 | | 12098<br>3101376 | 51400 | 110357 | 0.0400 | | 0.400<br>99.0 | 2.00 | 4.00 |
| Carbon monoxide | Ave | 339009 | 2851 | 18615 | 91888 | 189300 | 10.0 | 0.100 | 0.500 | 2.50 | 5.00 |

Curve Type Legend:

Ave = Average

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cicis051914B.d
Lims ID: ICIS
Client ID:
Sample Type: ICIS Calib Level: 2
Inject. Date: 19-May-2014 11:18:03 ALS Bottle#: 0 Worklist Smp#: 2
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CICIS051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:44 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 19-May-2014 14:20:49

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.722 | 1.722 | 0.000 | 168924 | 5.00 | 5.06 | |
| 2 Oxygen | 3.825 | 3.825 | 0.000 | 164033 | 5.00 | 4.72 | |
| 3 Nitrogen | 4.717 | 4.717 | 0.000 | 180532 | 5.00 | 4.81 | |
| 4 Methane | 6.531 | 6.531 | 0.000 | 109933 | 4.00 | 3.62 | |
| 5 Carbon monoxide | 7.062 | 7.062 | 0.000 | 189696 | 5.00 | 5.41 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cicis051914C.d
Lims ID: ICIS
Client ID:
Sample Type: ICIS Calib Level: 3
Inject. Date: 19-May-2014 11:34:57 ALS Bottle#: 0 Worklist Smp#: 3
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CICIS051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:45 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 19-May-2014 15:07:34

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.722 | 1.722 | 0.000 | 168494 | 5.00 | 5.04 | |
| 2 Oxygen | 3.825 | 3.825 | 0.000 | 163889 | 5.00 | 4.72 | |
| 3 Nitrogen | 4.721 | 4.721 | 0.000 | 180427 | 5.00 | 4.81 | |
| 4 Methane | 6.532 | 6.532 | 0.000 | 110780 | 4.00 | 3.65 | |
| 5 Carbon monoxide | 7.064 | 7.064 | 0.000 | 188904 | 5.00 | 5.39 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cicis051914b-72292-ai_3c_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cicis051914c-72292-ai_3c_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 168924 | 168494 | 168709 | 0.25 |
| Oxygen | 164033 | 163889 | 163961 | 0.09 |
| Nitrogen | 180532 | 180427 | 180479.5 | 0.06 |
| Methane | 109933 | 110780 | 110356.5 | 0.77 |
| Carbon monoxide | 189696 | 188904 | 189300 | 0.42 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 5.06 | 5.04 | 5.05 | 0.25 |
| Oxygen | 4.72 | 4.72 | 4.72 | 0.09 |
| Nitrogen | 4.81 | 4.81 | 4.81 | 0.06 |
| Methane | 3.62 | 3.65 | 3.64 | 0.77 |
| Carbon monoxide | 5.41 | 5.39 | 5.4 | 0.42 |

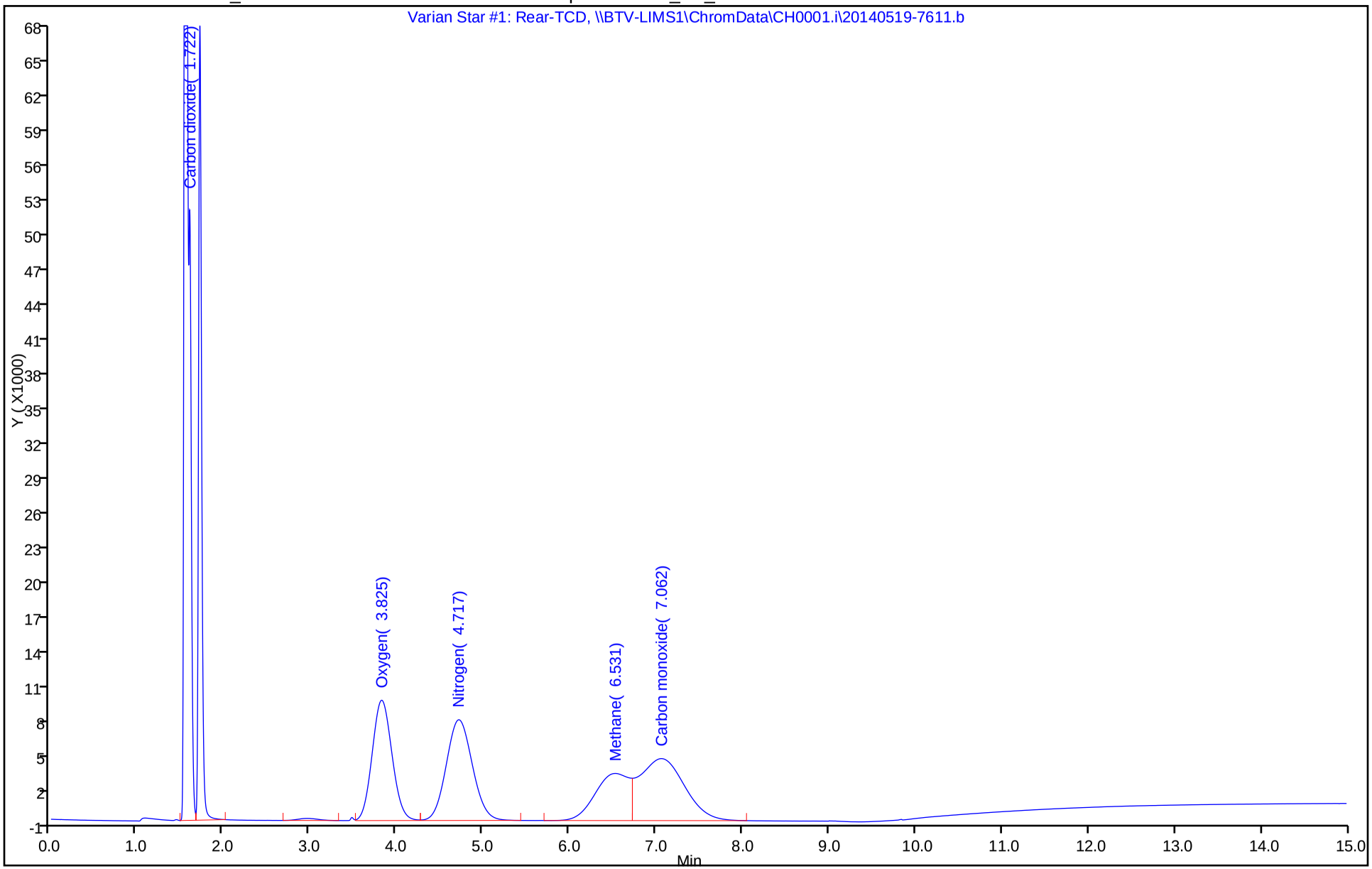
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 20-May-2014 13:27:45 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cicis051914B.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 11:18:03 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | ICIS | | | Worklist Smp#: | 2 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

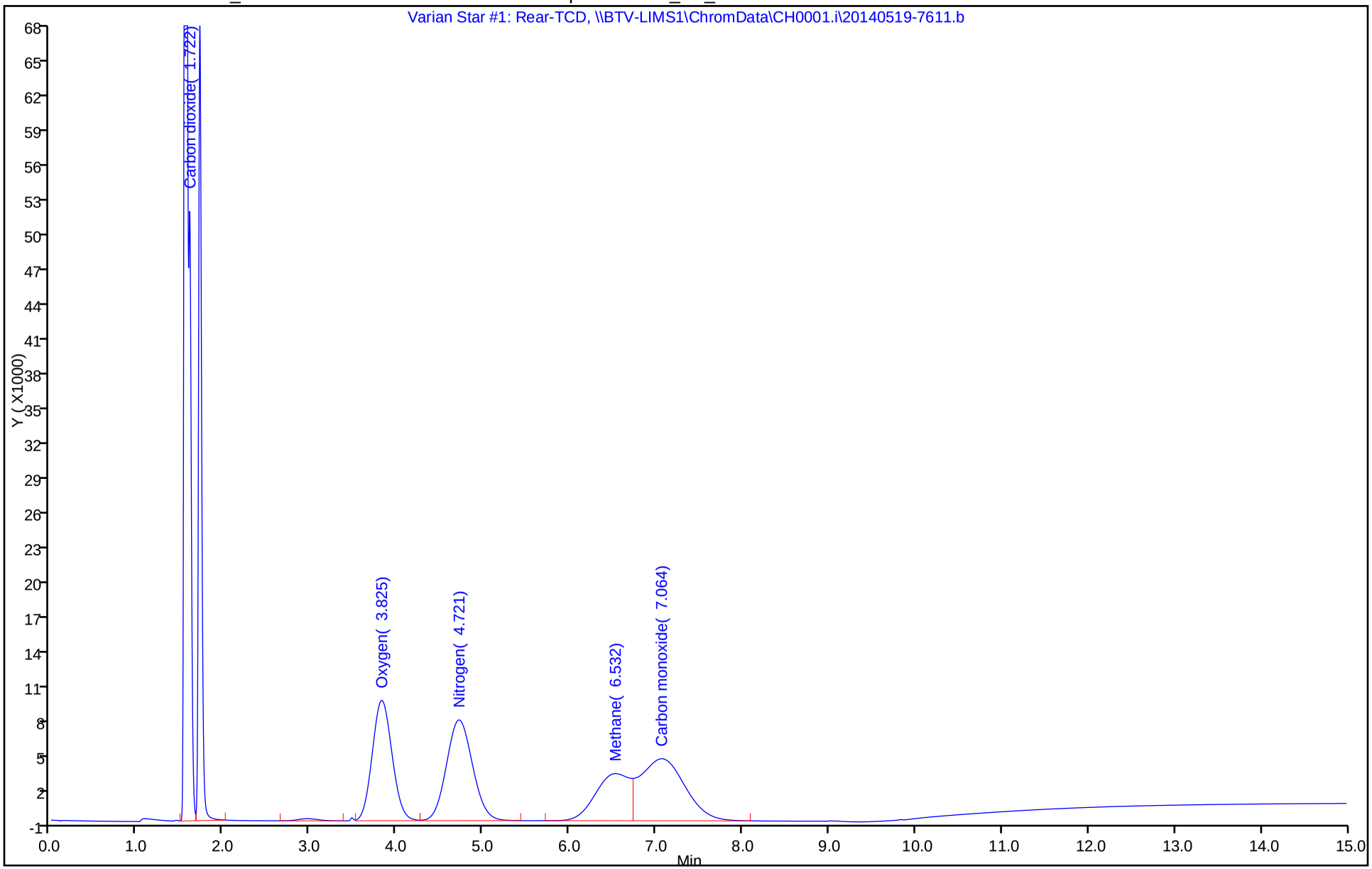


Report Date: 20-May-2014 13:27:45 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cicis051914C.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 11:34:57 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | ICIS | | | Worklist Smp#: | 3 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic6051914B.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 5
Inject. Date: 19-May-2014 12:08:55 ALS Bottle#: 0 Worklist Smp#: 5
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC6051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:43 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.690 | 1.690 | 0.000 | 3241358 | 100.0 | 97.0 | |

TestAmerica Burlington
Target Compound Quantitation Report

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic6051914C.d | | | | |
| Lims ID: | IC | | | | |
| Client ID: | | | | | |
| Sample Type: | IC | Calib Level: | 6 | | |
| Inject. Date: | 19-May-2014 12:25:53 | ALS Bottle#: | 0 | Worklist Smp#: | 6 |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | | |
| Sample Info: | 3CIC6051914,1 | | | | |
| Operator ID: | BPL | Instrument ID: | CH0001.i | | |
| Sublist: | chrom-EPA3C_CH0001.i*sub1 | | | | |
| Method: | \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m | | | | |
| Limit Group: | AI_3C_Limits | | | | |
| Last Update: | 20-May-2014 13:27:44 | Calib Date: | 20-May-2014 10:45:29 | | |
| Integrator: | Falcon | | | | |
| Quant Method: | External Standard | Quant By: | Initial Calibration | | |
| Last ICal File: | \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d | | | | |
| Column 1 : | | | Det: Varian Star #1: Rear-TCD | | |
| Process Host: | XAWRK012 | | | | |

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.690 | 1.690 | 0.000 | 3247063 | 100.0 | 97.2 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic6051914b-72292-ai_3c_l
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic6051914c-72292-ai_3c_l

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 3241358 | 3247063 | 3244210.5 | 0.18 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 97.01 | 97.18 | 97.09 | 0.18 |

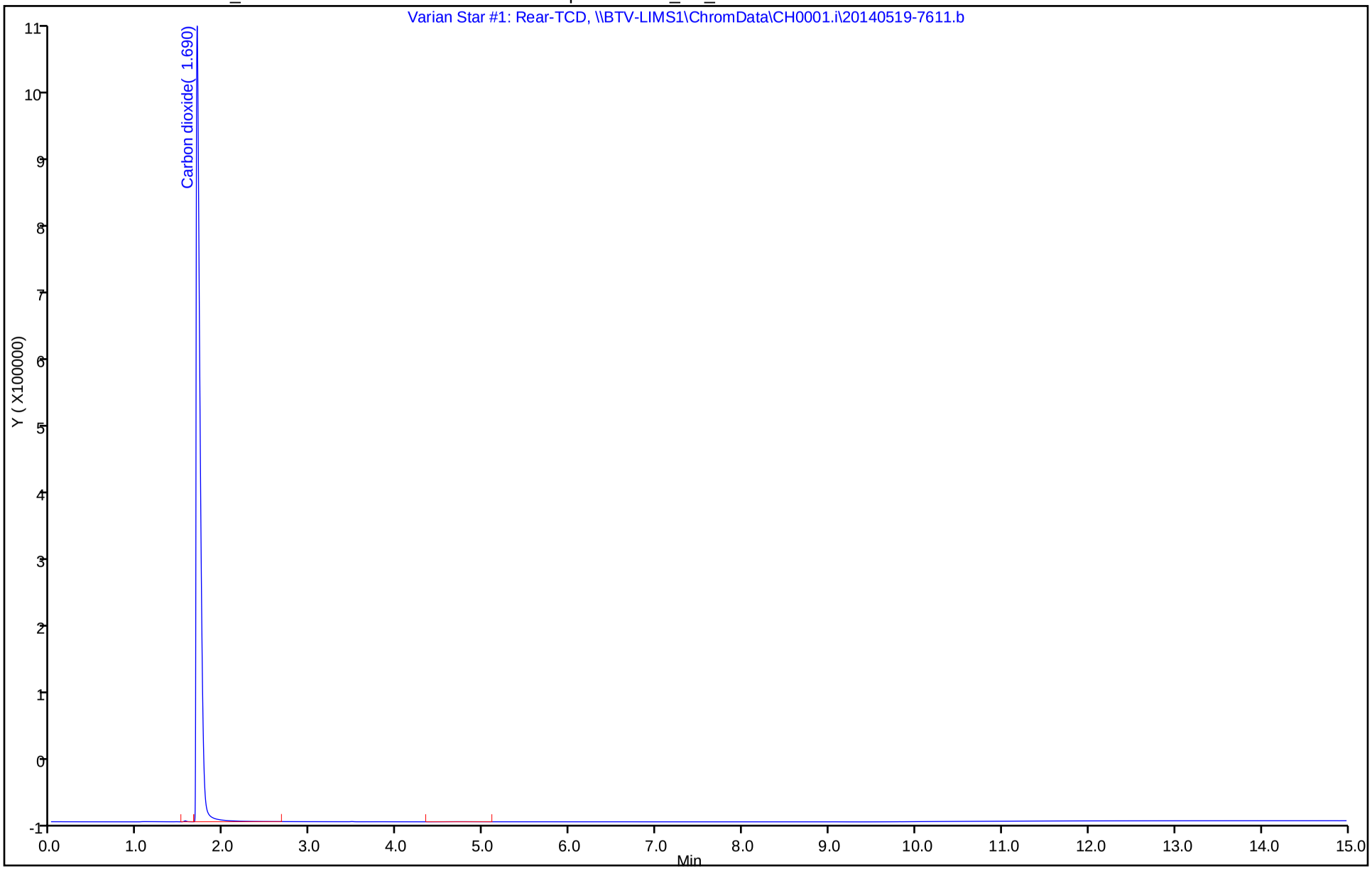
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied
---

Report Date: 20-May-2014 13:27:44 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic6051914B.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 12:08:55 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 5 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

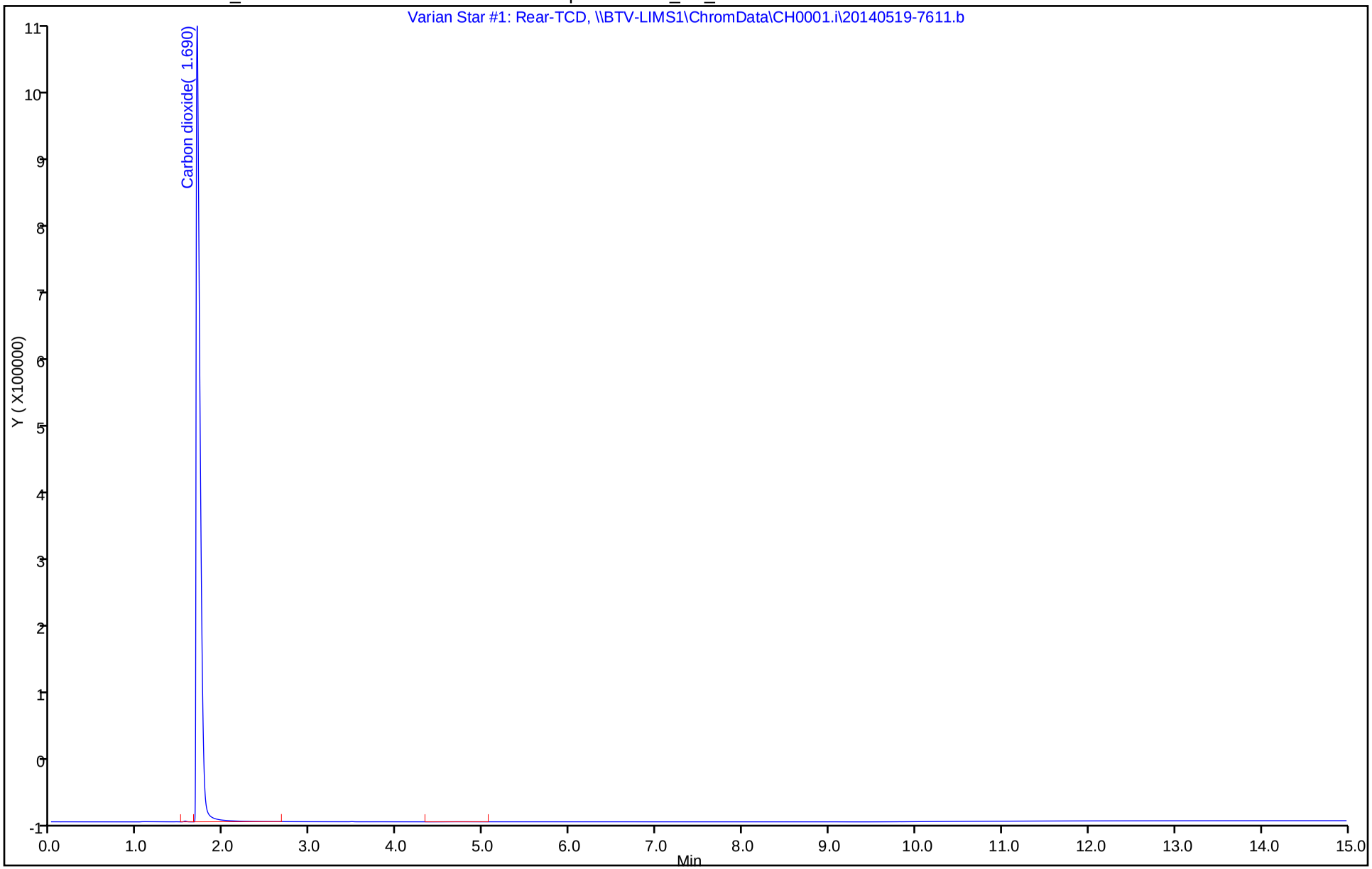


Report Date: 20-May-2014 13:27:44 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic6051914C.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 12:25:53 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 6 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic8051914B.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 8
Inject. Date: 19-May-2014 13:13:14 ALS Bottle#: 0 Worklist Smp#: 8
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC8051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:42 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 4 Methane | 6.426 | 6.532 | -0.106 | 3100680 | 99.0 | 102.2 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic8051914C.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 9
Inject. Date: 19-May-2014 13:30:56 ALS Bottle#: 0 Worklist Smp#: 9
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC8051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:43 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 19-May-2014 14:53:34

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 4 Methane | 6.429 | 6.532 | -0.103 | 3102072 | 99.0 | 102.2 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic8051914b-72292-ai_3c_l
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic8051914c-72292-ai_3c_l

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Methane | 3100680 | 3102072 | 3101376 | 0.04 |

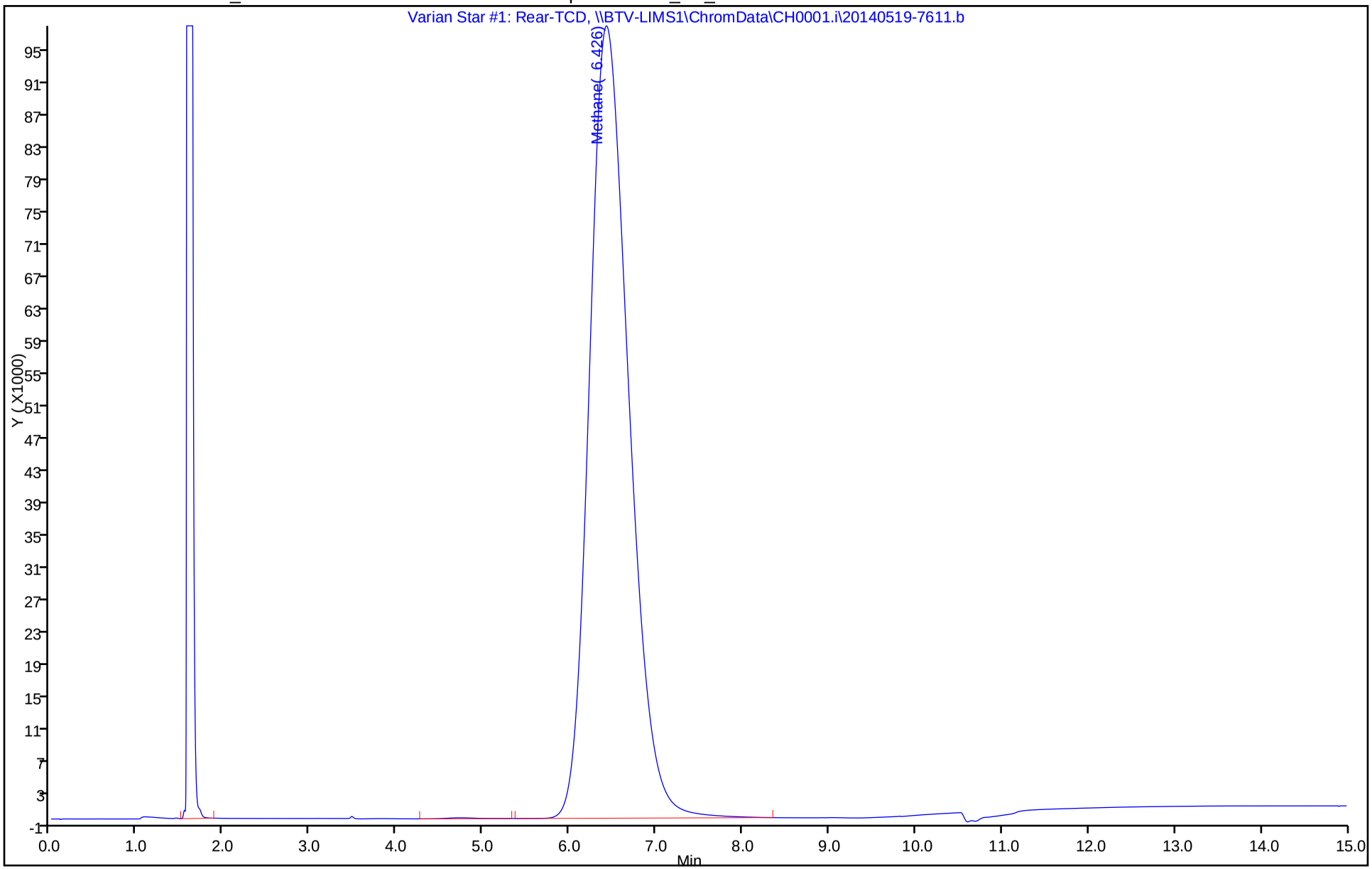
| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Methane | 102.15 | 102.2 | 102.17 | 0.04 |

---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied
---

Report Date: 20-May-2014 13:27:43 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

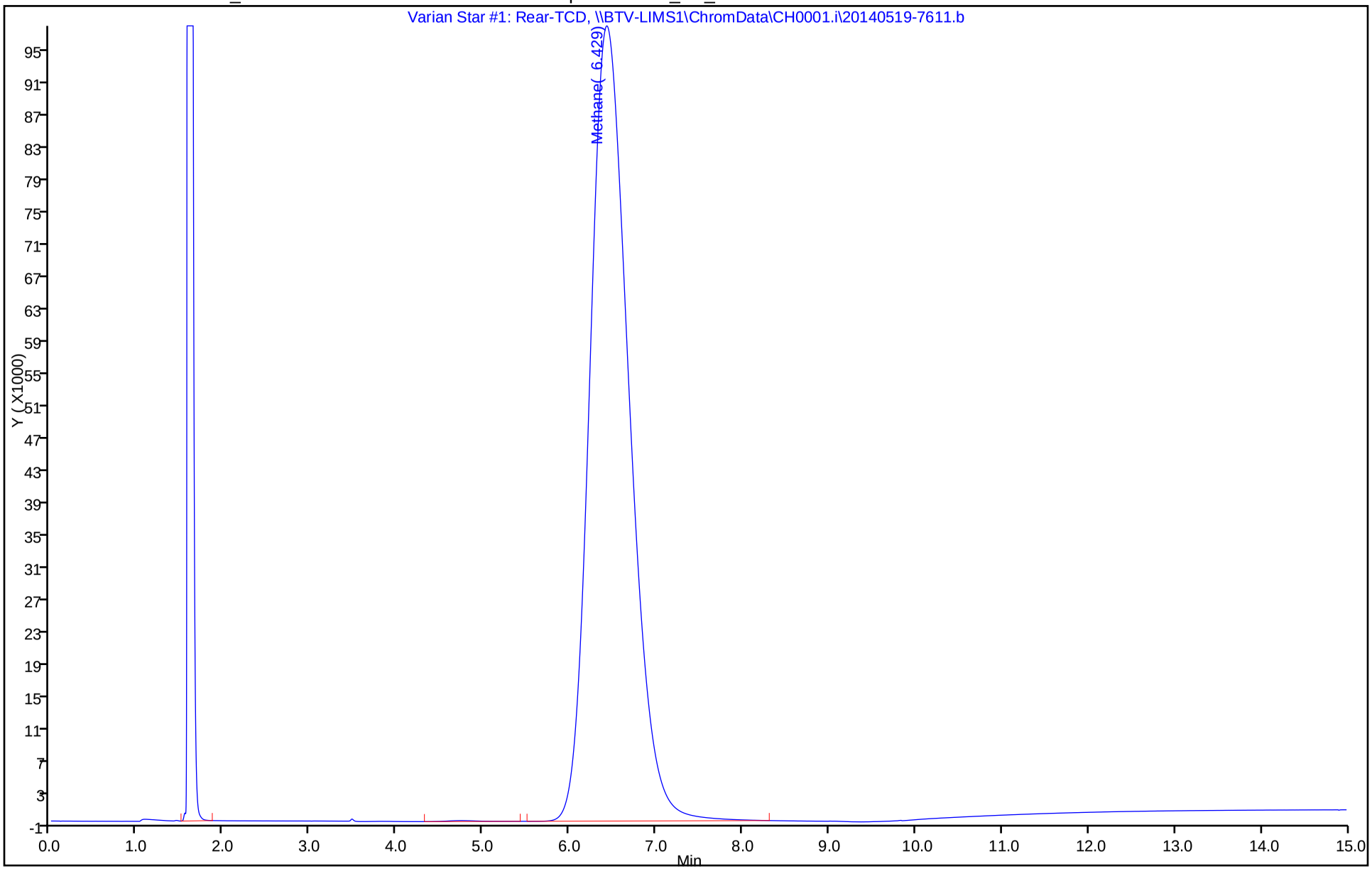
| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic8051914B.d | | | | |
| Injection Date: | 19-May-2014 13:13:14 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 8 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 20-May-2014 13:27:43 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic8051914C.d | | | | |
| Injection Date: | 19-May-2014 13:30:56 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 9 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic1051914B.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 11
Inject. Date: 19-May-2014 14:07:26 ALS Bottle#: 0 Worklist Smp#: 11
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC1051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:40 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 19-May-2014 14:53:59

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.722 | 1.690 | 0.032 | 1668 | 0.0500 | 0.0499 | |
| 2 Oxygen | 3.814 | 3.825 | -0.011 | 2174 | 0.0500 | 0.0626 | M |
| 4 Methane | 6.579 | 6.532 | 0.047 | 1486 | 0.0400 | 0.0490 | M |

QC Flag Legend

Review Flags
M - Manually Integrated

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic1051914C.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 12
Inject. Date: 19-May-2014 14:23:19 ALS Bottle#: 0 Worklist Smp#: 12
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC1051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:41 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 19-May-2014 14:54:47

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.725 | 1.690 | 0.035 | 1666 | 0.0500 | 0.0499 | |
| 2 Oxygen | 3.829 | 3.825 | 0.004 | 2210 | 0.0500 | 0.0636 | M |
| 4 Methane | 6.597 | 6.532 | 0.065 | 1525 | 0.0400 | 0.0502 | M |

QC Flag Legend

Review Flags
M - Manually Integrated

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic1051914b-72292-ai_3c_l
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic1051914c-72292-ai_3c_l

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 1668 | 1666 | 1667 | 0.12 |
| Oxygen | 2174 | 2210 | 2192 | 1.64 |
| Nitrogen | 0 | 0 | 0 | 0 |
| Methane | 1486 | 1525 | 1505.5 | 2.59 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0.05 | 0.05 | 0.05 | 0.12 |
| Oxygen | 0.06 | 0.06 | 0.06 | 1.64 |
| Nitrogen | 0 | 0 | 0 | 0 |
| Methane | 0.05 | 0.05 | 0.05 | 2.59 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

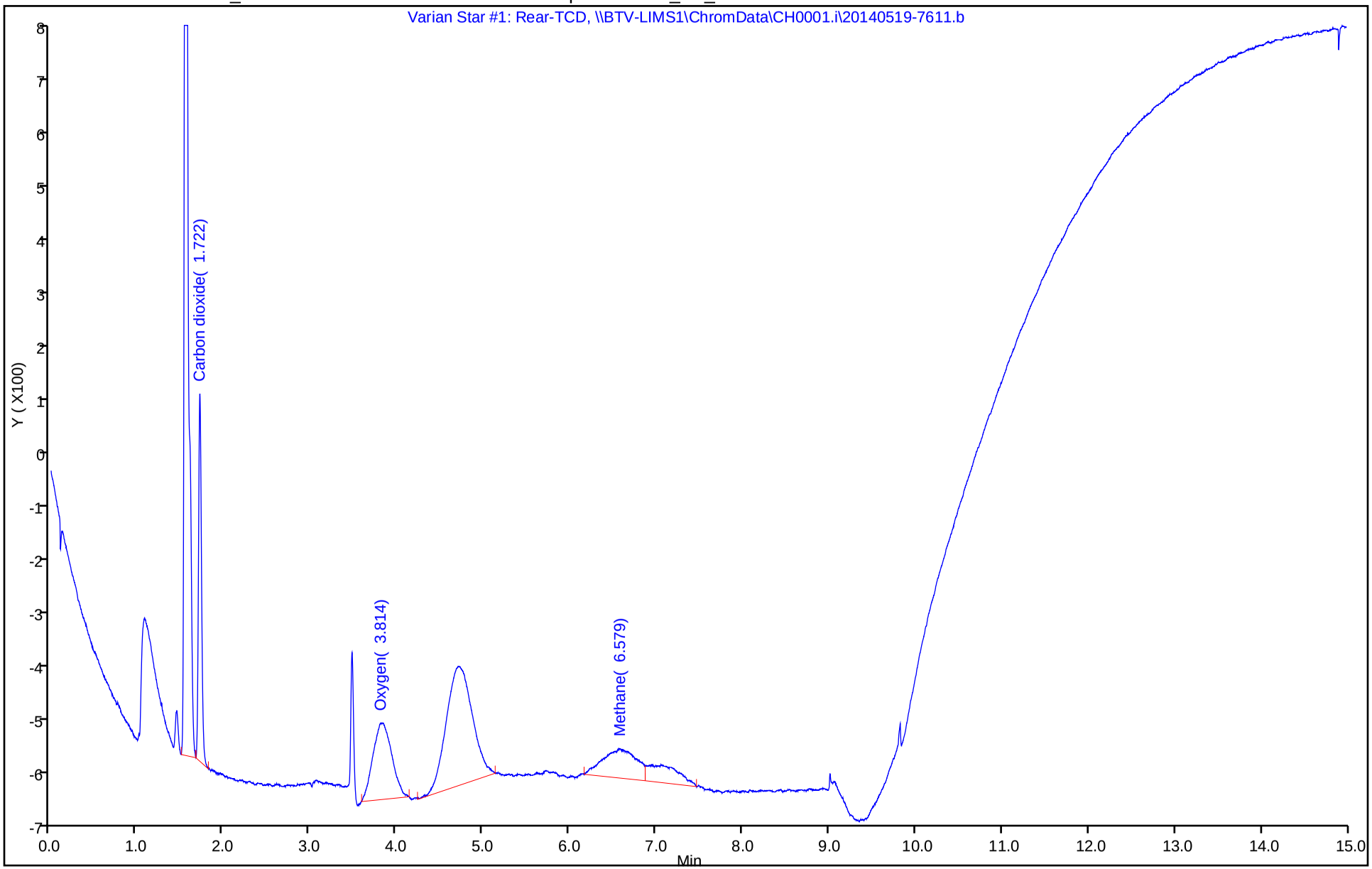
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 20-May-2014 13:27:40 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic1051914B.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 14:07:26 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 11 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

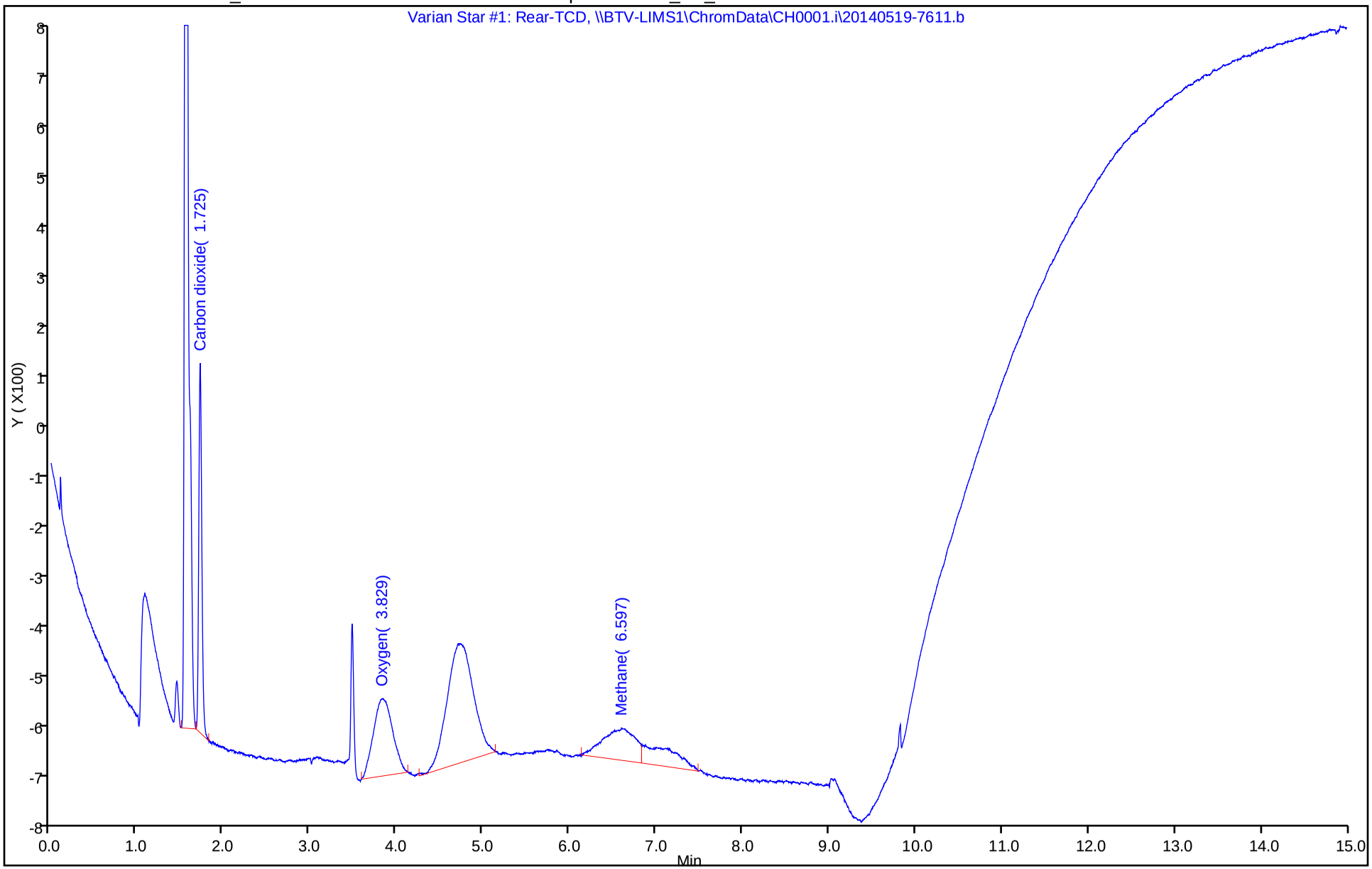


Report Date: 20-May-2014 13:27:41 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic1051914C.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 14:23:19 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 12 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Manual Integration/User Assign Peak Report

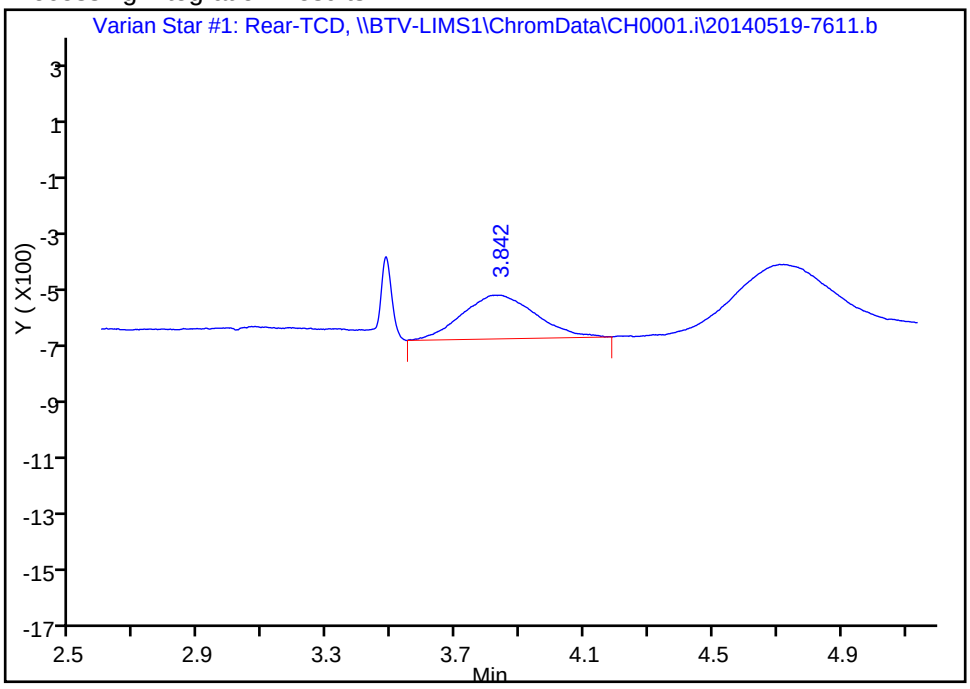
TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic1051914B.d
Injection Date: 19-May-2014 14:07:26 Instrument ID: CH0001.i
Lims ID: IC
Client ID:
Operator ID: BPL ALS Bottle#: 0 Worklist Smp#: 11
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Method: EPA3C_CH0001.i Limit Group: AI_3C_Limits
Column: Detector Varian Star #1: Rear-TCD

## 2 Oxygen, CAS: 7782-44-7

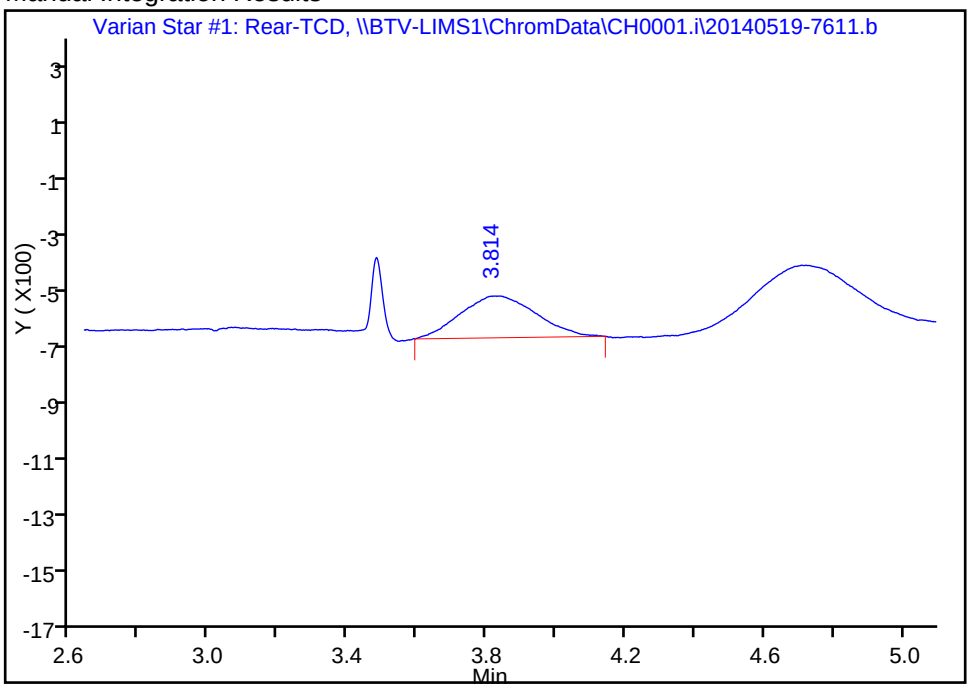
Processing Integration Results

RT: 3.84
Response: 2403
Amount: 0.059909




Manual Integration Results

RT: 3.81
Response: 2174
Amount: 0.062603




Reviewer: lyonsb, 20-May-2014 10:49:14
Audit Action: Manually Integrated
Audit Reason: Baseline Event

Manual Integration/User Assign Peak Report

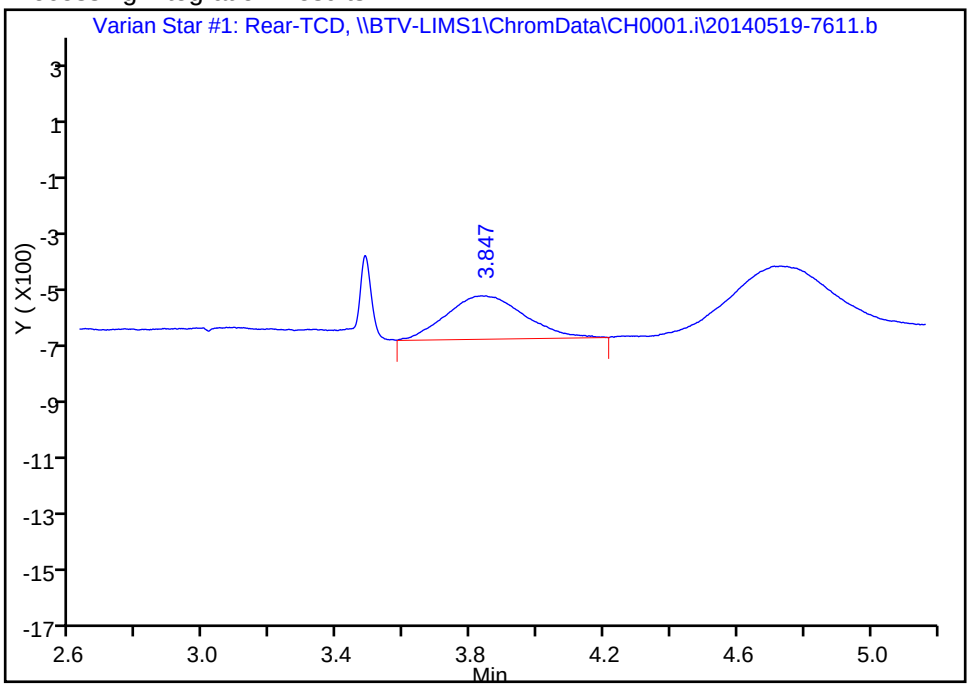
TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic1051914C.d
Injection Date: 19-May-2014 14:23:19 Instrument ID: CH0001.i
Lims ID: IC
Client ID:
Operator ID: BPL ALS Bottle#: 0 Worklist Smp#: 12
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Method: EPA3C_CH0001.i Limit Group: AI_3C_Limits
Column: Detector Varian Star #1: Rear-TCD

## 2 Oxygen, CAS: 7782-44-7

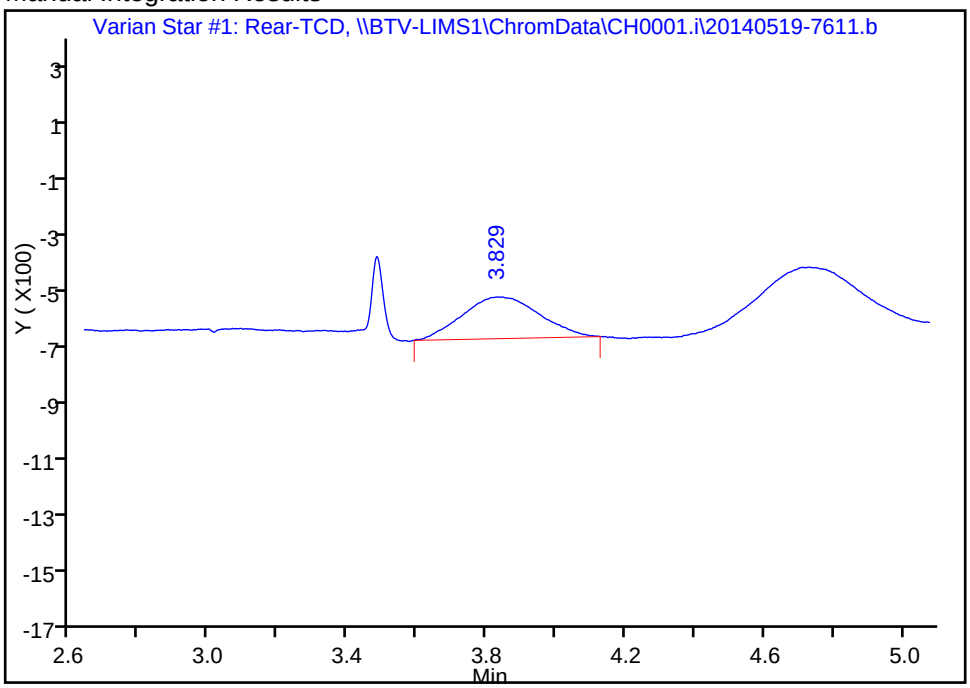
Processing Integration Results

RT: 3.85
Response: 2430
Amount: 0.061238




Manual Integration Results

RT: 3.83
Response: 2210
Amount: 0.063640




Reviewer: lyonsb, 20-May-2014 10:50:07
Audit Action: Manually Integrated
Audit Reason: Baseline Event

Manual Integration/User Assign Peak Report

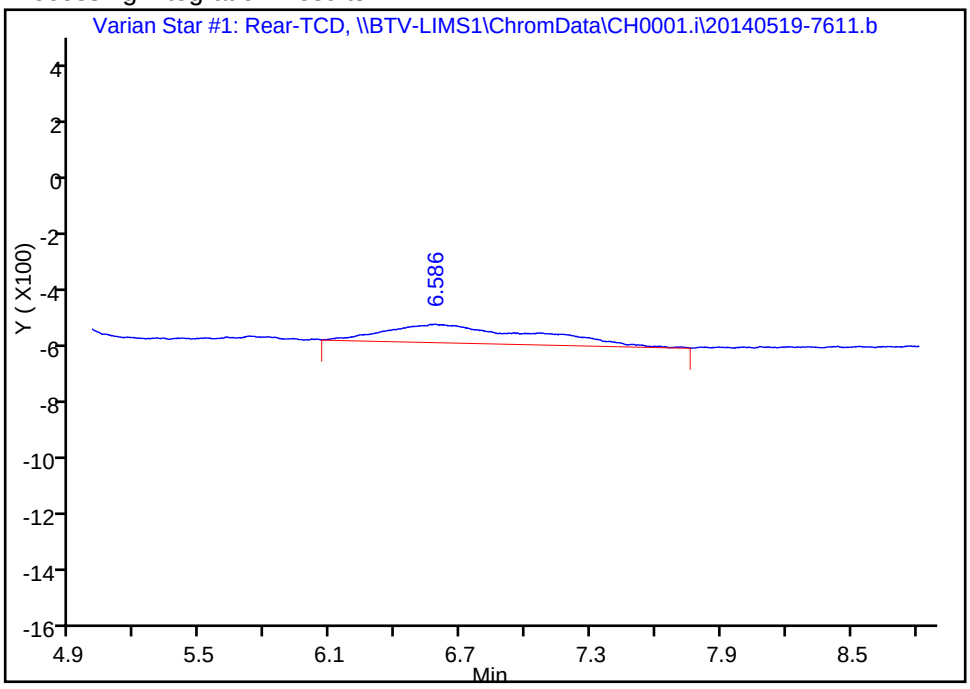
TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic1051914B.d
Injection Date: 19-May-2014 14:07:26 Instrument ID: CH0001.i
Lims ID: IC
Client ID:
Operator ID: BPL ALS Bottle#: 0 Worklist Smp#: 11
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Method: EPA3C_CH0001.i Limit Group: AI_3C_Limits
Column: Detector Varian Star #1: Rear-TCD

## 4 Methane, CAS: 74-82-8

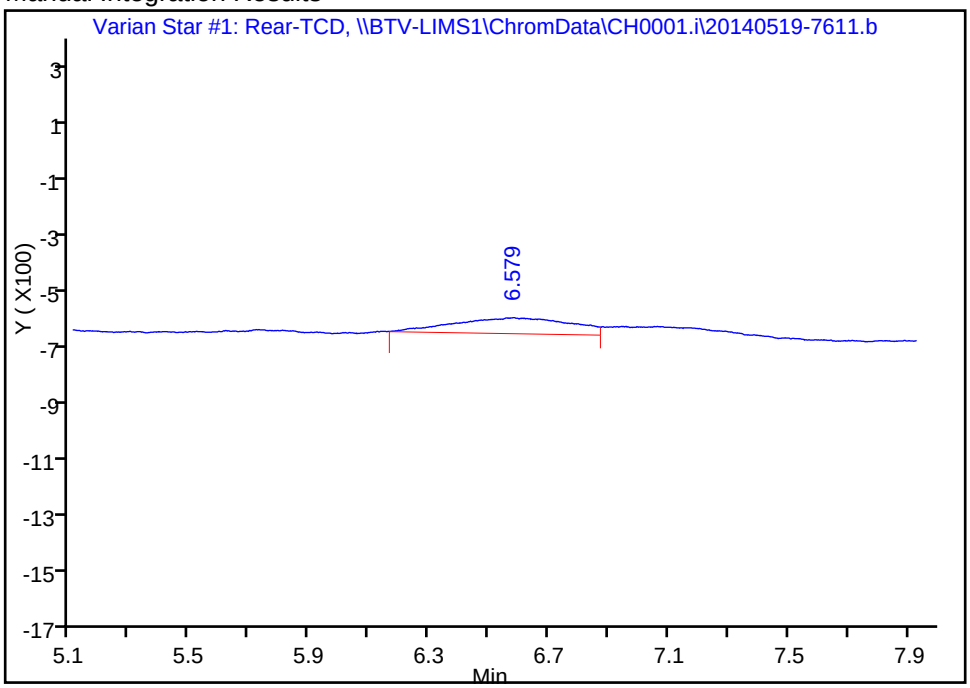
Processing Integration Results

RT: 6.59
Response: 3073
Amount: 0.075749




Manual Integration Results

RT: 6.58
Response: 1486
Amount: 0.048956




Reviewer: lyonsb, 19-May-2014 15:04:00
Audit Action: Split an Integrated Peak
Audit Reason: Baseline Event

Manual Integration/User Assign Peak Report

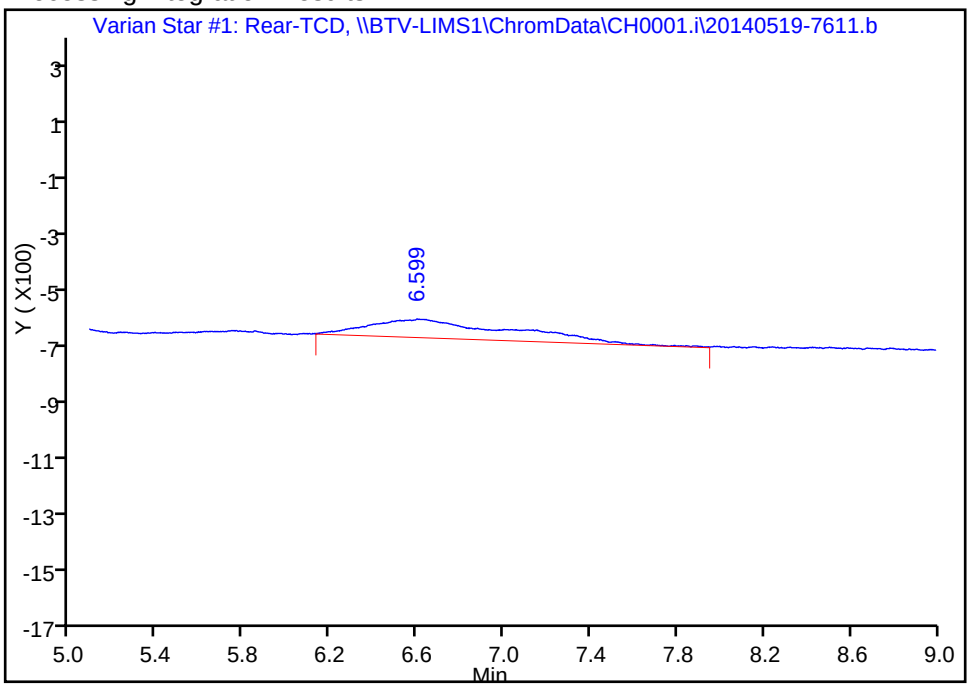
TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic1051914C.d
Injection Date: 19-May-2014 14:23:19 Instrument ID: CH0001.i
Lims ID: IC
Client ID:
Operator ID: BPL ALS Bottle#: 0 Worklist Smp#: 12
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Method: EPA3C_CH0001.i Limit Group: AI_3C_Limits
Column: Detector Varian Star #1: Rear-TCD

## 4 Methane, CAS: 74-82-8

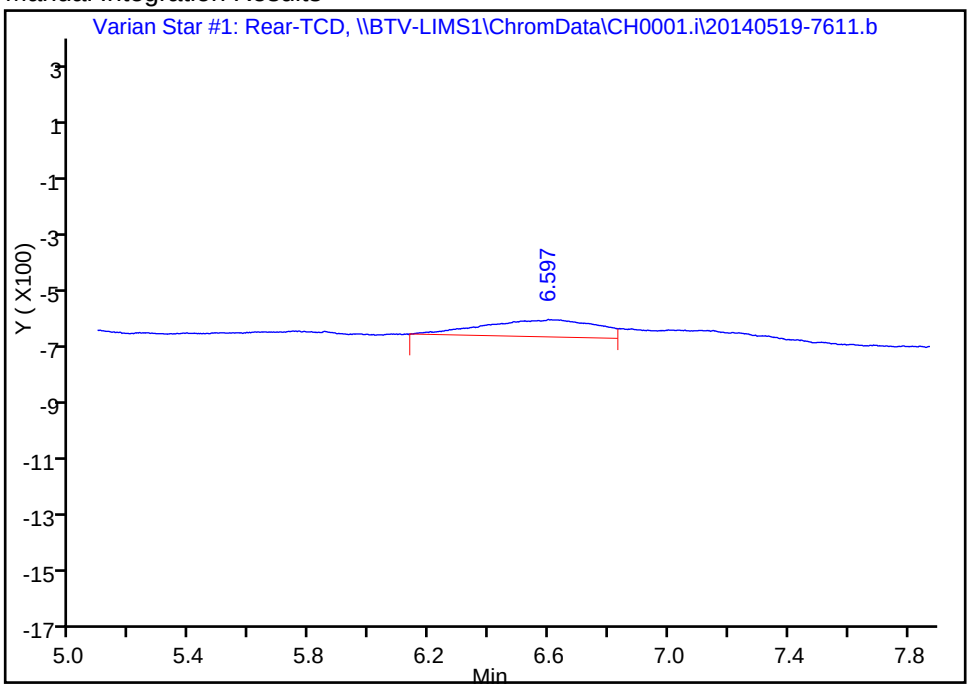
Processing Integration Results

RT: 6.60
Response: 2972
Amount: 0.079735




Manual Integration Results

RT: 6.60
Response: 1525
Amount: 0.050241




Reviewer: lyonsb, 19-May-2014 15:05:00
Audit Action: Split an Integrated Peak
Audit Reason: Baseline Event

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic2051914A.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 13
Inject. Date: 19-May-2014 14:39:30 ALS Bottle#: 0 Worklist Smp#: 13
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC1051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:42 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 20-May-2014 11:12:28

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.722 | 1.690 | 0.032 | 17612 | 0.5000 | 0.5271 | |
| 2 Oxygen | 3.829 | 3.825 | 0.004 | 17324 | 0.5000 | 0.4989 | |
| 3 Nitrogen | 4.717 | 4.721 | -0.004 | 21447 | 0.5000 | 0.5713 | |
| 4 Methane | 6.524 | 6.532 | -0.008 | 11896 | 0.4000 | 0.3919 | M |
| 5 Carbon monoxide | 7.036 | 7.064 | -0.028 | 18875 | 0.5000 | 0.5381 | M |

QC Flag Legend

Review Flags
M - Manually Integrated

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic2051914B.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 14
Inject. Date: 19-May-2014 14:55:22 ALS Bottle#: 0 Worklist Smp#: 14
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC2051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:42 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 19-May-2014 15:18:57

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.720 | 1.690 | 0.030 | 17549 | 0.5000 | 0.5252 | |
| 2 Oxygen | 3.822 | 3.825 | -0.003 | 17291 | 0.5000 | 0.4979 | |
| 3 Nitrogen | 4.704 | 4.721 | -0.017 | 21476 | 0.5000 | 0.5721 | |
| 4 Methane | 6.517 | 6.532 | -0.015 | 12299 | 0.4000 | 0.4052 | |
| 5 Carbon monoxide | 7.037 | 7.064 | -0.027 | 18355 | 0.5000 | 0.5233 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic2051914a-72292-ai_3c_l
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic2051914b-72292-ai_3c_l

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 17612 | 17549 | 17580.5 | 0.36 |
| Oxygen | 17324 | 17291 | 17307.5 | 0.19 |
| Nitrogen | 21447 | 21476 | 21461.5 | 0.14 |
| Methane | 11896 | 12299 | 12097.5 | 3.33 |
| Carbon monoxide | 18875 | 18355 | 18615 | 2.79 |

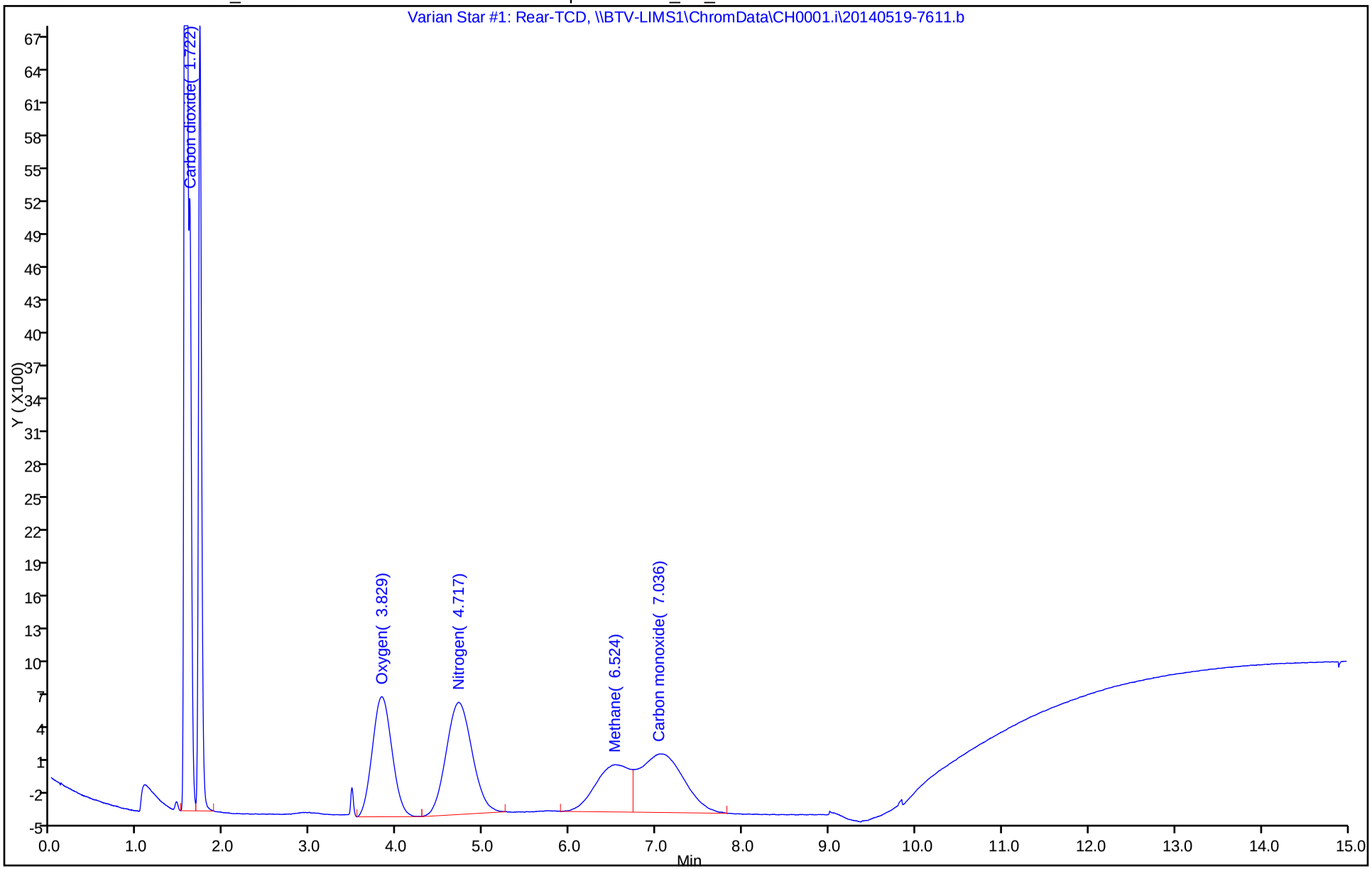
| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0.53 | 0.53 | 0.53 | 0.36 |
| Oxygen | 0.5 | 0.5 | 0.5 | 0.19 |
| Nitrogen | 0.57 | 0.57 | 0.57 | 0.14 |
| Methane | 0.39 | 0.41 | 0.4 | 3.33 |
| Carbon monoxide | 0.54 | 0.52 | 0.53 | 2.79 |

---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 20-May-2014 13:27:42 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic2051914A.d | | | | |
| Injection Date: | 19-May-2014 14:39:30 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 13 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

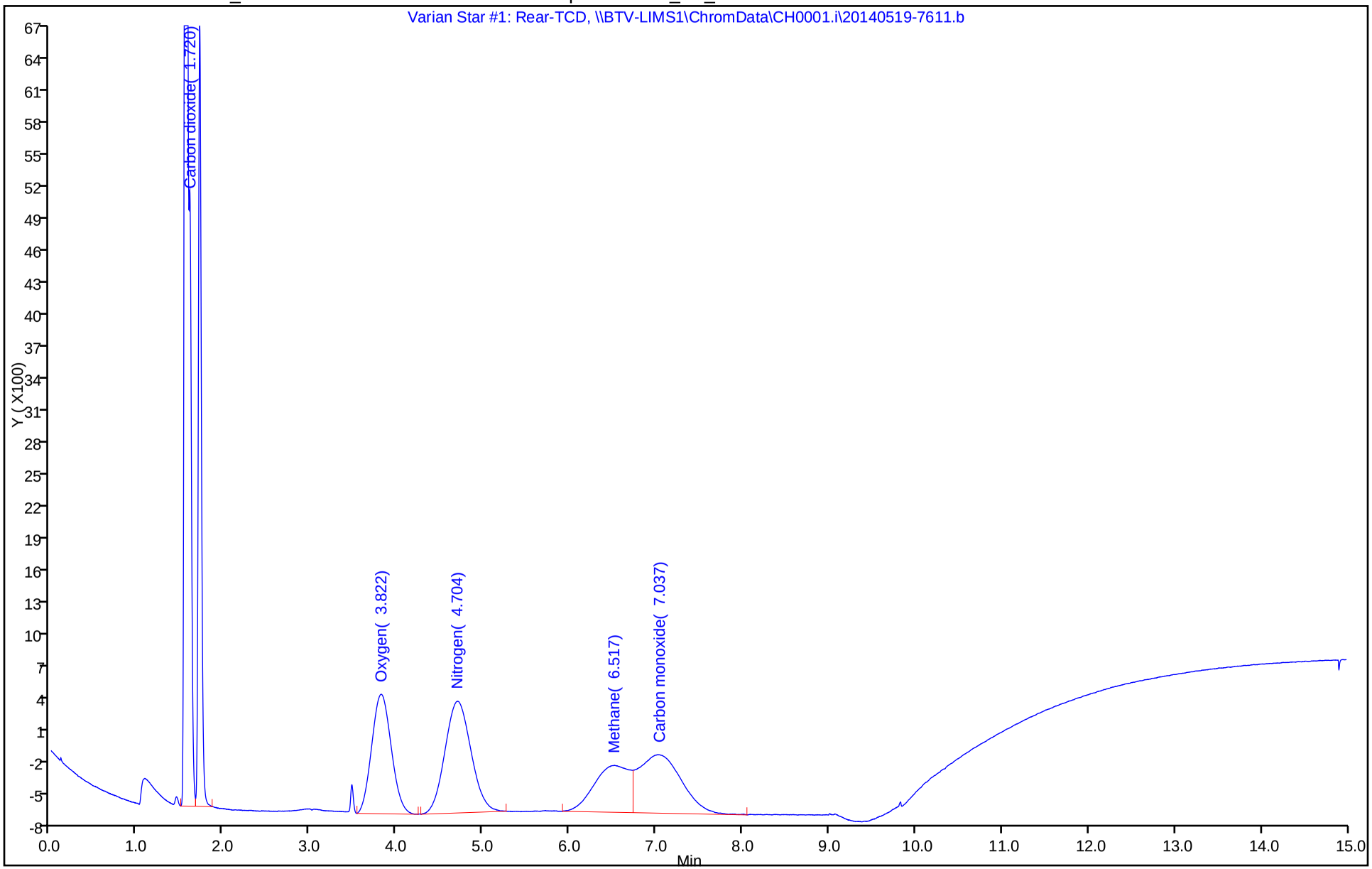


Report Date: 20-May-2014 13:27:42 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic2051914B.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 14:55:22 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 14 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Manual Integration/User Assign Peak Report

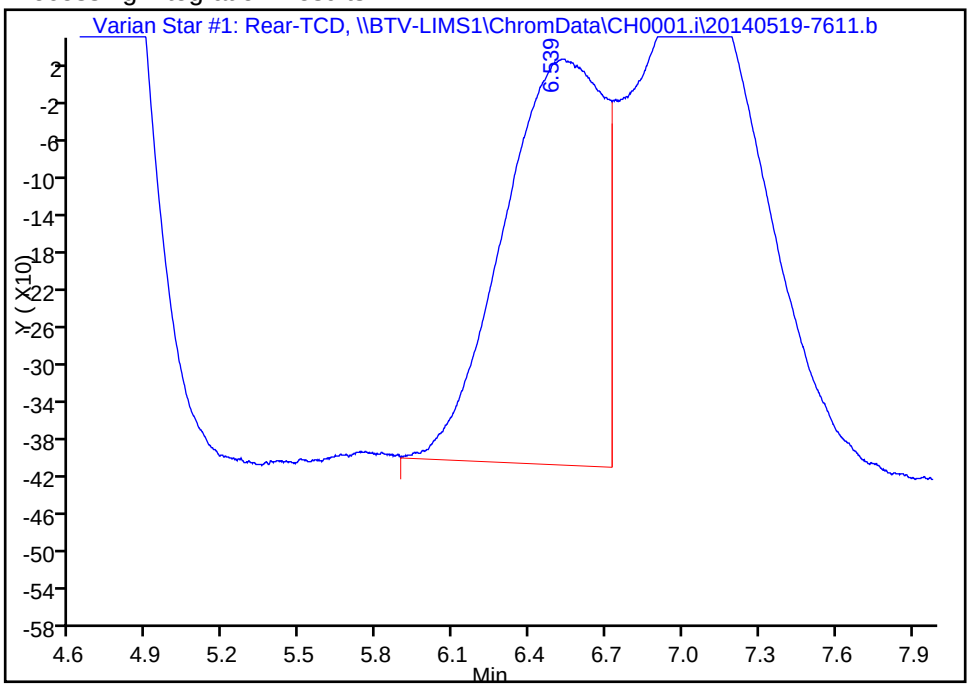
TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic2051914A.d
Injection Date: 19-May-2014 14:39:30 Instrument ID: CH0001.i
Lims ID: IC
Client ID:
Operator ID: BPL ALS Bottle#: 0 Worklist Smp#: 13
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Method: EPA3C_CH0001.i Limit Group: AI_3C_Limits
Column: Detector Varian Star #1: Rear-TCD

## 4 Methane, CAS: 74-82-8

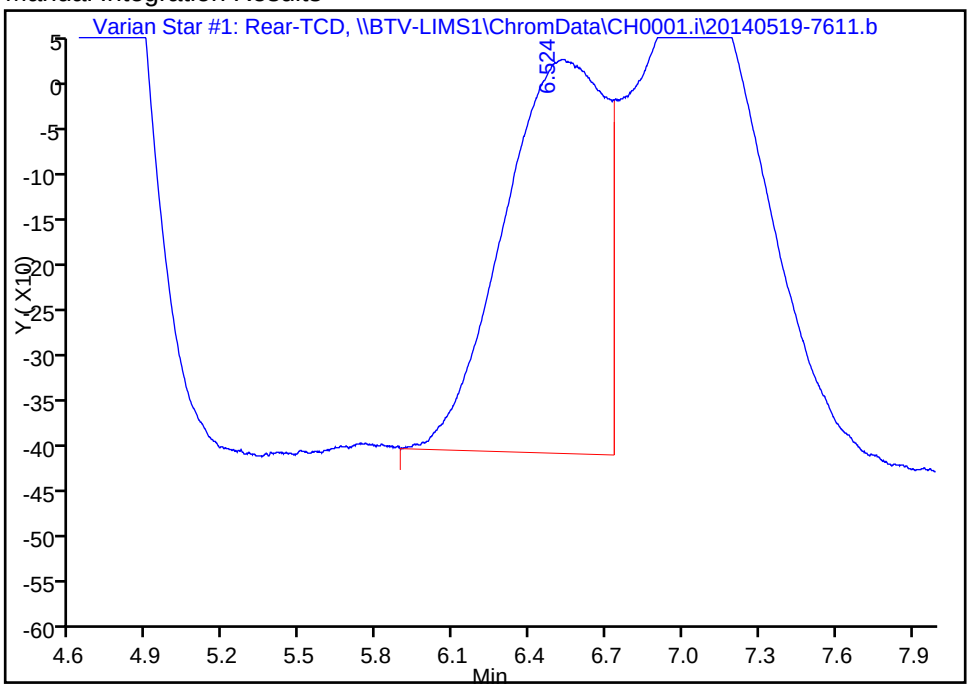
Processing Integration Results

RT: 6.54
Response: 11827
Amount: 0.390947




Manual Integration Results

RT: 6.52
Response: 11896
Amount: 0.391914




Reviewer: lyonsb, 20-May-2014 11:19:29
Audit Action: Manually Integrated/Assigned Compound ID
Audit Reason: Baseline Event

Manual Integration/User Assign Peak Report

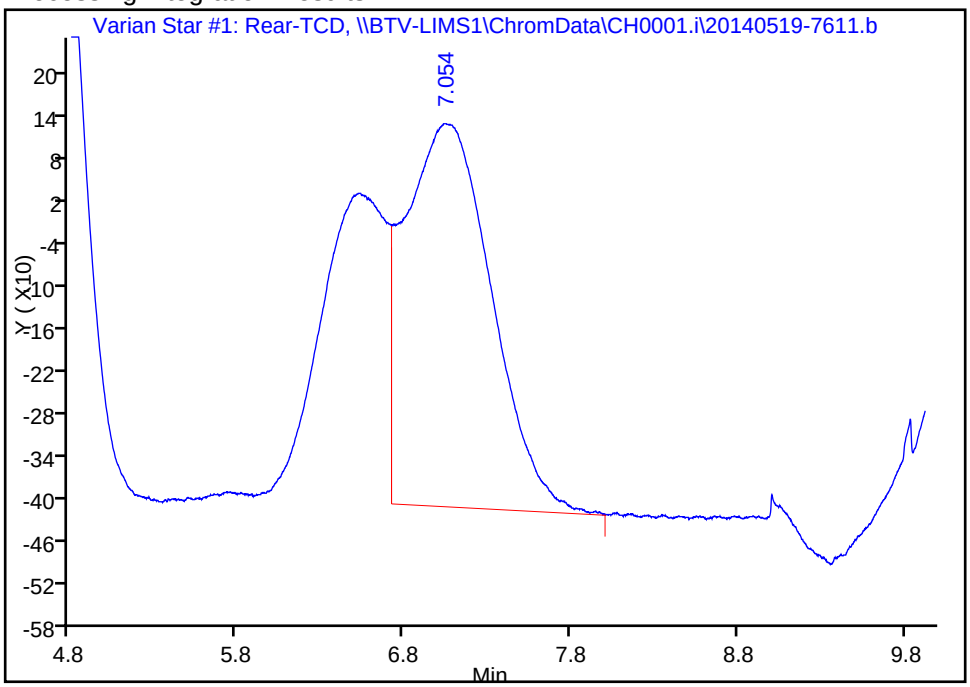
TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic2051914A.d
Injection Date: 19-May-2014 14:39:30 Instrument ID: CH0001.i
Lims ID: IC
Client ID:
Operator ID: BPL ALS Bottle#: 0 Worklist Smp#: 13
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Method: EPA3C_CH0001.i Limit Group: AI_3C_Limits
Column: Detector Varian Star #1: Rear-TCD

## 5 Carbon monoxide, CAS: 630-08-0

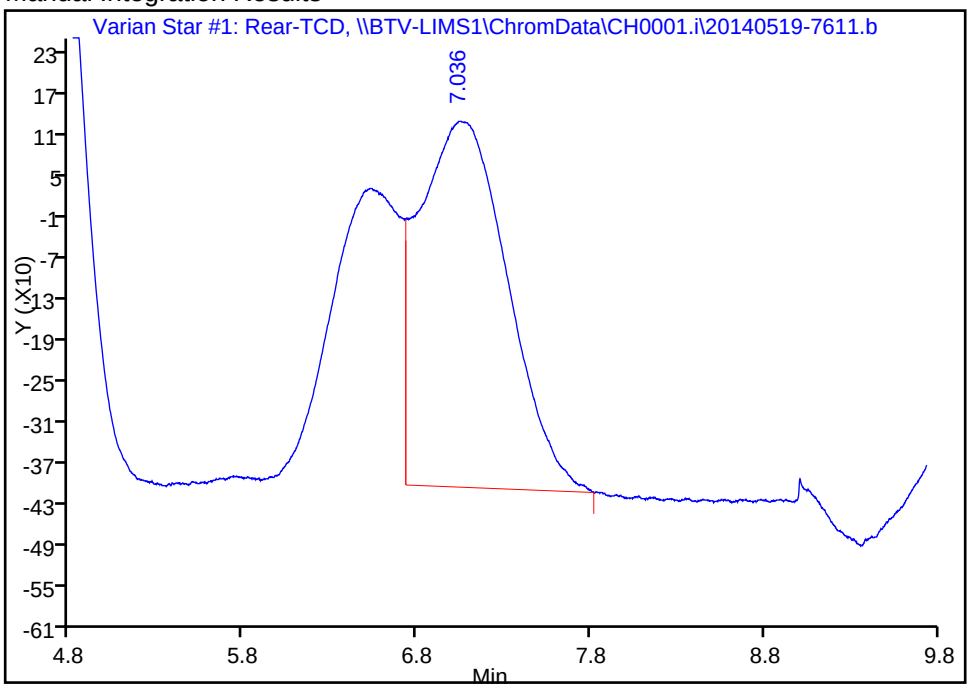
Processing Integration Results

RT: 7.05
Response: 19471
Amount: 0.556802




Manual Integration Results

RT: 7.04
Response: 18875
Amount: 0.538115




Reviewer: lyonsb, 20-May-2014 11:19:29
Audit Action: Split an Integrated Peak
Audit Reason: Baseline Event

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic3051914B.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 17
Inject. Date: 19-May-2014 15:42:57 ALS Bottle#: 0 Worklist Smp#: 17
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC3051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:40 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 19-May-2014 16:32:10

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.718 | 1.690 | 0.028 | 80678 | 2.50 | 2.41 | |
| 2 Oxygen | 3.815 | 3.825 | -0.010 | 80220 | 2.50 | 2.31 | |
| 3 Nitrogen | 4.698 | 4.721 | -0.023 | 92615 | 2.50 | 2.47 | |
| 4 Methane | 6.503 | 6.532 | -0.029 | 50875 | 2.00 | 1.68 | |
| 5 Carbon monoxide | 7.020 | 7.064 | -0.044 | 91976 | 2.50 | 2.62 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic3051914C.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 18
Inject. Date: 19-May-2014 15:58:49 ALS Bottle#: 0 Worklist Smp#: 18
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC3051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:40 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 19-May-2014 16:36:29

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.720 | 1.690 | 0.030 | 80878 | 2.50 | 2.42 | |
| 2 Oxygen | 3.820 | 3.825 | -0.005 | 80508 | 2.50 | 2.32 | |
| 3 Nitrogen | 4.705 | 4.721 | -0.016 | 92955 | 2.50 | 2.48 | |
| 4 Methane | 6.517 | 6.532 | -0.015 | 51924 | 2.00 | 1.71 | |
| 5 Carbon monoxide | 7.028 | 7.064 | -0.036 | 91799 | 2.50 | 2.62 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic3051914b-72292-ai_3c_l
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic3051914c-72292-ai_3c_l

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 80678 | 80878 | 80778 | 0.25 |
| Oxygen | 80220 | 80508 | 80364 | 0.36 |
| Nitrogen | 92615 | 92955 | 92785 | 0.37 |
| Methane | 50875 | 51924 | 51399.5 | 2.04 |
| Carbon monoxide | 91976 | 91799 | 91887.5 | 0.19 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 2.41 | 2.42 | 2.42 | 0.25 |
| Oxygen | 2.31 | 2.32 | 2.31 | 0.36 |
| Nitrogen | 2.47 | 2.48 | 2.47 | 0.37 |
| Methane | 1.68 | 1.71 | 1.69 | 2.04 |
| Carbon monoxide | 2.62 | 2.62 | 2.62 | 0.19 |

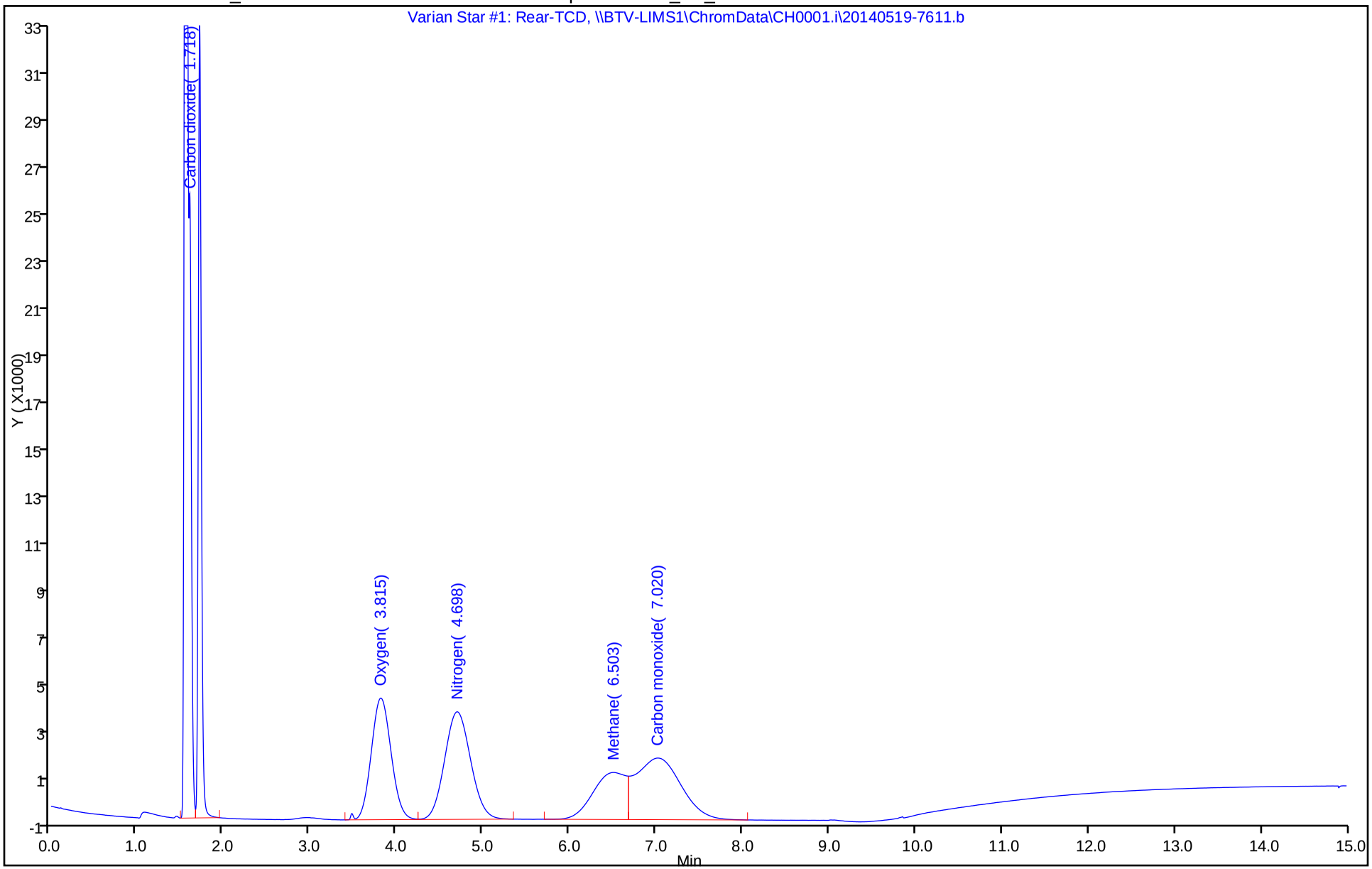
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 20-May-2014 13:27:40 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic3051914B.d

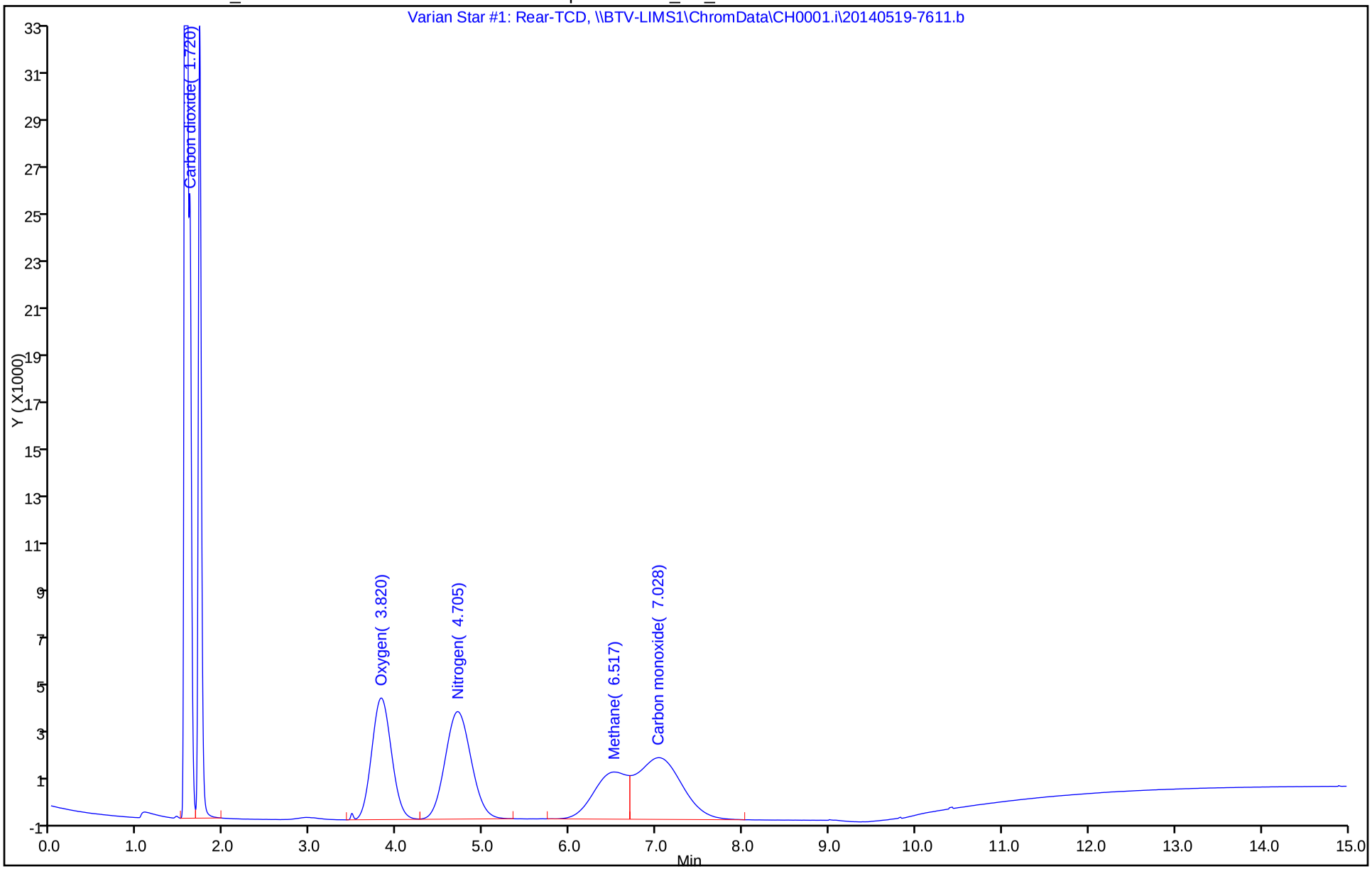
| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 15:42:57 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 17 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 20-May-2014 13:27:40 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic3051914C.d | | | | |
| Injection Date: | 19-May-2014 15:58:49 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 18 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic5051914B.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 20
Inject. Date: 19-May-2014 16:30:31 ALS Bottle#: 0 Worklist Smp#: 20
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC5051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:38 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 2 Oxygen | 3.800 | 3.825 | -0.025 | 687490 | 22.0 | 19.8 | |
| 3 Nitrogen | 4.647 | 4.721 | -0.074 | 2845671 | 78.0 | 75.8 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic5051914C.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 21
Inject. Date: 19-May-2014 16:46:24 ALS Bottle#: 0 Worklist Smp#: 21
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC5051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:39 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 2 Oxygen | 3.798 | 3.825 | -0.027 | 689877 | 22.0 | 19.9 | |
| 3 Nitrogen | 4.643 | 4.721 | -0.078 | 2857487 | 78.0 | 76.1 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic5051914b-72292-ai_3c_l
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic5051914c-72292-ai_3c_l

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Oxygen | 687490 | 689877 | 688683.5 | 0.35 |
| Nitrogen | 2845671 | 2857487 | 2851579 | 0.41 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Oxygen | 19.8 | 19.87 | 19.83 | 0.35 |
| Nitrogen | 75.8 | 76.12 | 75.96 | 0.41 |

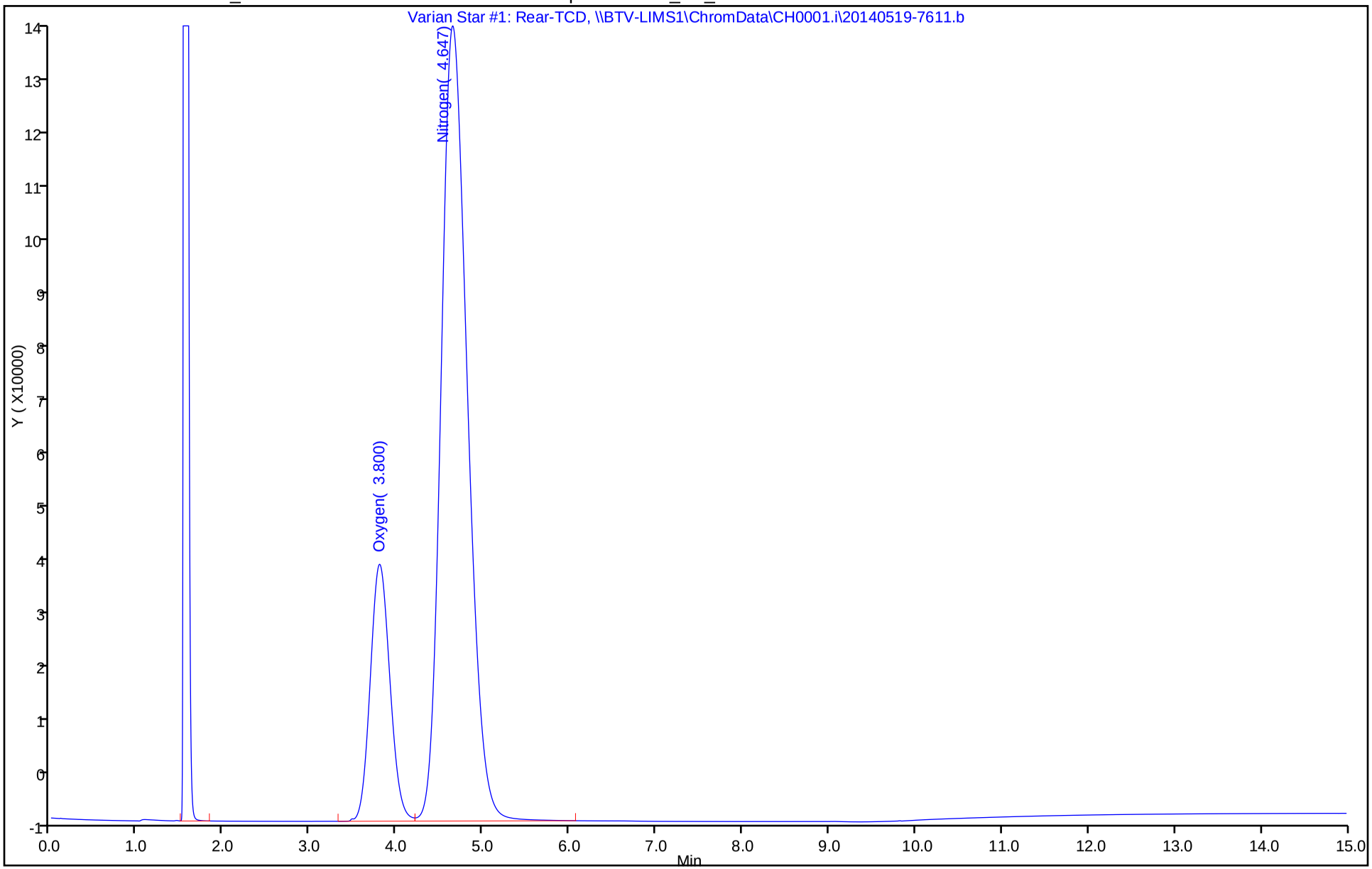
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 20-May-2014 13:27:38 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic5051914B.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 16:30:31 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 20 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

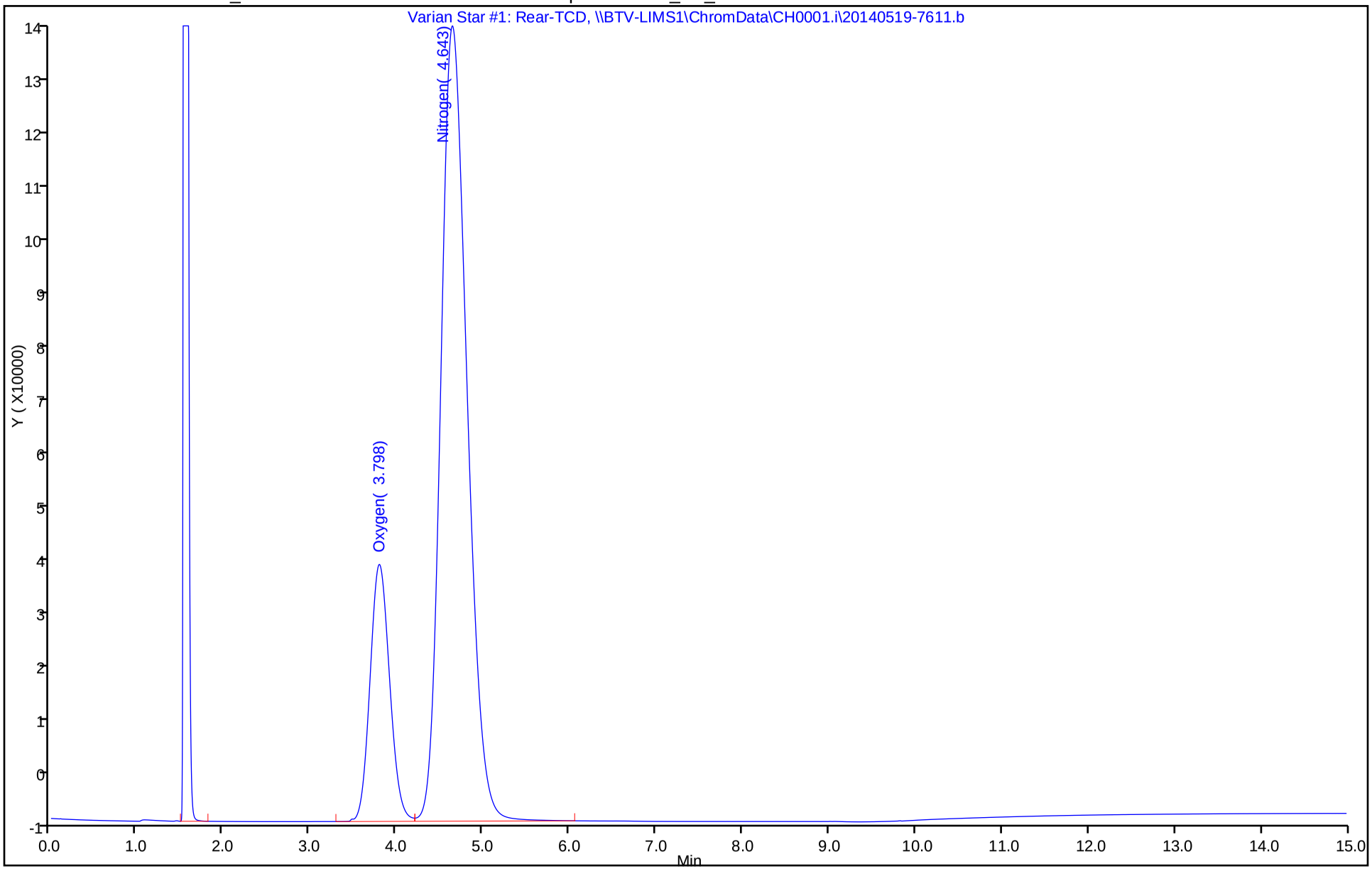


Report Date: 20-May-2014 13:27:39 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic5051914C.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 16:46:24 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 21 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic7051914B.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 23
Inject. Date: 19-May-2014 17:18:07 ALS Bottle#: 0 Worklist Smp#: 23
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC7051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:38 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 3 Nitrogen | 4.630 | 4.721 | -0.091 | 3581392 | 100.0 | 95.4 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic7051914C.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 24
Inject. Date: 19-May-2014 17:33:58 ALS Bottle#: 0 Worklist Smp#: 24
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC7051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:38 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 20-May-2014 10:16:33

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 3 Nitrogen | 4.625 | 4.721 | -0.096 | 3585163 | 100.0 | 95.5 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic7051914b-72292-ai_3c_l
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic7051914c-72292-ai_3c_l

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Nitrogen | 3581392 | 3585163 | 3583277.5 | 0.11 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Nitrogen | 95.4 | 95.5 | 95.45 | 0.11 |

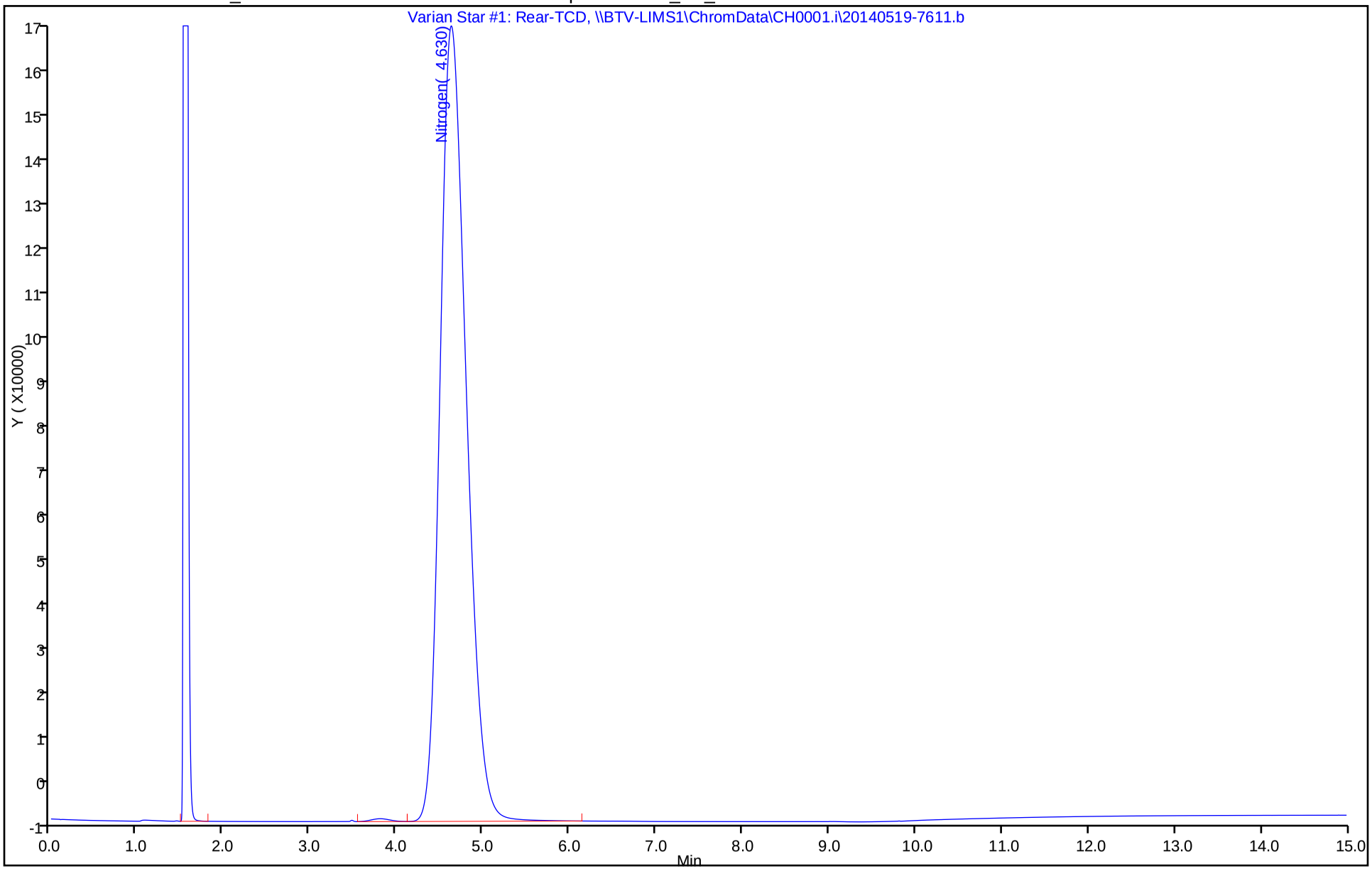
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied
---

Report Date: 20-May-2014 13:27:38 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic7051914B.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 17:18:07 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 23 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

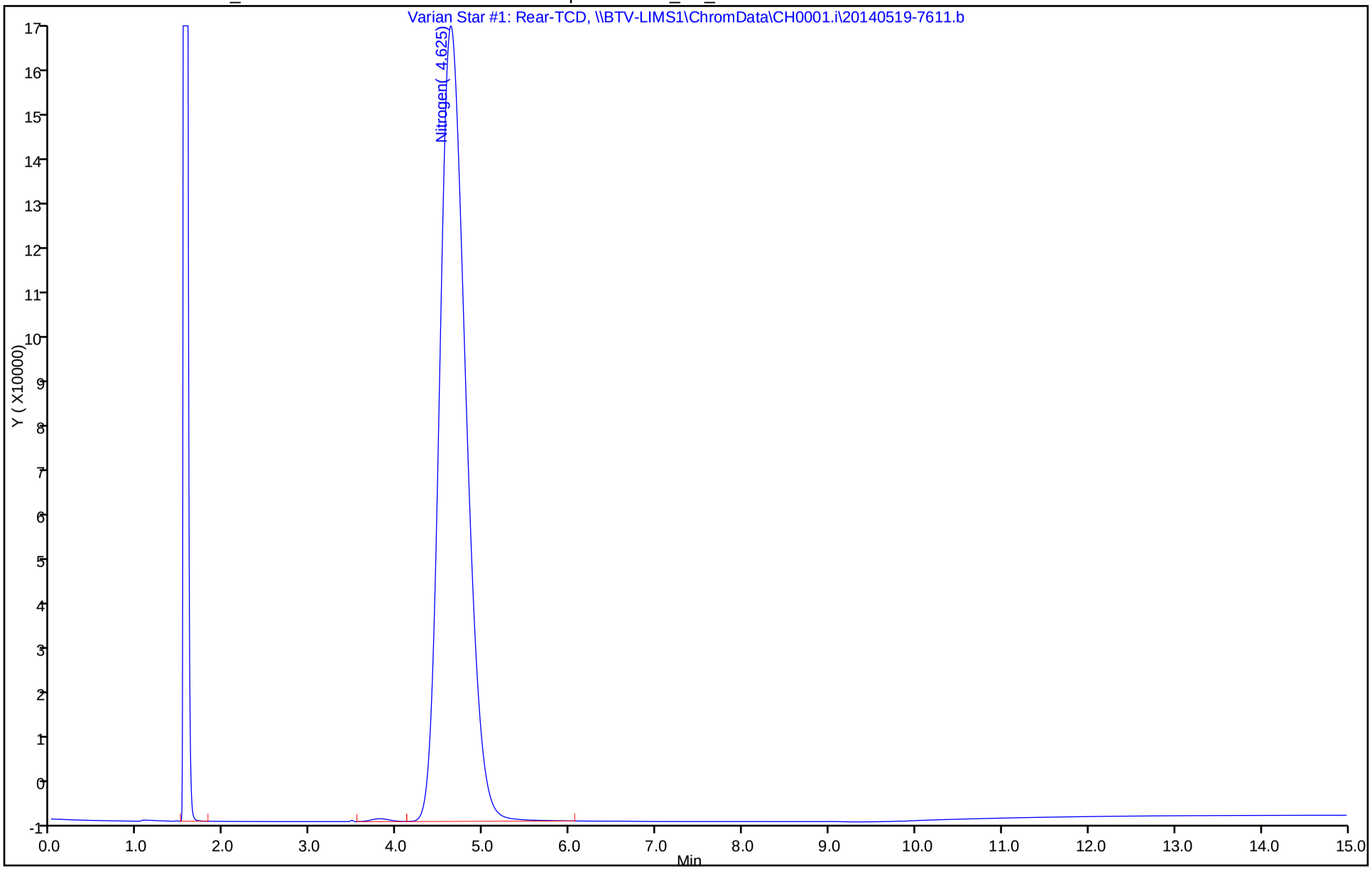


Report Date: 20-May-2014 13:27:38 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic7051914C.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 17:33:58 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 24 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic10051914A.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 28
Inject. Date: 19-May-2014 18:37:26 ALS Bottle#: 0 Worklist Smp#: 80
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC10051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:36 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 20-May-2014 10:19:29

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 5 Carbon monoxide | 7.024 | 7.064 | -0.040 | 2798 | 0.1000 | 0.0798 | M |

QC Flag Legend

Review Flags
M - Manually Integrated

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic10051914B.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 29
Inject. Date: 19-May-2014 18:53:18 ALS Bottle#: 0 Worklist Smp#: 81
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC10051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:37 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 20-May-2014 10:19:17

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 5 Carbon monoxide | 7.037 | 7.064 | -0.027 | 2903 | 0.1000 | 0.0828 | M |

QC Flag Legend

Review Flags
M - Manually Integrated

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic10051914a-72292-ai_3c_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic10051914b-72292-ai_3c_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon monoxide | 2798 | 2903 | 2850.5 | 3.68 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon monoxide | 0.08 | 0.08 | 0.08 | 3.68 |

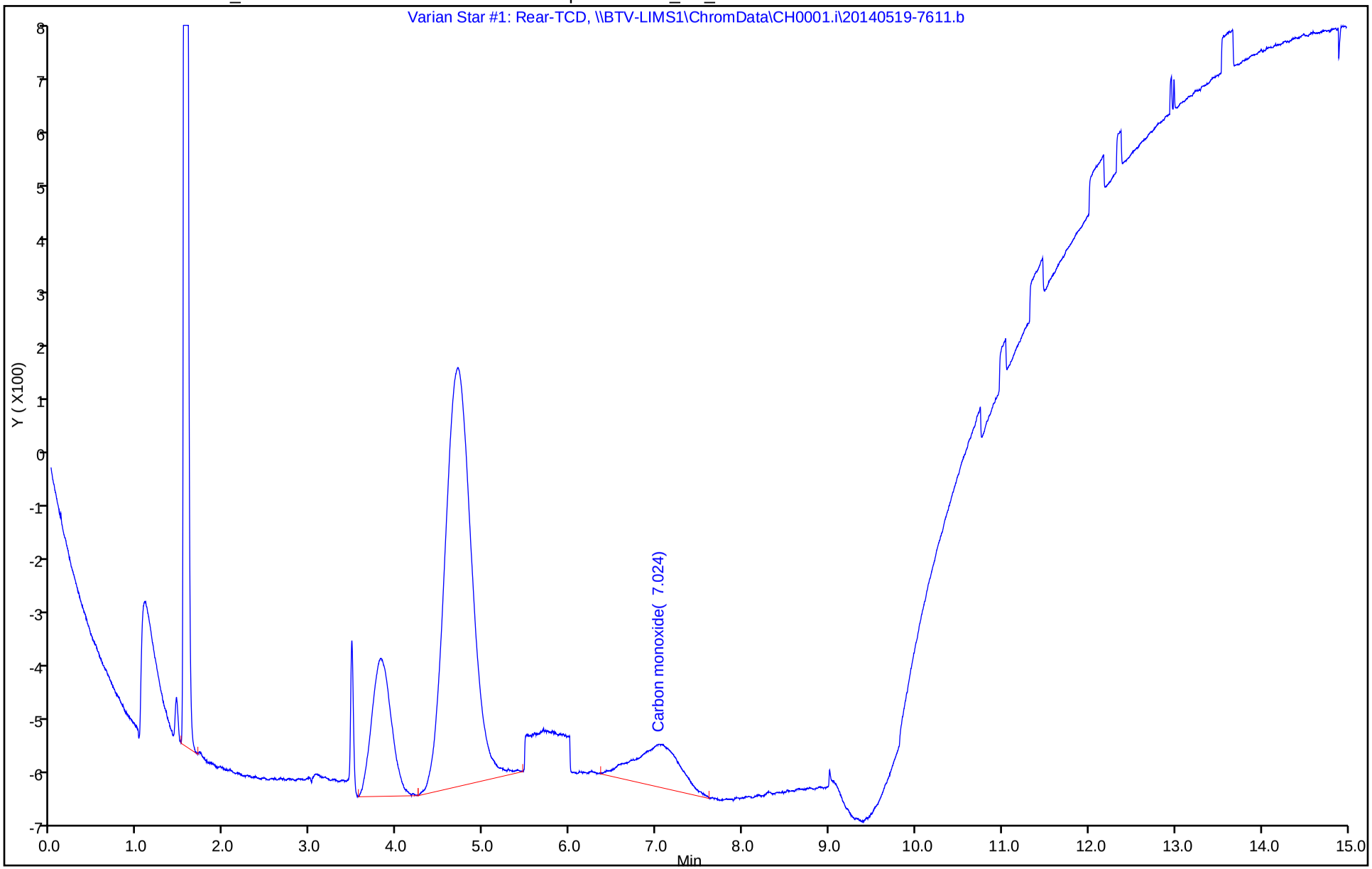
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied
---

Report Date: 20-May-2014 13:27:37 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic10051914A.d

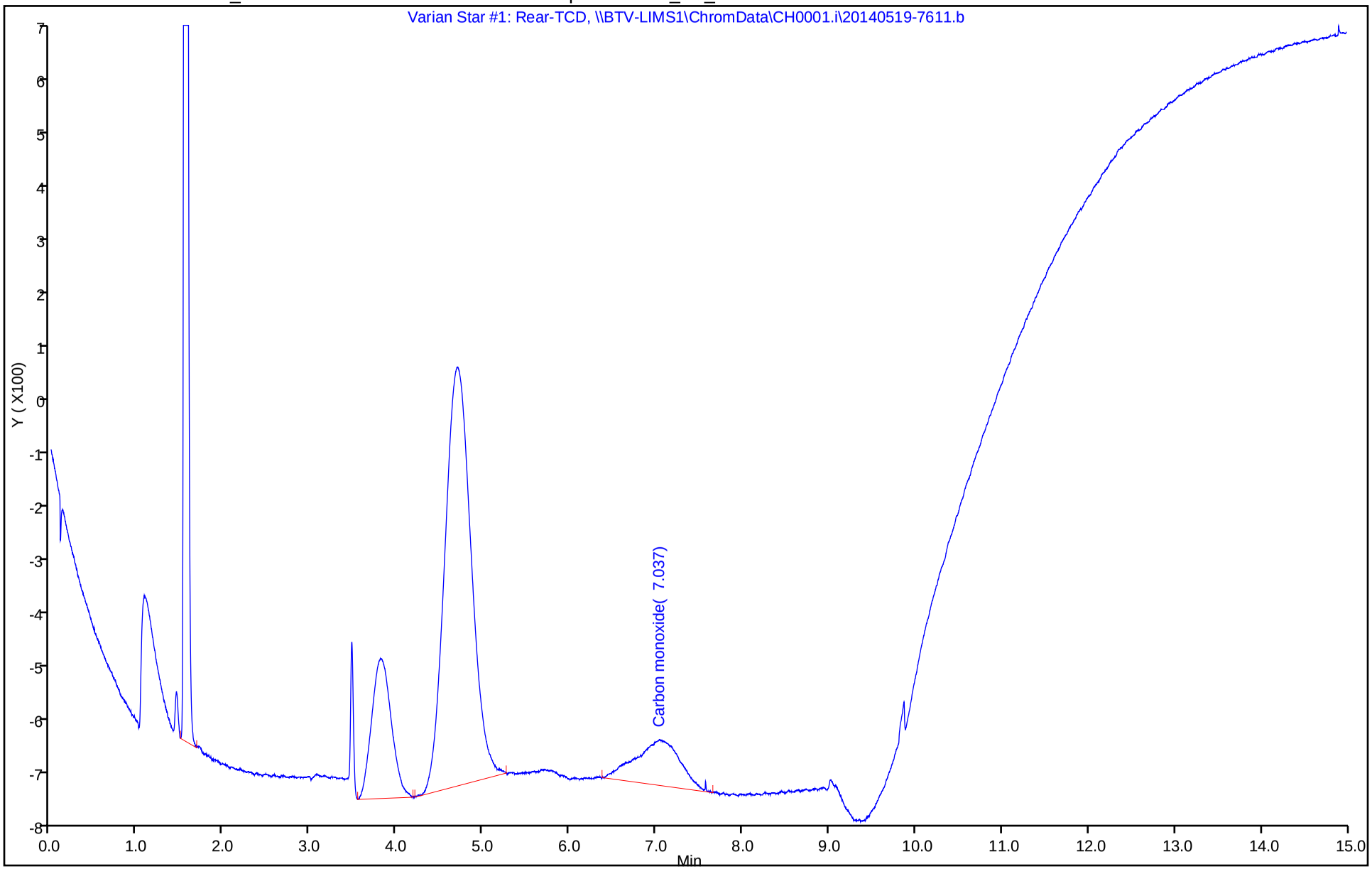
| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 19-May-2014 18:37:26 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 80 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 20-May-2014 13:27:37 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic10051914B.d | | | | |
| Injection Date: | 19-May-2014 18:53:18 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 81 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Manual Integration/User Assign Peak Report

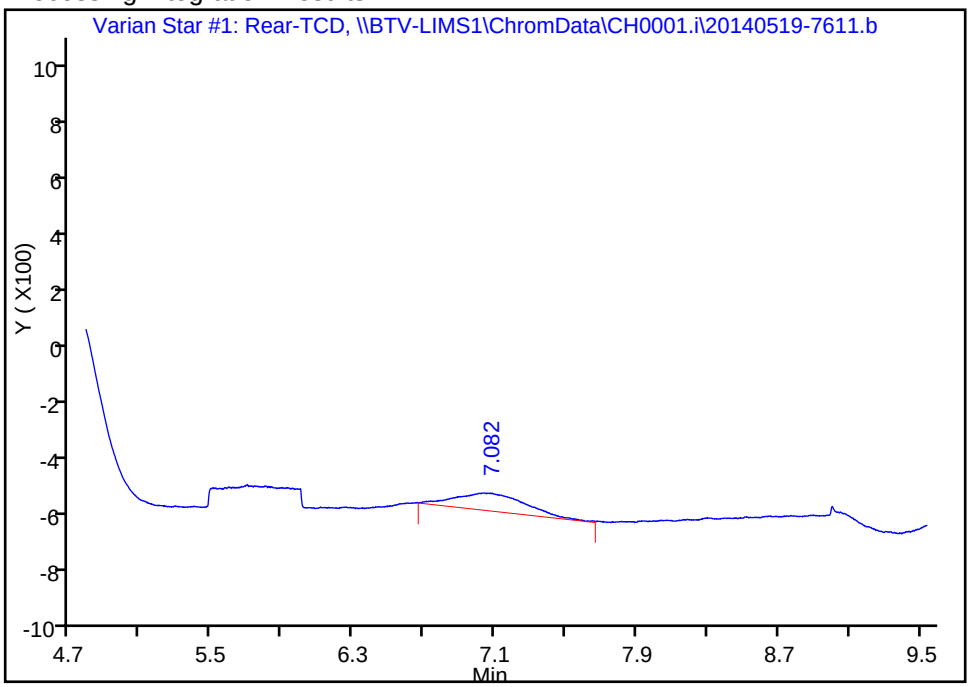
TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic10051914A.d
Injection Date: 19-May-2014 18:37:26 Instrument ID: CH0001.i
Lims ID: IC
Client ID:
Operator ID: BPL ALS Bottle#: 0 Worklist Smp#: 80
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Method: EPA3C_CH0001.i Limit Group: AI_3C_Limits
Column: Detector Varian Star #1: Rear-TCD

## 5 Carbon monoxide, CAS: 630-08-0

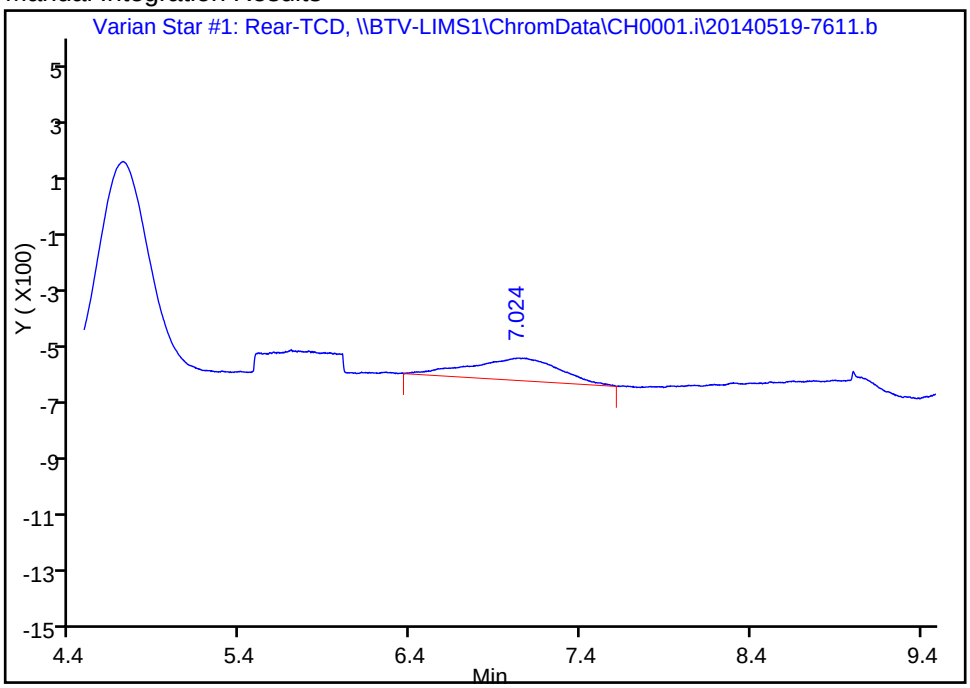
Processing Integration Results

RT: 7.08
Response: 1681
Amount: 0.045268




Manual Integration Results

RT: 7.02
Response: 2798
Amount: 0.079769




Reviewer: lyonsb, 20-May-2014 10:19:29
Audit Action: Manually Integrated
Audit Reason: Baseline Event

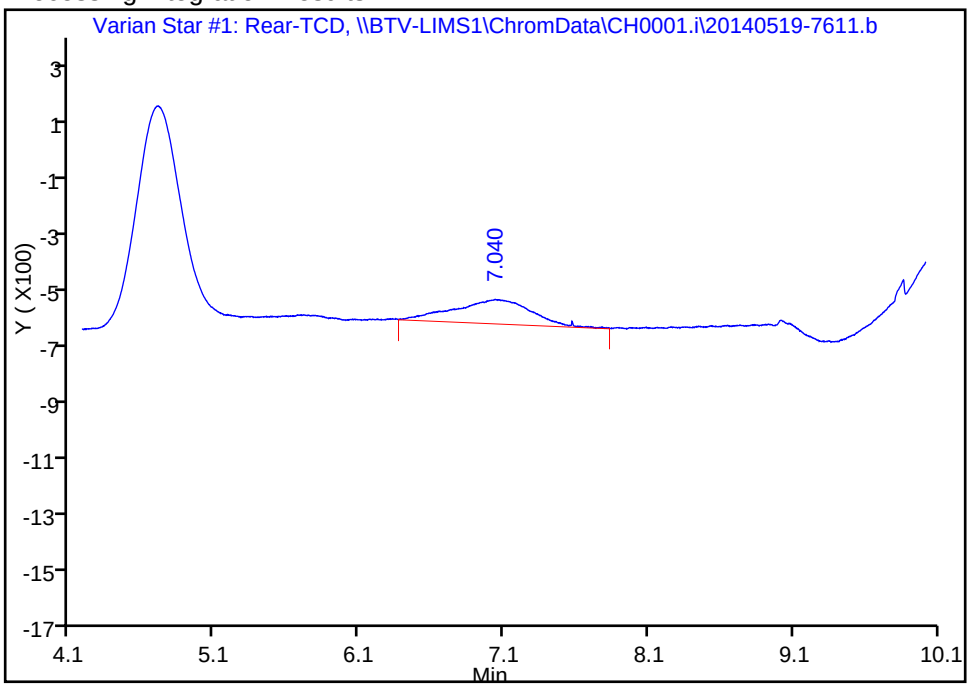
TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic10051914B.d
Injection Date: 19-May-2014 18:53:18 Instrument ID: CH0001.i
Lims ID: IC
Client ID:
Operator ID: BPL ALS Bottle#: 0 Worklist Smp#: 81
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Method: EPA3C_CH0001.i Limit Group: AI_3C_Limits
Column: Detector Varian Star #1: Rear-TCD

## 5 Carbon monoxide, CAS: 630-08-0

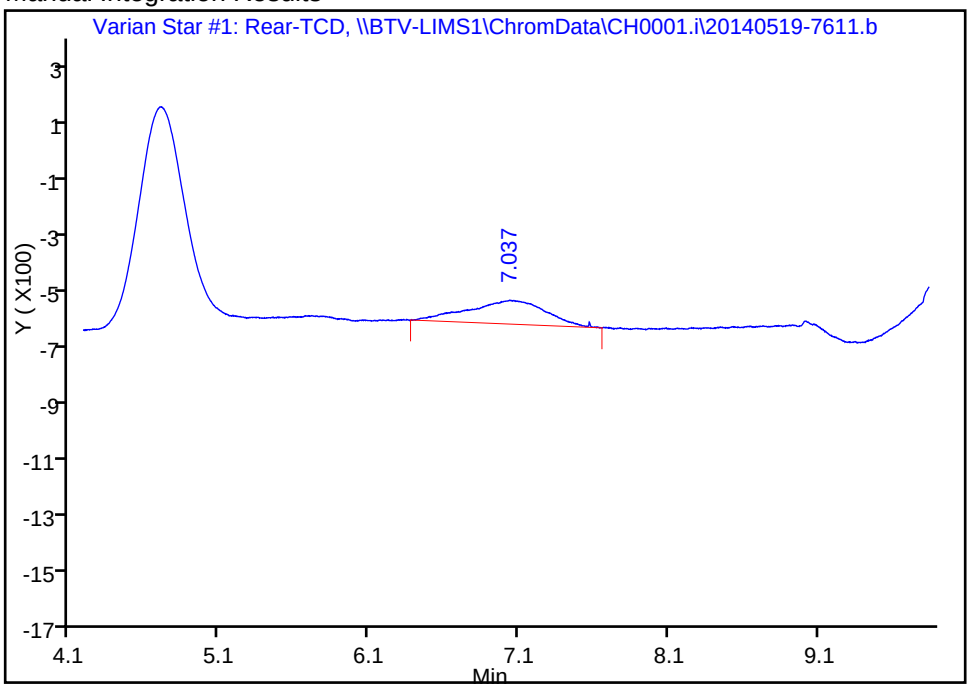
Processing Integration Results

RT: 7.04
Response: 3103
Amount: 0.083241




Manual Integration Results

RT: 7.04
Response: 2903
Amount: 0.082763




Reviewer: lyonsb, 20-May-2014 10:19:17
Audit Action: Manually Integrated
Audit Reason: Baseline Event

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914A.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 31
Inject. Date: 20-May-2014 10:29:35 ALS Bottle#: 0 Worklist Smp#: 85
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC09051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:34 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 20-May-2014 10:47:08

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 5 Carbon monoxide | 7.086 | 7.064 | 0.022 | 337295 | 10.0 | 9.62 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d
Lims ID: IC
Client ID:
Sample Type: IC Calib Level: 32
Inject. Date: 20-May-2014 10:45:29 ALS Bottle#: 0 Worklist Smp#: 86
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CIC09051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:35 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 20-May-2014 11:03:49

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 5 Carbon monoxide | 7.057 | 7.064 | -0.007 | 340722 | 10.0 | 9.71 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic09051914a-72292-ai_3c_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cic09051914b-72292-ai_3c_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon monoxide | 337295 | 340722 | 339008.5 | 1.01 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon monoxide | 9.62 | 9.71 | 9.66 | 1.01 |

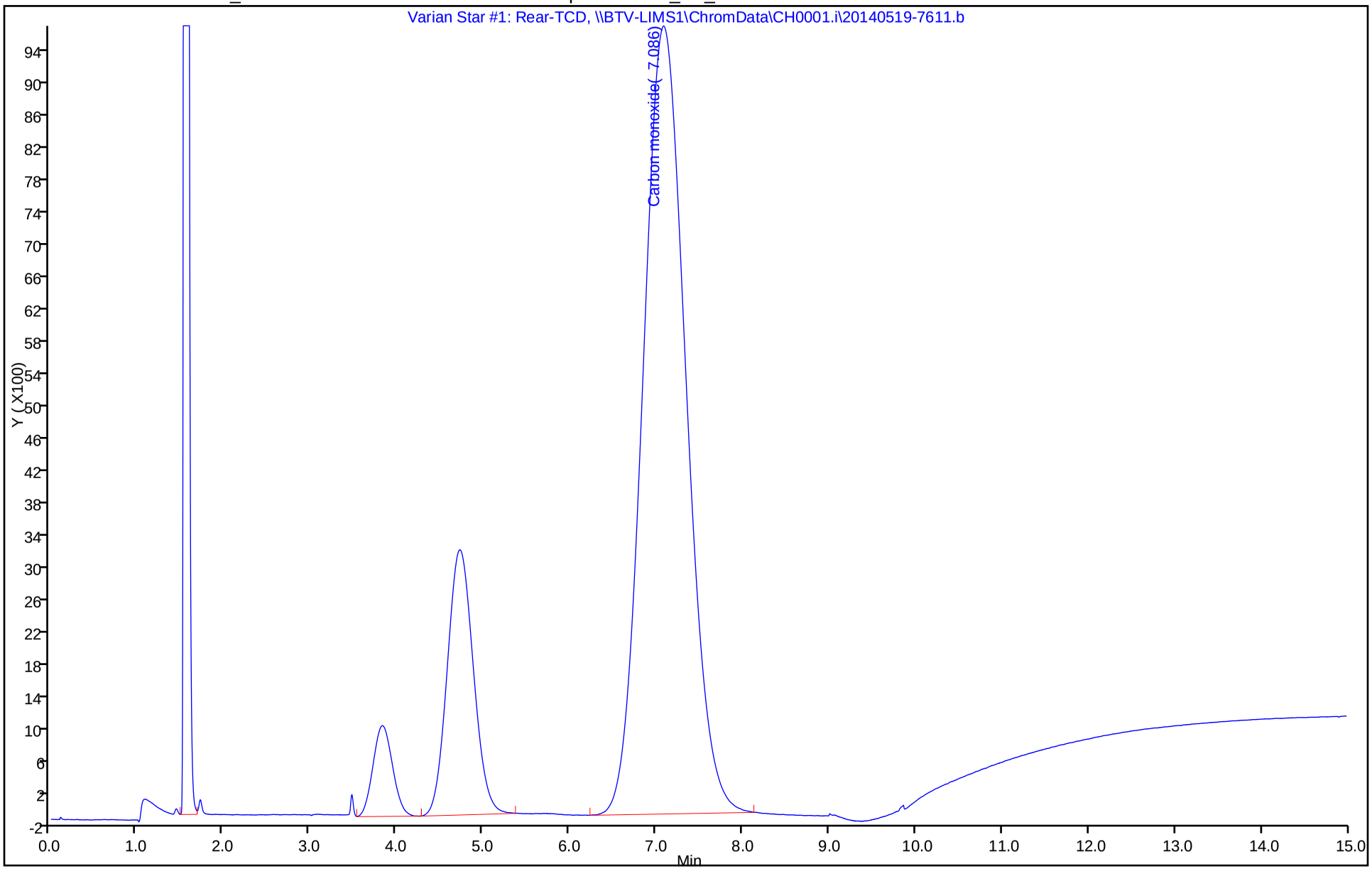
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 20-May-2014 13:27:34 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914A.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 20-May-2014 10:29:35 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 85 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

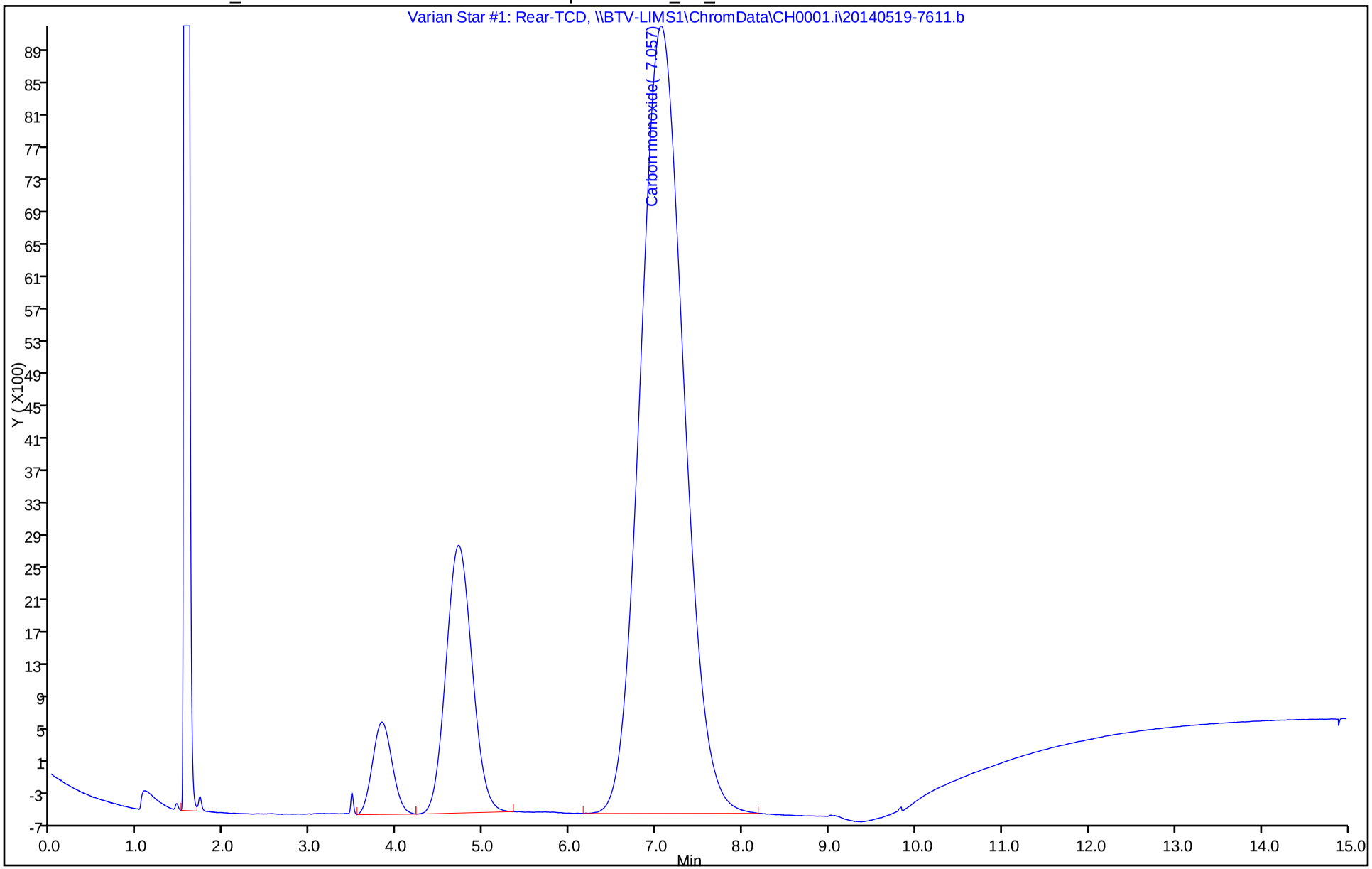


Report Date: 20-May-2014 13:27:35 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 20-May-2014 10:45:29 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | IC | | | Worklist Smp#: | 86 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM VII
AIR - GC VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Lab Sample ID: ICV 200-72381/11 Calibration Date: 05/20/2014 11:01

Instrument ID: CH0001.i Calib Start Date: 05/19/2014 11:18

GC Column: CTR-1 ID: 3.18(mm) Calib End Date: 05/20/2014 10:29

Lab File ID: 3cicv051914C.d-avg Conc. Units: % v/v Heated Purge: (Y/N) N

| ANALYTE | CURVE TYPE | AVE CF | CF | MIN CF | CALC AMOUNT | SPIKE AMOUNT | %D | MAX %D |
|---|---|---|---|---|---|---|---|---|
| Carbon dioxide | Ave | 33413 | 33775 | | 5.05 | 5.00 | 1.1 | |
| Oxygen | Ave | 34727 | 33019 | | 4.75 | 5.00 | -4.9 | |
| Nitrogen | Ave | 37541 | 36238 | | 4.83 | 5.00 | -3.5 | |
| Methane | Ave | 30354 | 27218 | | 3.59 | 4.00 | -10.3 | |
| Carbon monoxide | Ave | 35076 | 38310 | | 5.46 | 5.00 | 9.2 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cicv051914C.d
Lims ID: ICV
Client ID:
Sample Type: ICV
Inject. Date: 20-May-2014 11:01:20 ALS Bottle#: 0 Worklist Smp#: 87
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CICV051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist:

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:35 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

First Level Reviewer: lyonsb Date: 20-May-2014 11:23:50

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.720 | 1.690 | 0.030 | 168756 | 5.00 | 5.05 | |
| 2 Oxygen | 3.822 | 3.825 | -0.003 | 165179 | 5.00 | 4.76 | |
| 3 Nitrogen | 4.706 | 4.721 | -0.015 | 181105 | 5.00 | 4.82 | |
| 4 Methane | 6.521 | 6.532 | -0.011 | 108843 | 4.00 | 3.59 | |
| 5 Carbon monoxide | 7.037 | 7.064 | -0.027 | 191427 | 5.00 | 5.46 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cicv051914D.d
Lims ID: ICV
Client ID:
Sample Type: ICV
Inject. Date: 20-May-2014 11:17:21 ALS Bottle#: 0 Worklist Smp#: 88
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3CICV051914,1
Operator ID: BPL Instrument ID: CH0001.i
Sublist:

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 20-May-2014 13:27:35 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK012

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.720 | 1.690 | 0.030 | 168989 | 5.00 | 5.06 | |
| 2 Oxygen | 3.825 | 3.825 | 0.000 | 165013 | 5.00 | 4.75 | |
| 3 Nitrogen | 4.713 | 4.721 | -0.008 | 181274 | 5.00 | 4.83 | |
| 4 Methane | 6.528 | 6.532 | -0.004 | 108897 | 4.00 | 3.59 | |
| 5 Carbon monoxide | 7.048 | 7.064 | -0.016 | 191676 | 5.00 | 5.46 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cicv051914c-72292-ai_3c_l
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cicv051914d-72292-ai_3c_l

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 168756 | 168989 | 168872.5 | 0.14 |
| Oxygen | 165179 | 165013 | 165096 | 0.1 |
| Nitrogen | 181105 | 181274 | 181189.5 | 0.09 |
| Methane | 108843 | 108897 | 108870 | 0.05 |
| Carbon monoxide | 191427 | 191676 | 191551.5 | 0.13 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 5.05 | 5.06 | 5.05 | 0.14 |
| Oxygen | 4.76 | 4.75 | 4.75 | 0.1 |
| Nitrogen | 4.82 | 4.83 | 4.83 | 0.09 |
| Methane | 3.59 | 3.59 | 3.59 | 0.05 |
| Carbon monoxide | 5.46 | 5.46 | 5.46 | 0.13 |

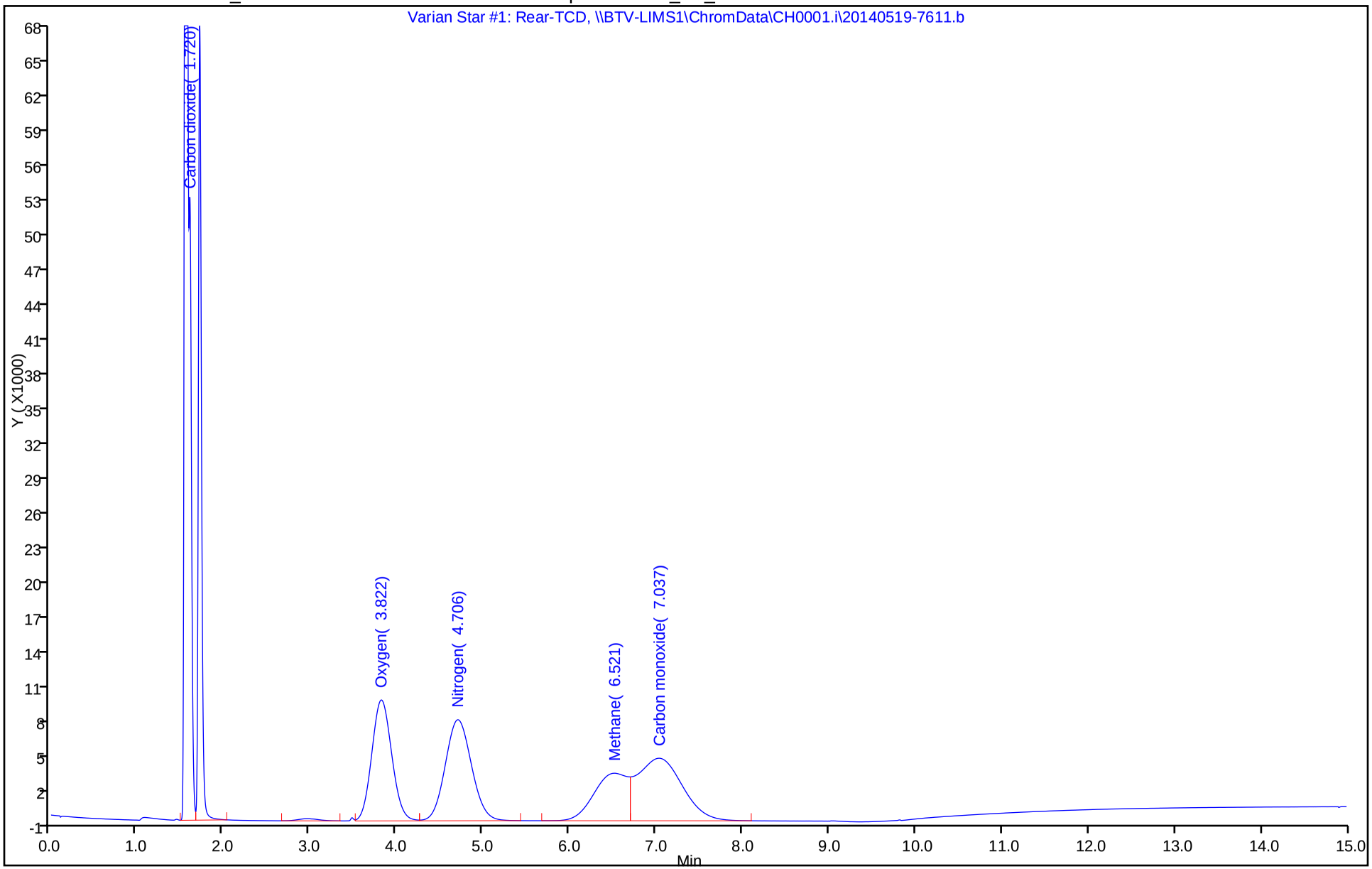
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 20-May-2014 13:27:36 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cicv051914C.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 20-May-2014 11:01:20 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | ICV | | | Worklist Smp#: | 87 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

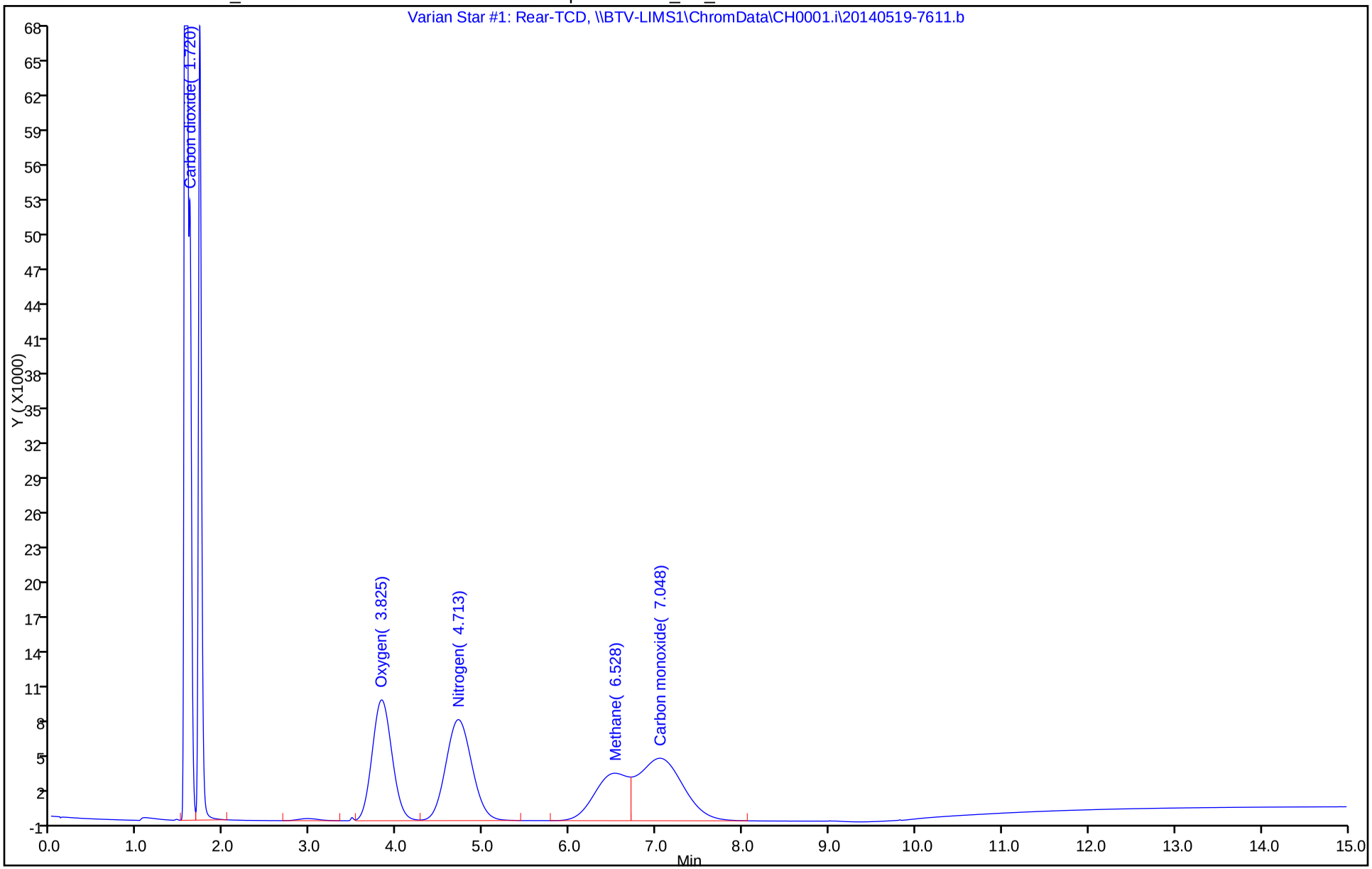


Report Date: 20-May-2014 13:27:36 Chrom Revision: 2.2 16-May-2014 10:46:48

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cicv051914D.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 20-May-2014 11:17:21 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | ICV | | | Worklist Smp#: | 88 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM VII
AIR - GC VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Lab Sample ID: CCV 200-75942/1 Calibration Date: 08/12/2014 12:01

Instrument ID: CH0001.i Calib Start Date: 05/19/2014 11:18

GC Column: CTR-1 ID: 3.18(mm) Calib End Date: 05/20/2014 10:29

Lab File ID: 3cccv081114b.d-avg Conc. Units: % v/v Heated Purge: (Y/N) N

| ANALYTE | CURVE TYPE | AVE CF | CF | MIN CF | CALC AMOUNT | SPIKE AMOUNT | %D | MAX %D |
|---|---|---|---|---|---|---|---|---|
| Carbon dioxide | Ave | 33413 | 33819 | | 5.06 | 5.00 | 1.2 | 20.0 |
| Oxygen | Ave | 34727 | 33051 | | 4.75 | 5.00 | -4.8 | 20.0 |
| Nitrogen | Ave | 37541 | 36889 | | 4.89 | 5.00 | -1.7 | 20.0 |
| Methane | Ave | 30354 | 27680 | | 3.67 | 4.00 | -8.8 | 20.0 |
| Carbon monoxide | Ave | 35076 | 38072 | | 5.40 | 5.00 | 8.5 | 20.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3cccv081114b.d
Lims ID: CCV
Client ID:
Sample Type: CCV
Inject. Date: 12-Aug-2014 12:01:59 ALS Bottle#: 0 Worklist Smp#: 2
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3cccv081114b
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 12-Aug-2014 13:22:04 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.724 | 1.722 | 0.002 | 169097 | 5.00 | 5.06 | |
| 2 Oxygen | 3.830 | 3.824 | 0.006 | 165253 | 5.00 | 4.76 | |
| 3 Nitrogen | 4.729 | 4.719 | 0.010 | 184443 | 5.00 | 4.91 | |
| 4 Methane | 6.544 | 6.522 | 0.022 | 110720 | 4.00 | 3.65 | |
| 5 Carbon monoxide | 7.087 | 7.067 | 0.020 | 190362 | 5.00 | 5.43 | |

## Reagents:

AT3CCCVs_00056 Amount Added: 2.00 Units: mL

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3clccv81114c.d
Lims ID: CCV
Client ID:
Sample Type: CCV
Inject. Date: 12-Aug-2014 12:22:00 ALS Bottle#: 0 Worklist Smp#: 3
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3clccv81114c
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 12-Aug-2014 13:22:05 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

First Level Reviewer: lyonsb Date: 12-Aug-2014 13:21:39

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.722 | 1.722 | 0.000 | 168970 | 5.00 | 5.06 | |
| 2 Oxygen | 3.824 | 3.824 | 0.000 | 164750 | 5.00 | 4.74 | |
| 3 Nitrogen | 4.719 | 4.719 | 0.000 | 182440 | 5.00 | 4.86 | |
| 4 Methane | 6.529 | 6.522 | 0.007 | 112235 | 4.00 | 3.70 | |
| 5 Carbon monoxide | 7.059 | 7.067 | -0.008 | 188676 | 5.00 | 5.38 | |

## Reagents:

AT3CCCVs_00056 Amount Added: 2.00 Units: mL

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cccv081114b-75924-ai_3c_l
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3clccv81114c-75924-ai_3c_l

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 169097 | 168970 | 169033.5 | 0.08 |
| Oxygen | 165253 | 164750 | 165001.5 | 0.3 |
| Nitrogen | 184443 | 182440 | 183441.5 | 1.09 |
| Methane | 110720 | 112235 | 111477.5 | 1.36 |
| Carbon monoxide | 190362 | 188676 | 189519 | 0.89 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 5.06 | 5.06 | 5.06 | 0.08 |
| Oxygen | 4.76 | 4.74 | 4.75 | 0.3 |
| Nitrogen | 4.91 | 4.86 | 4.89 | 1.09 |
| Methane | 3.65 | 3.7 | 3.67 | 1.36 |
| Carbon monoxide | 5.43 | 5.38 | 5.4 | 0.89 |

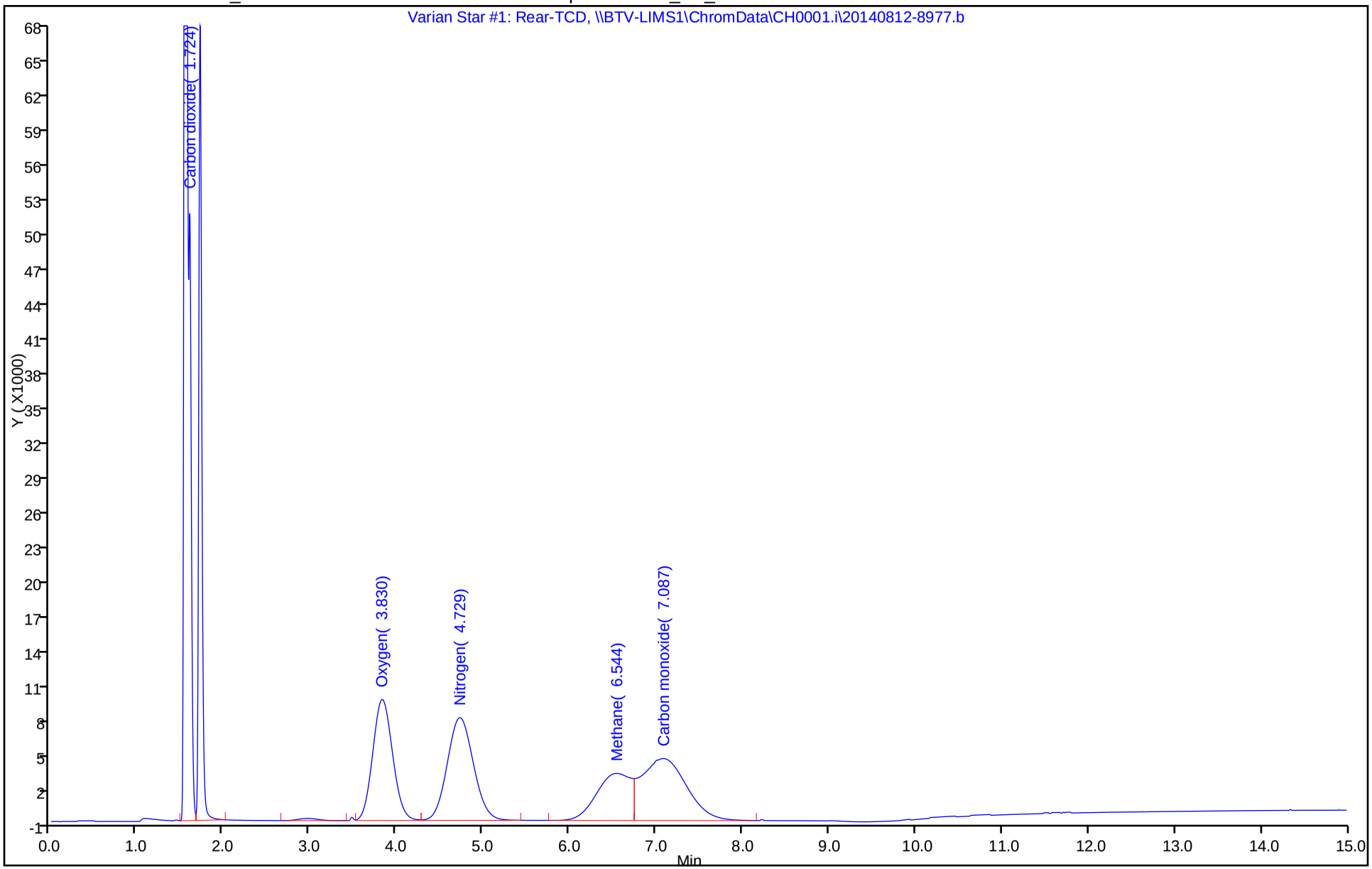
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 12-Aug-2014 13:22:04 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3cccv081114b.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 12-Aug-2014 12:01:59 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | CCV | | | Worklist Smp#: | 2 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

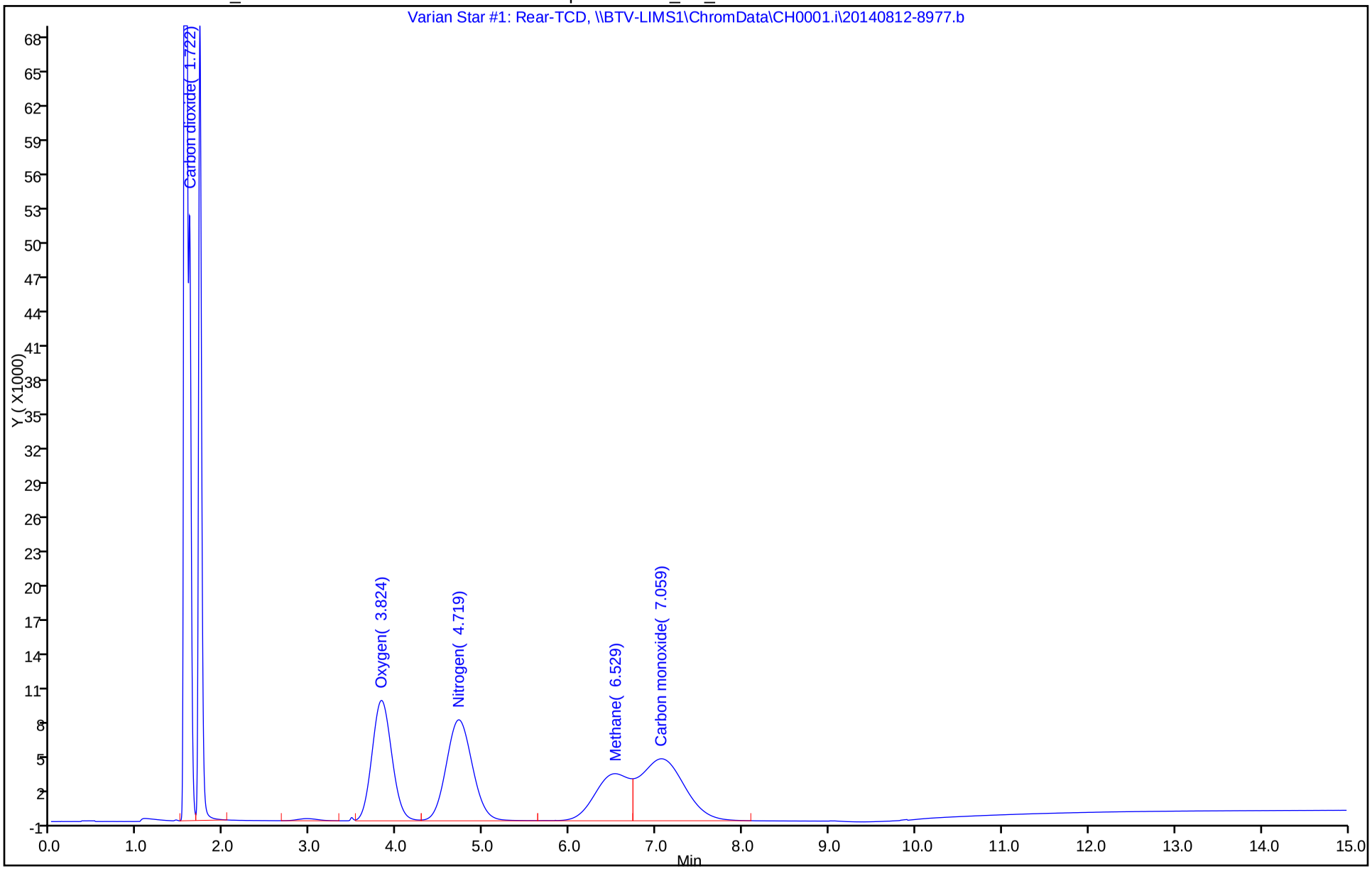


Report Date: 12-Aug-2014 13:22:05 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3clccv81114c.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 12-Aug-2014 12:22:00 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | CCV | | | Worklist Smp#: | 3 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM VII
AIR - GC VOA CONTINUING CALIBRATION DATA

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Lab Sample ID: CCVC 200-75942/10 Calibration Date: 08/13/2014 09:30

Instrument ID: CH0001.i Calib Start Date: 05/19/2014 11:18

GC Column: CTR-1 ID: 3.18(mm) Calib End Date: 05/20/2014 10:29

Lab File ID: 3cccvc081114a.d-avg Conc. Units: % v/v Heated Purge: (Y/N) N

| ANALYTE | CURVE TYPE | AVE CF | CF | MIN CF | CALC AMOUNT | SPIKE AMOUNT | %D | MAX %D |
|---|---|---|---|---|---|---|---|---|
| Carbon dioxide | Ave | 33413 | 33644 | | 5.03 | 5.00 | 0.7 | 20.0 |
| Oxygen | Ave | 34727 | 32814 | | 4.72 | 5.00 | -5.5 | 20.0 |
| Nitrogen | Ave | 37541 | 36497 | | 4.86 | 5.00 | -2.8 | 20.0 |
| Methane | Ave | 30354 | 27520 | | 3.63 | 4.00 | -9.3 | 20.0 |
| Carbon monoxide | Ave | 35076 | 37744 | | 5.38 | 5.00 | 7.6 | 20.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3cccvc081114a.d
Lims ID: CCVC
Client ID:
Sample Type: CCVC
Inject. Date: 13-Aug-2014 09:30:27 ALS Bottle#: 0 Worklist Smp#: 31
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 25cccvc081114
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 10:04:10 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.723 | 1.722 | 0.001 | 168453 | 5.00 | 5.04 | |
| 2 Oxygen | 3.828 | 3.824 | 0.004 | 163776 | 5.00 | 4.72 | |
| 3 Nitrogen | 4.725 | 4.719 | 0.006 | 183064 | 5.00 | 4.88 | |
| 4 Methane | 6.538 | 6.522 | 0.016 | 109827 | 4.00 | 3.62 | |
| 5 Carbon monoxide | 7.078 | 7.067 | 0.011 | 188651 | 5.00 | 5.38 | |

## Reagents:

AT3CCCVs_00056 Amount Added: 2.00 Units: mL

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3cccvc081114b.d
Lims ID: CCVC
Client ID:
Sample Type: CCVC
Inject. Date: 13-Aug-2014 09:47:15 ALS Bottle#: 0 Worklist Smp#: 32
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 25cccvc081114
Operator ID: BPL Instrument ID: CH0001.i
Sublist: chrom-EPA3C_CH0001.i*sub1

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 10:04:10 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.718 | 1.722 | -0.004 | 167982 | 5.00 | 5.03 | |
| 2 Oxygen | 3.810 | 3.824 | -0.014 | 164361 | 5.00 | 4.73 | |
| 3 Nitrogen | 4.697 | 4.719 | -0.022 | 181906 | 5.00 | 4.85 | |
| 4 Methane | 6.498 | 6.522 | -0.024 | 110335 | 4.00 | 3.63 | |
| 5 Carbon monoxide | 7.022 | 7.067 | -0.045 | 188789 | 5.00 | 5.38 | |

## Reagents:

AT3CCCVs_00056 Amount Added: 2.00 Units: mL

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cccvc081114a-75924-ai_3c_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3cccvc081114b-75924-ai_3c_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 168453 | 167982 | 168217.5 | 0.28 |
| Oxygen | 163776 | 164361 | 164068.5 | 0.36 |
| Nitrogen | 183064 | 181906 | 182485 | 0.63 |
| Methane | 109827 | 110335 | 110081 | 0.46 |
| Carbon monoxide | 188651 | 188789 | 188720 | 0.07 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 5.04 | 5.03 | 5.03 | 0.28 |
| Oxygen | 4.72 | 4.73 | 4.72 | 0.36 |
| Nitrogen | 4.88 | 4.85 | 4.86 | 0.63 |
| Methane | 3.62 | 3.63 | 3.63 | 0.46 |
| Carbon monoxide | 5.38 | 5.38 | 5.38 | 0.07 |

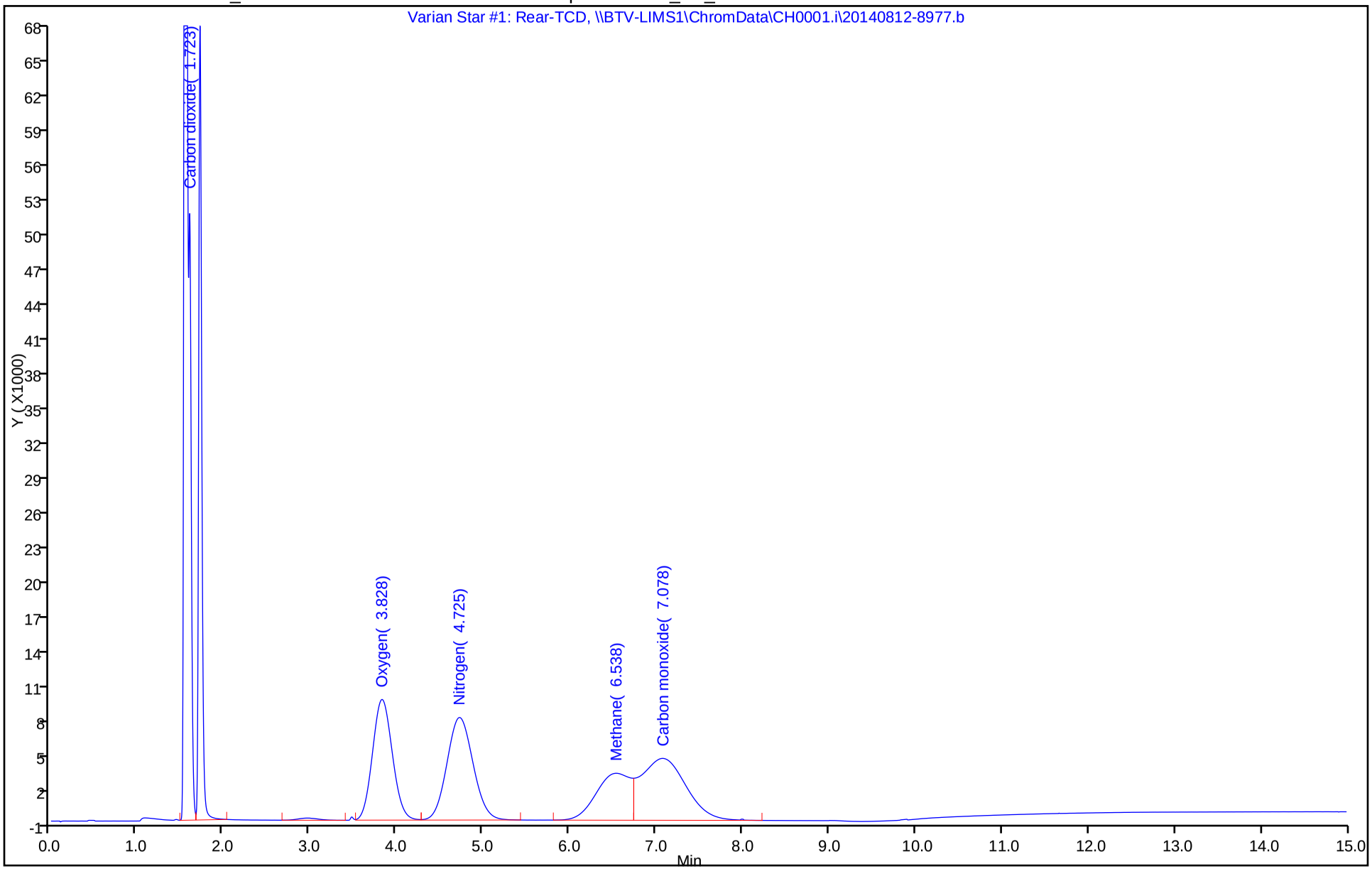
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 13-Aug-2014 10:04:10 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3cccvc081114a.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 13-Aug-2014 09:30:27 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | CCVC | | | Worklist Smp#: | 31 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

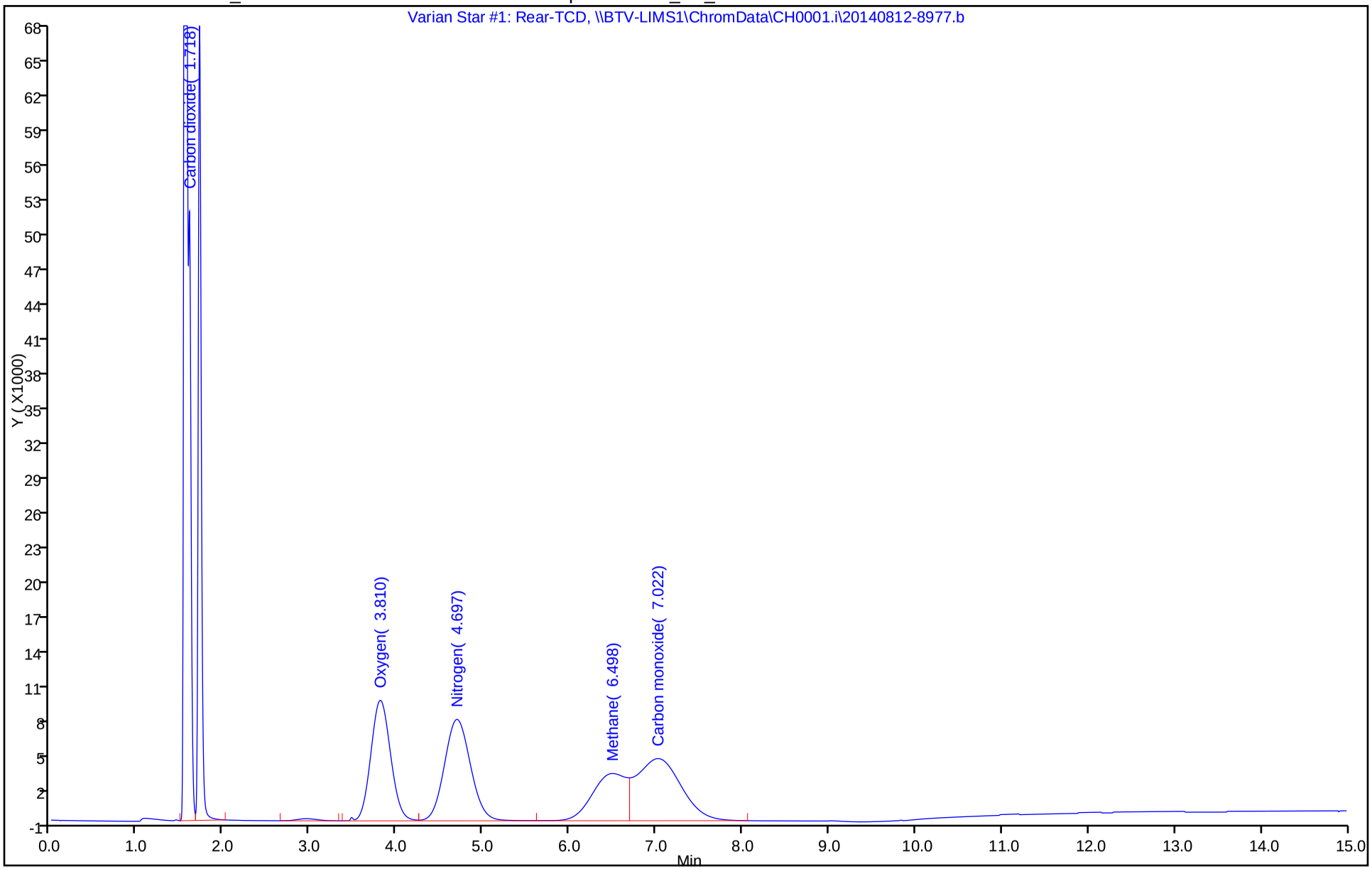


Report Date: 13-Aug-2014 10:04:10 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3cccvc081114b.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 13-Aug-2014 09:47:15 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | CCVC | | | Worklist Smp#: | 32 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM I
AIR - GC VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Client Sample ID: Lab Sample ID: MB 200-75942/3

Matrix: Air Lab File ID: mb081114001.d-avg

Analysis Method: EPA 3C Date Collected:

Sample wt/vol: 2(mL) Date Analyzed: 08/12/2014 14:57

Soil Aliquot Vol: Dilution Factor: 1

Soil Extract Vol.: GC Column: ID:

% Moisture: Level: (low/med) Low

Analysis Batch No.: 75942 Units: % v/v

| CAS NO. | COMPOUND NAME | RESULT | Q | RL | RL |
|---|---|---|---|---|---|
| 124-38-9 | Carbon dioxide | 0.050 | U | 0.050 | 0.050 |
| 74-82-8 | Methane | 0.040 | U | 0.040 | 0.040 |
| 7727-37-9 | Nitrogen | 0.50 | U | 0.50 | 0.50 |
| 7782-44-7 | Oxygen | 0.050 | U | 0.050 | 0.050 |
| 630-08-0 | Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\mb081114001.d
Lims ID: MB
Client ID:
Sample Type: MB
Inject. Date: 12-Aug-2014 14:57:18 ALS Bottle#: 0 Worklist Smp#: 10
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: mb081114
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 12-Aug-2014 15:15:17 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

First Level Reviewer: lyonsb Date: 12-Aug-2014 15:15:11

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 3 Nitrogen | 4.710 | 4.719 | -0.009 | 2399 | | 0.0639 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\mb081114.d
Lims ID: MB
Client ID:
Sample Type: MB
Inject. Date: 12-Aug-2014 14:41:27 ALS Bottle#: 0 Worklist Smp#: 9
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: mb081114
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 12-Aug-2014 15:15:17 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

First Level Reviewer: lyonsb Date: 12-Aug-2014 15:14:38

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 3 Nitrogen | 4.745 | 4.719 | 0.026 | 2332 | | 0.0621 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\mb081114001-75924-ai_3c_li
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\mb081114-75924-ai_3c_limit

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0 | 0 | 0 | 0 |
| Oxygen | 0 | 0 | 0 | 0 |
| Nitrogen | 2399 | 2332 | 2365.5 | 2.83 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0 | 0 | 0 | 0 |
| Oxygen | 0 | 0 | 0 | 0 |
| Nitrogen | 0.06 | 0.06 | 0.06 | 2.83 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

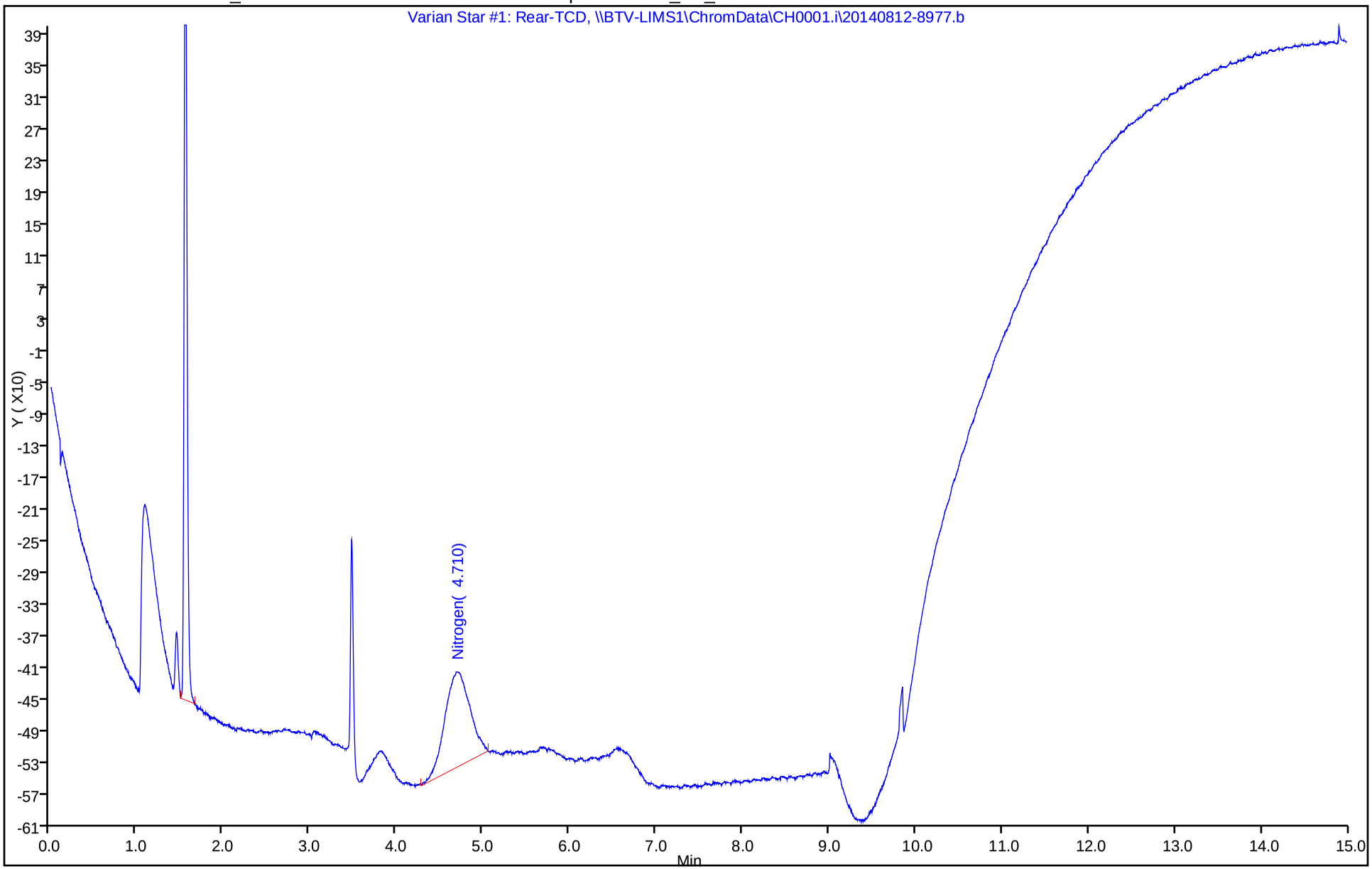
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 12-Aug-2014 15:15:18 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\mb081114001.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 12-Aug-2014 14:57:18 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | MB | | | Worklist Smp#: | 10 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

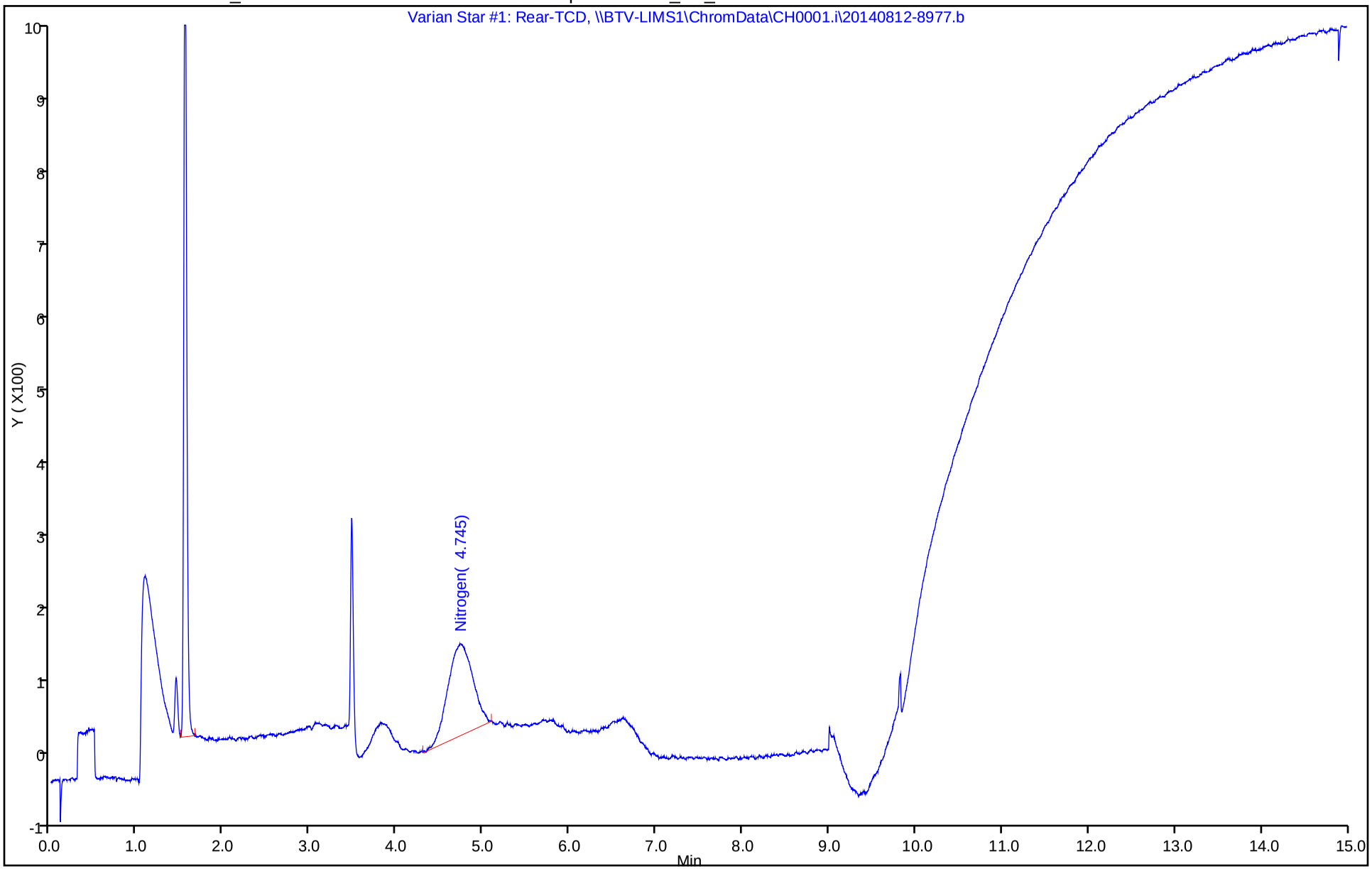


Report Date: 12-Aug-2014 15:15:17 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\mb081114.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 12-Aug-2014 14:41:27 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | MB | | | Worklist Smp#: | 9 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM I
AIR - GC VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Client Sample ID: Lab Sample ID: LCS 200-75942/2

Matrix: Air Lab File ID: 3clcs81114a.d-avg

Analysis Method: EPA 3C Date Collected:

Sample wt/vol: 2(mL) Date Analyzed: 08/12/2014 12:42

Soil Aliquot Vol: Dilution Factor: 1

Soil Extract Vol.: GC Column: ID:

% Moisture: Level: (low/med) Low

Analysis Batch No.: 75942 Units: % v/v

| CAS NO. | COMPOUND NAME | RESULT | Q | RL | RL |
|---|---|---|---|---|---|
| 124-38-9 | Carbon dioxide | 5.08 | | 0.050 | 0.050 |
| 74-82-8 | Methane | 3.66 | | 0.040 | 0.040 |
| 7727-37-9 | Nitrogen | 4.81 | | 0.50 | 0.50 |
| 7782-44-7 | Oxygen | 4.73 | | 0.050 | 0.050 |
| 630-08-0 | Carbon monoxide | 5.41 | | 1.0 | 1.0 |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3clcs81114a.d
Lims ID: LCS
Client ID:
Sample Type: LCS
Inject. Date: 12-Aug-2014 12:42:23 ALS Bottle#: 0 Worklist Smp#: 4
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3clcs81114a
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 12-Aug-2014 13:21:39 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.724 | 1.722 | 0.002 | 169817 | 5.00 | 5.08 | |
| 2 Oxygen | 3.830 | 3.824 | 0.006 | 164486 | 5.00 | 4.74 | |
| 3 Nitrogen | 4.727 | 4.719 | 0.008 | 180778 | 5.00 | 4.82 | |
| 4 Methane | 6.544 | 6.522 | 0.022 | 110915 | 4.00 | 3.65 | |
| 5 Carbon monoxide | 7.079 | 7.067 | 0.012 | 189777 | 5.00 | 5.41 | |

## Reagents:

AT3CLCSs_00001 Amount Added: 2.00 Units: mL

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3clcs81114b.d
Lims ID: LCS
Client ID:
Sample Type: LCS
Inject. Date: 12-Aug-2014 12:59:17 ALS Bottle#: 0 Worklist Smp#: 5
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 3clcs81114b
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 12-Aug-2014 13:21:39 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | Cal Amt % v/v | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.718 | 1.722 | -0.004 | 169709 | 5.00 | 5.08 | |
| 2 Oxygen | 3.813 | 3.824 | -0.011 | 164226 | 5.00 | 4.73 | |
| 3 Nitrogen | 4.702 | 4.719 | -0.017 | 180296 | 5.00 | 4.80 | |
| 4 Methane | 6.505 | 6.522 | -0.017 | 111234 | 4.00 | 3.66 | |
| 5 Carbon monoxide | 7.032 | 7.067 | -0.035 | 189718 | 5.00 | 5.41 | |

## Reagents:

AT3CLCSs_00001 Amount Added: 2.00 Units: mL

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3clcs81114a-75924-ai_3c_li
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\3clcs81114b-75924-ai_3c_li

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 169817 | 169709 | 169763 | 0.06 |
| Oxygen | 164486 | 164226 | 164356 | 0.16 |
| Nitrogen | 180778 | 180296 | 180537 | 0.27 |
| Methane | 110915 | 111234 | 111074.5 | 0.29 |
| Carbon monoxide | 189777 | 189718 | 189747.5 | 0.03 |

| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 5.08 | 5.08 | 5.08 | 0.06 |
| Oxygen | 4.74 | 4.73 | 4.73 | 0.16 |
| Nitrogen | 4.82 | 4.8 | 4.81 | 0.27 |
| Methane | 3.65 | 3.66 | 3.66 | 0.29 |
| Carbon monoxide | 5.41 | 5.41 | 5.41 | 0.03 |

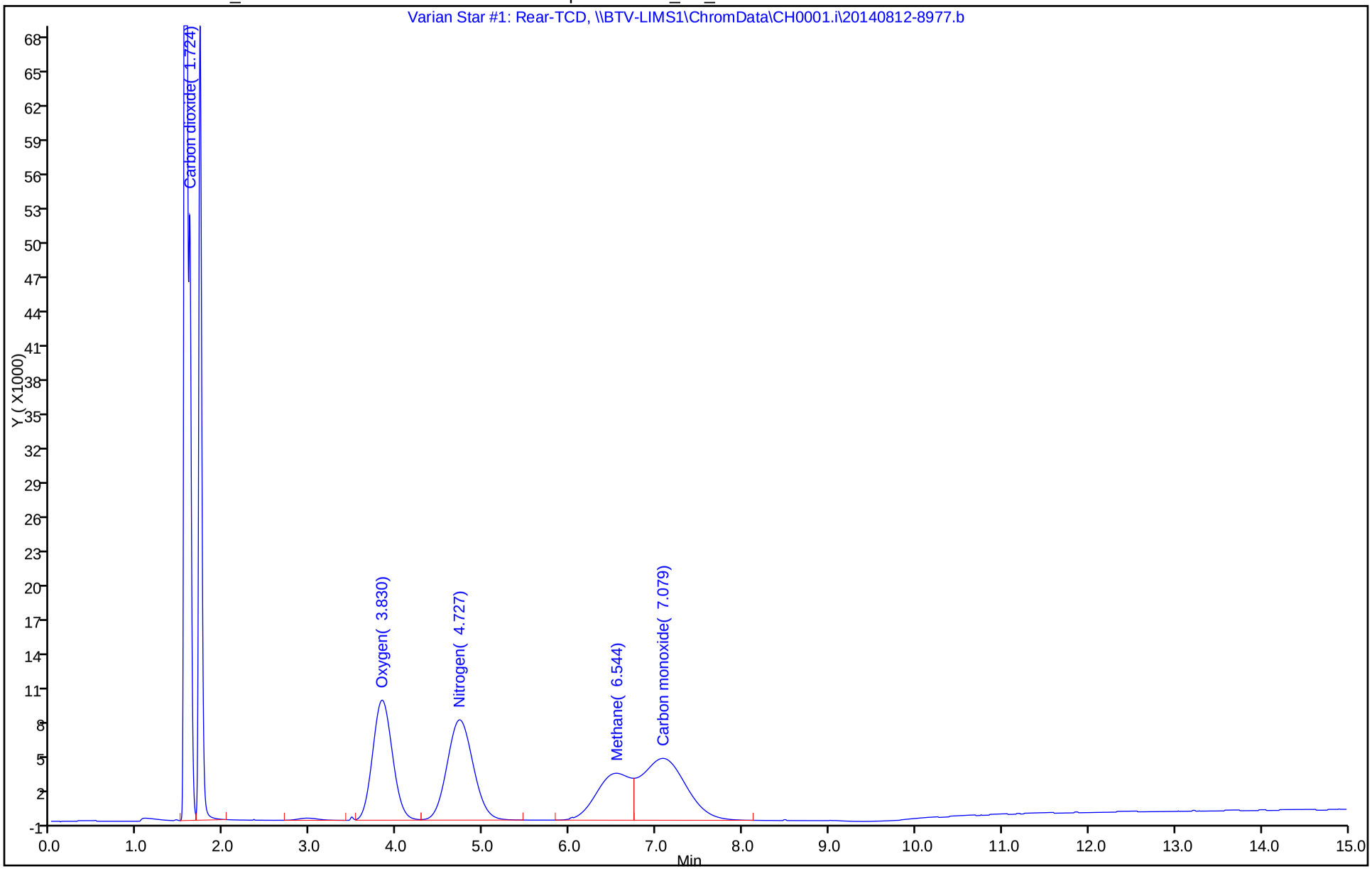
---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 12-Aug-2014 13:21:40 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3clcs81114a.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 12-Aug-2014 12:42:23 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | LCS | | | Worklist Smp#: | 4 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |

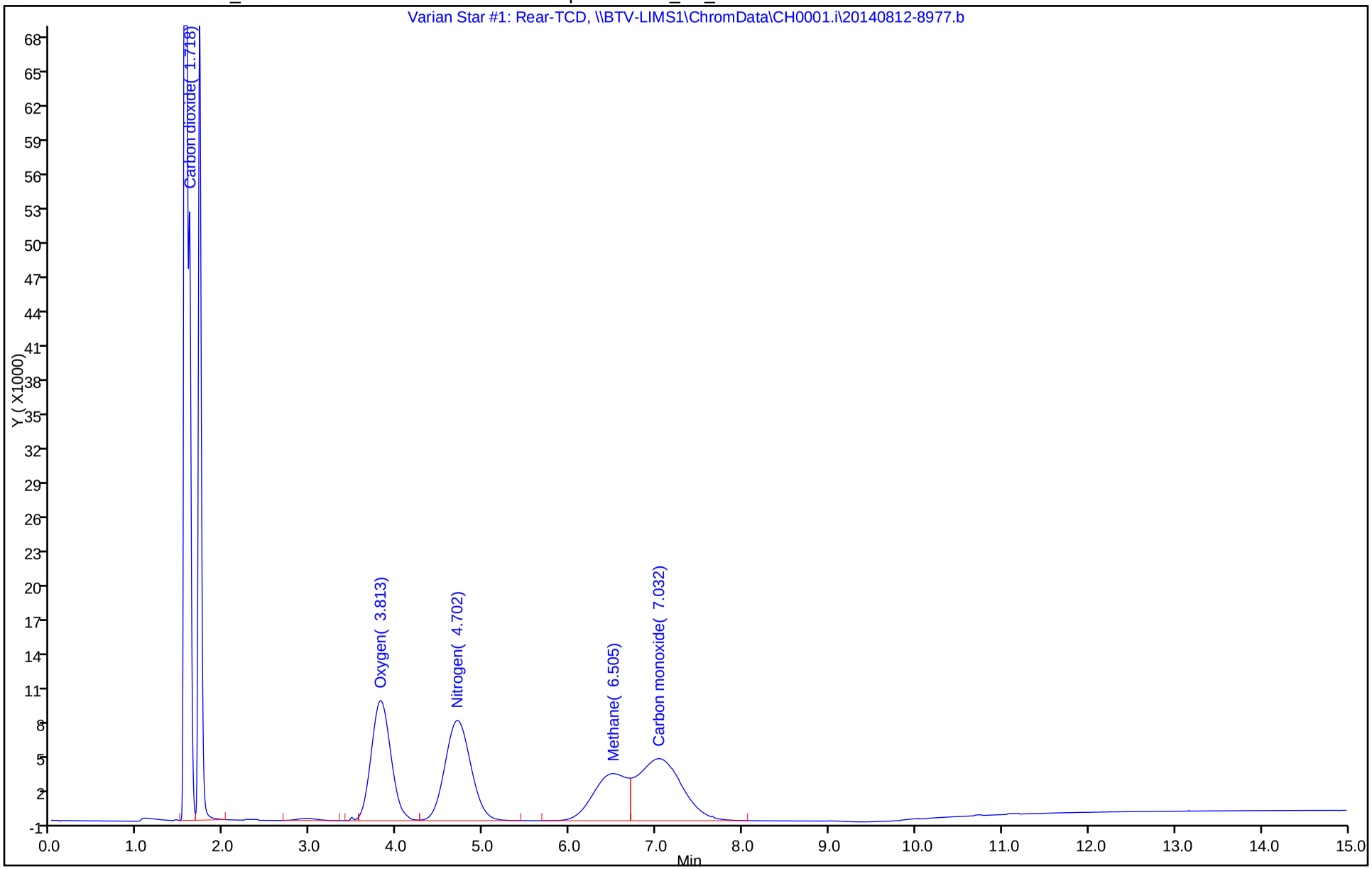


Report Date: 12-Aug-2014 13:21:40 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\3clcs81114b.d

| | | | | | |
|---|---|---|---|---|---|
| Injection Date: | 12-Aug-2014 12:59:17 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | LCS | | | Worklist Smp#: | 5 |
| Client ID: | | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



FORM I
AIR - GC VOA ORGANICS ANALYSIS DATA SHEET

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Client Sample ID: 205-VP3a DU Lab Sample ID: 200-23612-2 DU

Matrix: Air Lab File ID: 200-23612-a-2002.d-avg

Analysis Method: EPA 3C Date Collected: 08/10/2014 09:10

Sample wt/vol: 2(mL) Date Analyzed: 08/12/2014 17:18

Soil Aliquot Vol: Dilution Factor: 1

Soil Extract Vol.: GC Column: ID:

% Moisture: Level: (low/med) Low

Analysis Batch No.: 75942 Units: % v/v

| CAS NO. | COMPOUND NAME | RESULT | Q | RL | RL |
|---|---|---|---|---|---|
| 124-38-9 | Carbon dioxide | 0.468 | | 0.050 | 0.050 |
| 74-82-8 | Methane | 0.040 | U | 0.040 | 0.040 |
| 7727-37-9 | Nitrogen | 74.8 | | 0.50 | 0.50 |
| 7782-44-7 | Oxygen | 20.9 | | 0.050 | 0.050 |
| 630-08-0 | Carbon monoxide | 1.0 | U | 1.0 | 1.0 |

TestAmerica Burlington
Target Compound Quantitation Report

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-2002.d | | | | |
| Lims ID: | 200-23612-A-2 DU | Lab Sample ID: | 200-23612-2 | | |
| Client ID: | 205-VP3a | | | | |
| Sample Type: | Client | | | | |
| Inject. Date: | 12-Aug-2014 17:18:57 | ALS Bottle#: | 0 | Worklist Smp#: | 15 |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | | |
| Sample Info: | 200-23612-A-2 | | | | |
| Operator ID: | BPL | Instrument ID: | CH0001.i | | |
| Method: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m | | | | |
| Limit Group: | AI_3C_Limits | | | | |
| Last Update: | 13-Aug-2014 15:05:57 | Calib Date: | 20-May-2014 10:45:29 | | |
| Integrator: | Falcon | | | | |
| Quant Method: | External Standard | Quant By: | Initial Calibration | | |
| Last ICal File: | \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d | | | | |
| Column 1 : | | | Det: Varian Star #1: Rear-TCD | | |
| Process Host: | XAWRK007 | | | | |
| First Level Reviewer: lyonsb | | Date: | 13-Aug-2014 15:05:00 | | |

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.722 | 1.722 | 0.000 | 15563 | 0.4658 | |
| 2 Oxygen | 3.800 | 3.824 | -0.024 | 720863 | 20.8 | |
| 3 Nitrogen | 4.652 | 4.719 | -0.067 | 2790319 | 74.3 | |

TestAmerica Burlington
Target Compound Quantitation Report

Data File: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-2003.d
Lims ID: 200-23612-A-2 DU Lab Sample ID: 200-23612-2
Client ID: 205-VP3a
Sample Type: Client
Inject. Date: 12-Aug-2014 17:34:48 ALS Bottle#: 0 Worklist Smp#: 38
Purge Vol: 2.000 mL Dil. Factor: 1.0000
Sample Info: 200-23612-A-2
Operator ID: BPL Instrument ID: CH0001.i

Method: \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\EPA3C_CH0001.i.m
Limit Group: AI_3C_Limits
Last Update: 13-Aug-2014 15:05:57 Calib Date: 20-May-2014 10:45:29
Integrator: Falcon
Quant Method: External Standard Quant By: Initial Calibration
Last ICal File: \\BTV-LIMS1\ChromData\CH0001.i\20140519-7611.b\3cic09051914B.d

Column 1 : Det: Varian Star #1: Rear-TCD
Process Host: XAWRK007

| Compound | RT (min.) | Exp RT (min.) | Dlt RT (min.) | Response | OnCol Amt % v/v | Flags |
|---|---|---|---|---|---|---|
| 1 Carbon dioxide | 1.719 | 1.722 | -0.003 | 15686 | 0.4695 | |
| 2 Oxygen | 3.794 | 3.824 | -0.030 | 727786 | 21.0 | |
| 3 Nitrogen | 4.641 | 4.719 | -0.078 | 2823188 | 75.2 | |

Processing 3C data for files:
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-2002-75924-ai_
\\corptalsapp05\200-bt-rawdata\organics\gc\ch0001-3hutch\200-23612-a-2003-75924-ai_

Raw Results - Fixed Gases

| Analyte | Resp1 | Resp2 | Avg Resp | RPD |
|---|---|---|---|---|
| Carbon dioxide | 15563 | 15686 | 15624.5 | 0.79 |
| Oxygen | 720863 | 727786 | 724324.5 | 0.96 |
| Nitrogen | 2790319 | 2823188 | 2806753.5 | 1.17 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

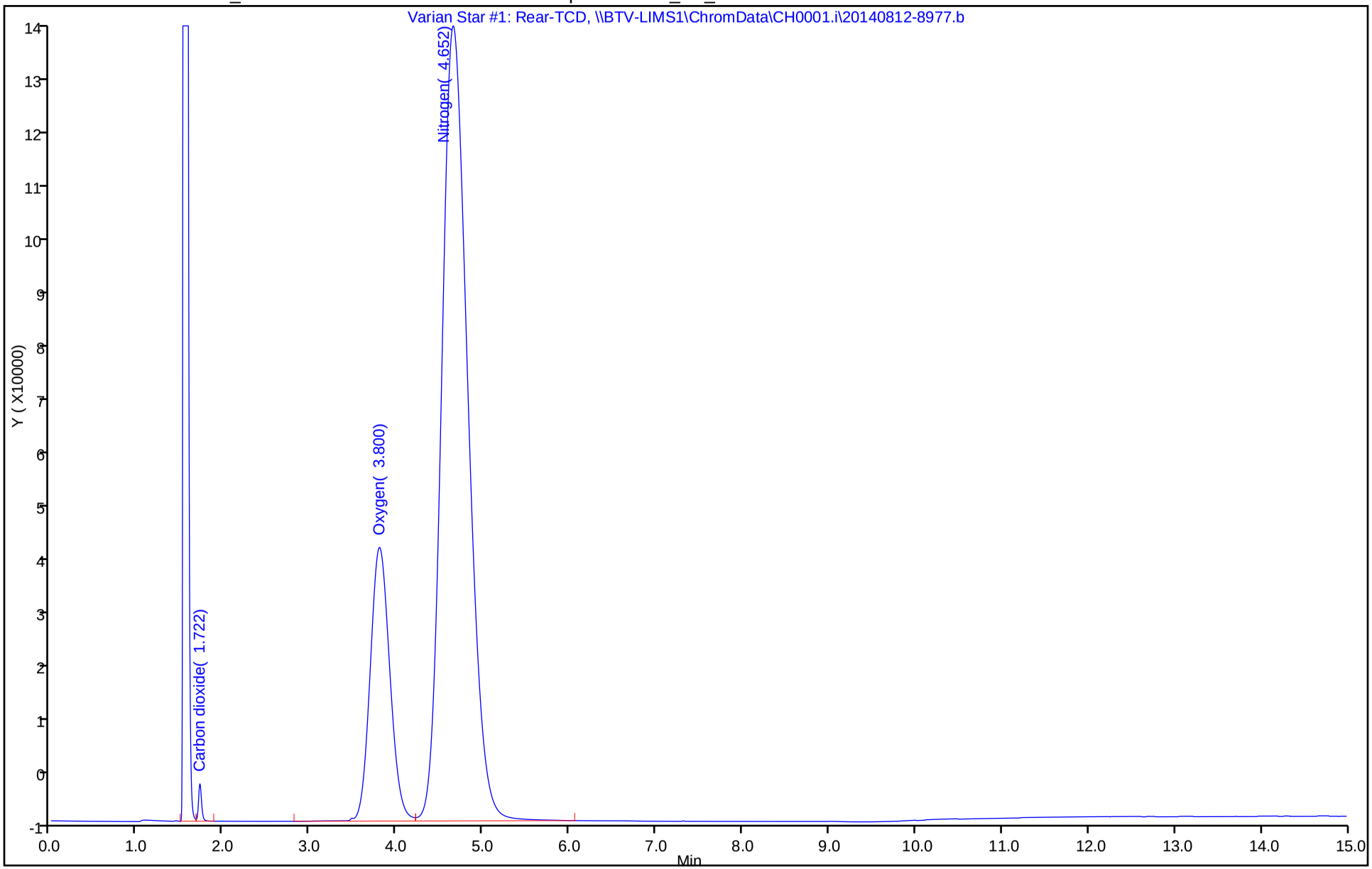
| Analyte | Conc1 | Conc2 | Avg Conc | RPD |
|---|---|---|---|---|
| Carbon dioxide | 0.47 | 0.47 | 0.47 | 0.79 |
| Oxygen | 20.76 | 20.96 | 20.86 | 0.96 |
| Nitrogen | 74.33 | 75.2 | 74.76 | 1.17 |
| Methane | 0 | 0 | 0 | 0 |
| Carbon monoxide | 0 | 0 | 0 | 0 |

---------- NMOC Correction----------
NMOC correction not requested, NMOC correction not applied

Report Date: 13-Aug-2014 15:06:43 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

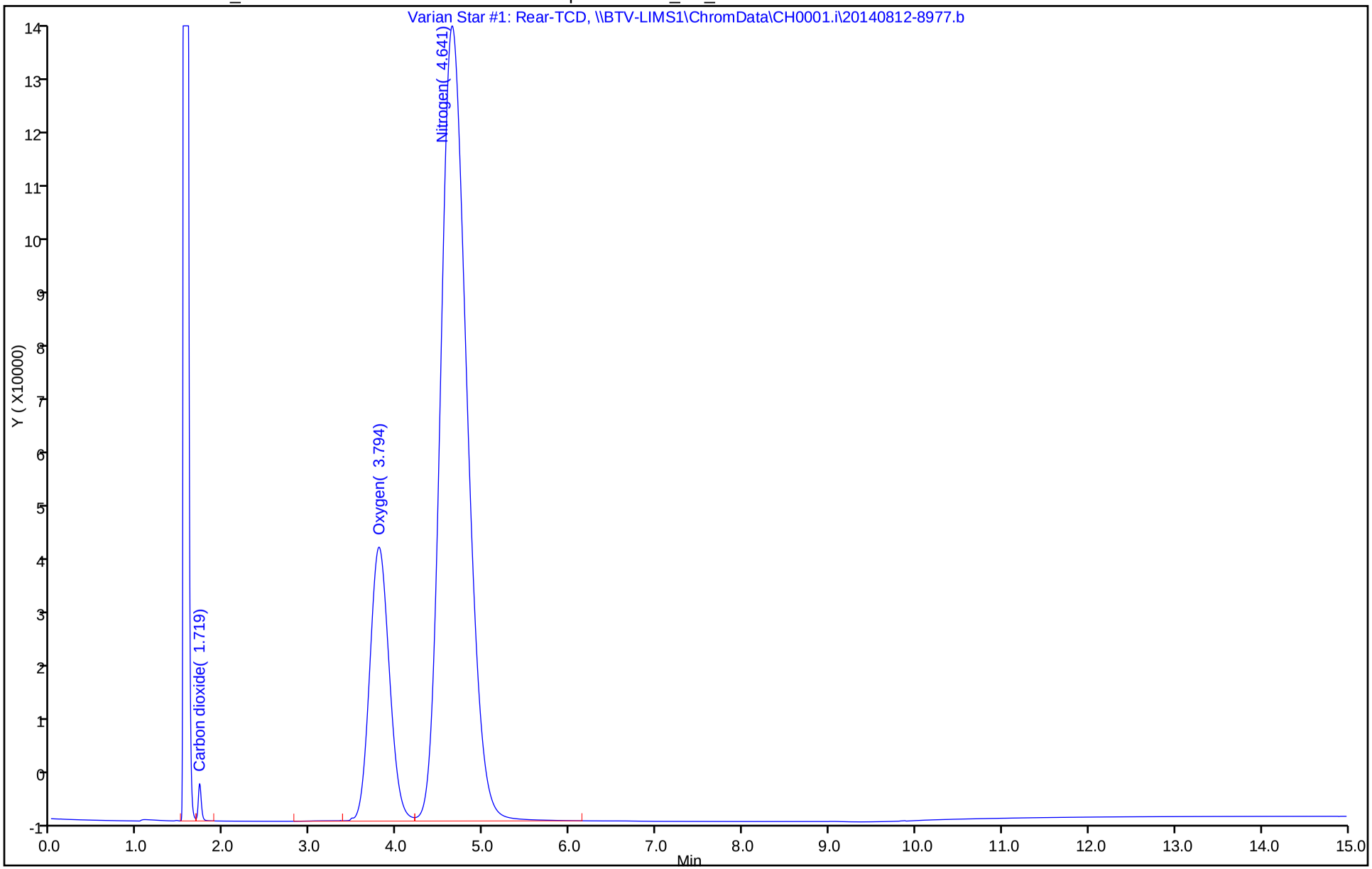
| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-2002.d | | | | |
| Injection Date: | 12-Aug-2014 17:18:57 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-2 DU | Lab Sample ID: | 200-23612-2 | Worklist Smp#: | 15 |
| Client ID: | 205-VP3a | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



Report Date: 13-Aug-2014 15:06:44 Chrom Revision: 2.2 24-Jun-2014 07:21:42

TestAmerica Burlington

| | | | | | |
|---|---|---|---|---|---|
| Data File: | \\BTV-LIMS1\ChromData\CH0001.i\20140812-8977.b\200-23612-a-2003.d | | | | |
| Injection Date: | 12-Aug-2014 17:34:48 | Instrument ID: | CH0001.i | Operator ID: | BPL |
| Lims ID: | 200-23612-A-2 DU | Lab Sample ID: | 200-23612-2 | Worklist Smp#: | 38 |
| Client ID: | 205-VP3a | | | | |
| Purge Vol: | 2.000 mL | Dil. Factor: | 1.0000 | ALS Bottle#: | 0 |
| Method: | EPA3C_CH0001.i | Limit Group: | AI_3C_Limits | | |



AIR - GC VOA ANALYSIS RUN LOG

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Instrument ID: CH0001.i Start Date: 05/19/2014 11:18

Analysis Batch Number: 72381 End Date: 05/20/2014 11:01

| LAB SAMPLE ID | CLIENT SAMPLE ID | DATE ANALYZED | DILUTION FACTOR | LAB FILE ID | COLUMN ID |
|---|---|---|---|---|---|
| ICIS 200-72381/1 | | 05/19/2014 11:18 | 1 | 3cicis051914B.d-avg | CTR-1 3.175(mm) |
| IC 200-72381/2 | | 05/19/2014 12:08 | 1 | 3cic6051914B.d-avg | CTR-1 3.175(mm) |
| IC 200-72381/3 | | 05/19/2014 13:13 | 1 | 3cic8051914B.d-avg | CTR-1 3.175(mm) |
| IC 200-72381/4 | | 05/19/2014 14:07 | 1 | 3cic1051914B.d-avg | CTR-1 3.175(mm) |
| IC 200-72381/5 | | 05/19/2014 14:39 | 1 | 3cic2051914A.d-avg | CTR-1 3.175(mm) |
| IC 200-72381/6 | | 05/19/2014 15:42 | 1 | 3cic3051914B.d-avg | CTR-1 3.175(mm) |
| IC 200-72381/7 | | 05/19/2014 16:30 | 1 | 3cic5051914B.d-avg | CTR-1 3.175(mm) |
| IC 200-72381/8 | | 05/19/2014 17:18 | 1 | 3cic7051914B.d-avg | CTR-1 3.175(mm) |
| IC 200-72381/9 | | 05/19/2014 18:37 | 1 | 3cic10051914A.d-avg | CTR-1 3.175(mm) |
| IC 200-72381/10 | | 05/20/2014 10:29 | 1 | 3cic09051914A.d-avg | CTR-1 3.175(mm) |
| ICV 200-72381/11 | | 05/20/2014 11:01 | 1 | 3cicv051914C.d-avg | CTR-1 3.175(mm) |

AIR - GC VOA ANALYSIS RUN LOG

Lab Name: TestAmerica Burlington Job No.: 200-23612-1

SDG No.: 200-23612

Instrument ID: CH0001.i Start Date: 08/12/2014 12:01

Analysis Batch Number: 75942 End Date: 08/13/2014 09:30

| LAB SAMPLE ID | CLIENT SAMPLE ID | DATE ANALYZED | DILUTION FACTOR | LAB FILE ID | COLUMN ID |
|---|---|---|---|---|---|
| CCV 200-75942/1 | | 08/12/2014 12:01 | 1 | 3cccv081114b.d-avg | CTR-1 3.175(mm) |
| LCS 200-75942/2 | | 08/12/2014 12:42 | 1 | 3clcs81114a.d-avg | CTR-1 3.175(mm) |
| MB 200-75942/3 | | 08/12/2014 14:57 | 1 | mb081114001.d-avg | CTR-1 3.175(mm) |
| 200-23612-1 | 205-VP3b | 08/12/2014 15:31 | 1 | 200-23612-a-1a.d-avg | CTR-1 3.175(mm) |
| 200-23612-2 | 205-VP3a | 08/12/2014 17:02 | 1 | 200-23612-a-2001.d-avg | CTR-1 3.175(mm) |
| 200-23612-2 DU | 205-VP3a DU | 08/12/2014 17:18 | 1 | 200-23612-a-2002.d-avg | CTR-1 3.175(mm) |
| 200-23612-3 | 205-VP3a-DUP | 08/12/2014 18:38 | 1 | 200-23612-a-3001.d-avg | CTR-1 3.175(mm) |
| 200-23612-4 | 205-VP3c | 08/12/2014 19:25 | 1 | 200-23612-a-4001.d-avg | CTR-1 3.175(mm) |
| 200-23612-6 | CALGAS1000 | 08/12/2014 21:00 | 1 | 200-23612-a-6001.d-avg | CTR-1 3.175(mm) |
| 200-23612-7 | CALGAS2000 | 08/12/2014 21:48 | 1 | 200-23612-a-7001.d-avg | CTR-1 3.175(mm) |
| ZZZZZ | | 08/12/2014 22:36 | 1.5 | | CTR-1 3.175(mm) |
| CCVC 200-75942/10 | | 08/13/2014 09:30 | 1 | 3cccvc081114a.d-avg | CTR-1 3.175(mm) |

EPA 3C

# Shipping and Receiving Documents

**TestAmerica Burlington**
30 Community Drive
Suite 11
South Burlington, VT 05403
phone 802.660.1990 fax 802.660.1919

# Canister Samples Chain of Custody Record

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

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

**TestAmerica Laboratories, Inc.**

| | | |
|---|---|---|
| **Client Contact Information** | **Project Manager: Paul Nicholson** | **Samples Collected By: Darius Mali** |
| Company Name: Geosyntec Consultants | **Phone: 519-515-0864** | |
| Address: 130 Research Lane Suite 2 | **Email: pnicholson@geosyntec.com** | |
| Guelph Ontario, Canada, N1G5G3 | | |
| Phone: 519-822-2230 | **Site Contact:** | |
| FAX: 519-822-3151 | **TA Contact:** | |
| Project Name:ESTCP | **Anaylsis Turnaround Time** | |
| Site/Location: Building 205 | Standard (Specific):_____ | |
| P O # TR0479 | Rush (Specifiy):_____1-day_____ | |

COC No: ___1___ of ___1___ COCs

**For Lab Use Only:**
Walk-in Client:
Lab Sampling:

Job / SDG No.:
(See below for Add'l Items)

| Sample Identification | Sample Date(s) | Time Start | Time Stop | Canister Vacuum in Field, 'Hg (Start)' | Canister Vacuum in Field, 'Hg (Stop)' | Flow Controller ID | Canister ID | TO-15 (Med / Std / Low / SIM) | MA-APH | EPA 3C | EPA 25C / 25.3 | ASTM D-1946 / 1945 / 3588 | EPA 15/16 | TO-3 | Other (Please specify in notes section) | *Sample Type* | Indoor Air | Ambient Air | Soil Gas | Landfill Gas | Other (Please specify in notes section) | Sample Specific Notes: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 205-VP3b | 10-Aug | 9:05 | 9:05 | Tedlar Bag | | | | | | X | | | | | | | | | X | | | CO2 CH4 N2 CO |
| 205-VP3a | 10-Aug | 9:10 | **9:10** | Tedlar Bag | | | | | | X | | | | | | | | | X | | | CO2 CH4 N2 CO |
| 205-VP3a-DUP | 10-Aug | 9:15 | **9:15** | Tedlar Bag | | | | | | X | | | | | | | | | X | | | CO2 CH4 N2 CO |
| 205-VP3c | 10-Aug | 9:20 | **9:20** | Tedlar Bag | | | | | | X | | | | | | | | | X | | | CO2 CH4 N2 CO |
| 205-VP3c-DUP | 10-Aug | 9:25 | **9:25** | Tedlar Bag | | | | | | X | | | | | | | | | X | | | CO2 CH4 N2 CO |
| CALGAS1000 | 10-Aug | 9:30 | **9:30** | Tedlar Bag | | | | | | X | | | | | | | | | X | | | CO2 CH4 N2 CO |
| CALGAS2000 | 10-Aug | 9:35 | **9:35** | Tedlar Bag | | | | | | X | | | | | | | | | X | | | CO2 CH4 N2 CO |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |

| | Temperature (Fahrenheit) | | | |
|---|---|---|---|---|
| | **Start** | **Interior** | **Ambient** | |
| | **Stop** | | | |

| | Temperature (Fahrenheit) | | | |
|---|---|---|---|---|
| | **Start** | **Interior** | **Ambient** | |
| | **Stop** | | | |

200-23612 Chain of Custody

**Special Instructions/QC Requirements & Comments:**

| | | | |
|---|---|---|---|
| **Samples Shipped by:** | **Date / Time:** 8/11/14/1800 | **Samples Received by:** | 8/12/14 9:46 |
| **Samples Relinquished by:** | **Date / Time:** 08/11/14 15:27 | **Received by:** | |
| **Relinquished by:** | **Date / Time:** | **Received by:** | 8/11/14 |
| **Lab Use Only:** **Shipper Name:** | **Opened by:** | **Condition:** | |

# Login Sample Receipt Checklist

Client: Geosyntec Consultants, Inc.

Job Number: 200-23612-1
SDG Number: 200-23612

**Login Number: 23612**
**List Number: 1**
**Creator: Atherton, Joel E**

**List Source: TestAmerica Burlington**

| Question | Answer | Comment |
|---|---|---|
| Radioactivity wasn't checked or is </= background as measured by a survey meter. | N/A | Lab does not accept radioactive samples. |
| 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 | Thermal preservation not required. |
| Cooler Temperature is acceptable. | True | |
| 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. | False | Refer to Job Narrative for details. |
| Samples are received within Holding Time. | True | |
| Sample containers have legible labels. | True | |
| Containers are not broken or leaking. | True | |
| Sample collection date/times are provided. | True | NO SAMPLE TIMES ON CONTAINER LABELS |
| Appropriate sample containers are used. | True | |
| Sample bottles are completely filled. | False | Refer to Job Narrative for details. |
| Sample Preservation Verified. | True | |
| 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. | N/A | |
| Samples do not require splitting or compositing. | N/A | |
| Residual Chlorine Checked. | N/A | |

# ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L1519907 |
| Client: | Geosyntec Consultants<br>130 Research Lane<br>Suite 2<br>Guelph, ON N1G563 |
| ATTN: | Todd McAlary |
| Phone: | (609) 462-1198 |
| Project Name: | ESTCP 2013 |
| Project Number: | TR0479 |
| Report Date: | 08/25/15 |

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), ME (MA00030), PA (68-02089), VA (460194), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), USFWS (Permit #LE2069641), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L1519907-01 | 205-IA-05-PS | AIR | BUILDIING 205 | 08/16/15 13:22 | 08/18/15 |
| L1519907-02 | 205-IA-06-PS-1 | AIR | BUILDIING 205 | 08/16/15 13:22 | 08/18/15 |
| L1519907-03 | 205-IA-07-PW | AIR | BUILDIING 205 | 08/16/15 13:22 | 08/18/15 |
| L1519907-04 | 205-IA-01-GS | AIR | BUILDIING 205 | 08/16/15 13:19 | 08/18/15 |
| L1519907-05 | 205-IA-02-GW | AIR | BUILDIING 205 | 08/16/15 13:19 | 08/18/15 |
| L1519907-06 | 205-IA-03-YS | AIR | BUILDIING 205 | 08/16/15 13:26 | 08/18/15 |
| L1519907-07 | 205-IA-04-YW | AIR | BUILDIING 205 | 08/16/15 13:26 | 08/18/15 |
| L1519907-08 | BUILDING 205_SOUTH EXHAUST | AIR | BUILDIING 205 | 08/16/15 10:54 | 08/18/15 |
| L1519907-09 | BUILDING 205_NORTH EXHAUST | AIR | BUILDIING 205 | 08/16/15 10:56 | 08/18/15 |
| L1519907-10 | BUILDING 205_MID EXHAUST | AIR | BUILDIING 205 | 08/16/15 10:55 | 08/18/15 |
| L1519907-11 | UNUSED CAN #650 | AIR | BUILDIING 205 | | 08/18/15 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** ESTCP 2013 **Lab Number:** L1519907
**Project Number:** TR0479 **Report Date:** 08/25/15

**Case Narrative (continued)**

Volatile Organics in Air

Canisters were released from the laboratory on August 13, 2015. The canister certification results are provided as an addendum.

Samples L1519907-01 through -06 and -09 The presence of Isopropyl Alcohol could not be determined in these samples due to a non-target compound interfering with the identification and quantification of this compound.

Samples L1519907-07, -08 and -10: The presence of Acetone could not be determined in these samples due to a non-target compound interfering with the identification and quantification of this compound.

Sample L1519907-07 results for Isopropyl Alcohol should be considered estimated due to co-elution with a non-target peak.

Sample Receipt

The canister ID number for the sample designated 205-IA-04-YW (L1519907-07) is listed on the chain of custody form as 1553 but should be 1593.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 08/25/15

# AIR

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-01
Client ID: 205-IA-05-PS
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 19:00
Analyst: RY

Date Collected: 08/16/15 13:22
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.337 | 0.200 | -- | 1.67 | 0.989 | -- | | 1 |
| Chloromethane | 0.599 | 0.200 | -- | 1.24 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 3.53 | 2.50 | -- | 6.65 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 7.09 | 1.00 | -- | 16.8 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.248 | 0.200 | -- | 1.39 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Methylene chloride | 0.689 | 0.500 | -- | 2.39 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | 0.501 | 0.500 | -- | 1.48 | 1.47 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-01 Date Collected: 08/16/15 13:22

Client ID: 205-IA-05-PS Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-01 Date Collected: 08/16/15 13:22

Client ID: 205-IA-05-PS Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 81 | | 60-140 |
| Bromochloromethane | 85 | | 60-140 |
| chlorobenzene-d5 | 88 | | 60-140 |

***Project Name:*** ESTCP 2013
***Project Number:*** TR0479

***Lab Number:*** L1519907
***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-01
Client ID: 205-IA-05-PS
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 19:00
Analyst: RY

Date Collected: 08/16/15 13:22
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 82 | | 60-140 |
| bromochloromethane | 85 | | 60-140 |
| chlorobenzene-d5 | 88 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-02
Client ID: 205-IA-06-PS-1
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 19:32
Analyst: RY

Date Collected: 08/16/15 13:22
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.496 | 0.200 | -- | 2.45 | 0.989 | -- | | 1 |
| Chloromethane | 0.574 | 0.200 | -- | 1.19 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 3.60 | 2.50 | -- | 6.78 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 7.08 | 1.00 | -- | 16.8 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.247 | 0.200 | -- | 1.39 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Methylene chloride | 0.653 | 0.500 | -- | 2.27 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-02 Date Collected: 08/16/15 13:22

Client ID: 205-IA-06-PS-1 Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-02 Date Collected: 08/16/15 13:22

Client ID: 205-IA-06-PS-1 Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 87 | | 60-140 |
| Bromochloromethane | 84 | | 60-140 |
| chlorobenzene-d5 | 91 | | 60-140 |

***Project Name:*** ESTCP 2013
***Project Number:*** TR0479

***Lab Number:*** L1519907
***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-02
Client ID: 205-IA-06-PS-1
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 19:32
Analyst: RY

Date Collected: 08/16/15 13:22
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 88 | | 60-140 |
| bromochloromethane | 85 | | 60-140 |
| chlorobenzene-d5 | 91 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-03
Client ID: 205-IA-07-PW
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 20:04
Analyst: RY

Date Collected: 08/16/15 13:22
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.396 | 0.200 | -- | 1.96 | 0.989 | -- | | 1 |
| Chloromethane | 0.577 | 0.200 | -- | 1.19 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 4.15 | 2.50 | -- | 7.82 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 6.45 | 1.00 | -- | 15.3 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.219 | 0.200 | -- | 1.23 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Methylene chloride | 0.684 | 0.500 | -- | 2.38 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | 0.534 | 0.500 | -- | 1.57 | 1.47 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-03 Date Collected: 08/16/15 13:22

Client ID: 205-IA-07-PW Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | 0.250 | 0.200 | -- | 0.942 | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-03 Date Collected: 08/16/15 13:22

Client ID: 205-IA-07-PW Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 85 | | 60-140 |
| Bromochloromethane | 86 | | 60-140 |
| chlorobenzene-d5 | 91 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-03
Client ID: 205-IA-07-PW
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 20:04
Analyst: RY

Date Collected: 08/16/15 13:22
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 87 | | 60-140 |
| bromochloromethane | 87 | | 60-140 |
| chlorobenzene-d5 | 92 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-04
Client ID: 205-IA-01-GS
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 20:36
Analyst: RY

Date Collected: 08/16/15 13:19
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.521 | 0.200 | -- | 2.58 | 0.989 | -- | | 1 |
| Chloromethane | 0.621 | 0.200 | -- | 1.28 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 6.24 | 2.50 | -- | 11.8 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 9.36 | 1.00 | -- | 22.2 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.250 | 0.200 | -- | 1.40 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Methylene chloride | 0.599 | 0.500 | -- | 2.08 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | 0.643 | 0.500 | -- | 1.90 | 1.47 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | 0.251 | 0.200 | -- | 0.885 | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-04 Date Collected: 08/16/15 13:19

Client ID: 205-IA-01-GS Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | 0.308 | 0.200 | -- | 1.16 | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-04 Date Collected: 08/16/15 13:19

Client ID: 205-IA-01-GS Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 84 | | 60-140 |
| Bromochloromethane | 85 | | 60-140 |
| chlorobenzene-d5 | 91 | | 60-140 |

***Project Name:*** ESTCP 2013
***Project Number:*** TR0479

***Lab Number:*** L1519907
***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-04
Client ID: 205-IA-01-GS
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 20:36
Analyst: RY

Date Collected: 08/16/15 13:19
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 86 | | 60-140 |
| bromochloromethane | 87 | | 60-140 |
| chlorobenzene-d5 | 92 | | 60-140 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

## SAMPLE RESULTS

Lab ID: L1519907-05
Client ID: 205-IA-02-GW
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 21:08
Analyst: RY

Date Collected: 08/16/15 13:19
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.368 | 0.200 | -- | 1.82 | 0.989 | -- | | 1 |
| Chloromethane | 0.632 | 0.200 | -- | 1.31 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 9.28 | 2.50 | -- | 17.5 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 10.1 | 1.00 | -- | 24.0 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.254 | 0.200 | -- | 1.43 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Methylene chloride | 0.535 | 0.500 | -- | 1.86 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | 0.577 | 0.500 | -- | 1.70 | 1.47 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | 0.272 | 0.200 | -- | 0.959 | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-05 Date Collected: 08/16/15 13:19

Client ID: 205-IA-02-GW Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | 0.390 | 0.200 | -- | 1.47 | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-05 Date Collected: 08/16/15 13:19

Client ID: 205-IA-02-GW Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 84 | | 60-140 |
| Bromochloromethane | 87 | | 60-140 |
| chlorobenzene-d5 | 91 | | 60-140 |

***Project Name:*** ESTCP 2013
***Project Number:*** TR0479
***Lab Number:*** L1519907
***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-05
Client ID: 205-IA-02-GW
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 21:08
Analyst: RY

Date Collected: 08/16/15 13:19
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | 0.051 | 0.020 | -- | 0.206 | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 86 | | 60-140 |
| bromochloromethane | 88 | | 60-140 |
| chlorobenzene-d5 | 92 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-06
Client ID: 205-IA-03-YS
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 21:41
Analyst: RY

Date Collected: 08/16/15 13:26
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.417 | 0.200 | -- | 2.06 | 0.989 | -- | | 1 |
| Chloromethane | 0.819 | 0.200 | -- | 1.69 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 6.28 | 2.50 | -- | 11.8 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 8.36 | 1.00 | -- | 19.9 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.236 | 0.200 | -- | 1.33 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Methylene chloride | 0.560 | 0.500 | -- | 1.95 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | 0.598 | 0.500 | -- | 1.76 | 1.47 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-06 Date Collected: 08/16/15 13:26

Client ID: 205-IA-03-YS Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | 0.236 | 0.200 | -- | 0.889 | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-06 Date Collected: 08/16/15 13:26

Client ID: 205-IA-03-YS Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 81 | | 60-140 |
| Bromochloromethane | 89 | | 60-140 |
| chlorobenzene-d5 | 89 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-06
Client ID: 205-IA-03-YS
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 21:41
Analyst: RY

Date Collected: 08/16/15 13:26
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | 0.028 | 0.020 | -- | 0.113 | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | 0.026 | 0.020 | -- | 0.140 | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 85 | | 60-140 |
| bromochloromethane | 91 | | 60-140 |
| chlorobenzene-d5 | 90 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-07
Client ID: 205-IA-04-YW
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 22:13
Analyst: RY

Date Collected: 08/16/15 13:26
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.571 | 0.200 | -- | 2.82 | 0.989 | -- | | 1 |
| Chloromethane | 0.707 | 0.200 | -- | 1.46 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 6.31 | 2.50 | -- | 11.9 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.229 | 0.200 | -- | 1.29 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | 5.09 | 0.500 | -- | 12.5 | 1.23 | -- | | 1 |
| Methylene chloride | 3.76 | 0.500 | -- | 13.1 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | 0.549 | 0.500 | -- | 1.62 | 1.47 | -- | | 1 |
| Ethyl Acetate | 9.22 | 0.500 | -- | 33.2 | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | 0.385 | 0.200 | -- | 1.36 | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-07 Date Collected: 08/16/15 13:26

Client ID: 205-IA-04-YW Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | 0.350 | 0.200 | -- | 1.20 | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | 0.238 | 0.200 | -- | 0.975 | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | 2.68 | 0.200 | -- | 10.1 | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | 0.273 | 0.200 | -- | 1.16 | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-07 Date Collected: 08/16/15 13:26

Client ID: 205-IA-04-YW Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 85 | | 60-140 |
| Bromochloromethane | 87 | | 60-140 |
| chlorobenzene-d5 | 88 | | 60-140 |

***Project Name:*** ESTCP 2013
***Project Number:*** TR0479

***Lab Number:*** L1519907
***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-07
Client ID: 205-IA-04-YW
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 22:13
Analyst: RY

Date Collected: 08/16/15 13:26
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | 0.039 | 0.020 | -- | 0.158 | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | 0.035 | 0.020 | -- | 0.237 | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 85 | | 60-140 |
| bromochloromethane | 87 | | 60-140 |
| chlorobenzene-d5 | 87 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-08
Client ID: BUILDING 205_SOUTH EXHAUST
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 22:45
Analyst: RY

Date Collected: 08/16/15 10:54
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.440 | 0.200 | -- | 2.18 | 0.989 | -- | | 1 |
| Chloromethane | 0.576 | 0.200 | -- | 1.19 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.212 | 0.200 | -- | 1.19 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | 2.32 | 0.500 | -- | 5.70 | 1.23 | -- | | 1 |
| Methylene chloride | 3.40 | 0.500 | -- | 11.8 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| Ethyl Acetate | 2.81 | 0.500 | -- | 10.1 | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | 0.245 | 0.200 | -- | 0.863 | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-08 Date Collected: 08/16/15 10:54

Client ID: BUILDING 205_SOUTH EXHAUST Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | 0.285 | 0.200 | -- | 0.981 | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | 0.878 | 0.200 | -- | 3.31 | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-08 Date Collected: 08/16/15 10:54

Client ID: BUILDING 205_SOUTH EXHAUST Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 87 | | 60-140 |
| Bromochloromethane | 90 | | 60-140 |
| chlorobenzene-d5 | 88 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-08
Client ID: BUILDING 205_SOUTH EXHAUST
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 22:45
Analyst: RY

Date Collected: 08/16/15 10:54
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | 0.034 | 0.020 | -- | 0.135 | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 89 | | 60-140 |
| bromochloromethane | 92 | | 60-140 |
| chlorobenzene-d5 | 90 | | 60-140 |

**Project Name:** ESTCP 2013 **Lab Number:** L1519907

**Project Number:** TR0479 **Report Date:** 08/25/15

## SAMPLE RESULTS

Lab ID: L1519907-09
Client ID: BUILDING 205_NORTH EXHAUST
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 23:17
Analyst: RY

Date Collected: 08/16/15 10:56
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.509 | 0.200 | -- | 2.52 | 0.989 | -- | | 1 |
| Chloromethane | 0.632 | 0.200 | -- | 1.31 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 7.54 | 2.50 | -- | 14.2 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 8.04 | 1.00 | -- | 19.1 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.236 | 0.200 | -- | 1.33 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | 0.650 | 0.500 | -- | 1.92 | 1.47 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-09 Date Collected: 08/16/15 10:56

Client ID: BUILDING 205_NORTH EXHAUST Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | 0.858 | 0.200 | -- | 2.95 | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | 0.339 | 0.200 | -- | 1.28 | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-09 Date Collected: 08/16/15 10:56

Client ID: BUILDING 205_NORTH EXHAUST Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 86 | | 60-140 |
| Bromochloromethane | 88 | | 60-140 |
| chlorobenzene-d5 | 91 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-09
Client ID: BUILDING 205_NORTH EXHAUST
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 23:17
Analyst: RY

Date Collected: 08/16/15 10:56
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | 0.022 | 0.020 | -- | 0.089 | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 88 | | 60-140 |
| bromochloromethane | 91 | | 60-140 |
| chlorobenzene-d5 | 92 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-10
Client ID: BUILDING 205_MID EXHAUST
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/21/15 23:49
Analyst: RY

Date Collected: 08/16/15 10:55
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.487 | 0.200 | -- | 2.41 | 0.989 | -- | | 1 |
| Chloromethane | 0.583 | 0.200 | -- | 1.20 | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 3.22 | 2.50 | -- | 6.07 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.236 | 0.200 | -- | 1.33 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | 4.25 | 0.500 | -- | 10.4 | 1.23 | -- | | 1 |
| Methylene chloride | 7.18 | 0.500 | -- | 24.9 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| Ethyl Acetate | 7.82 | 0.500 | -- | 28.2 | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| n-Hexane | 0.401 | 0.200 | -- | 1.41 | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-10 Date Collected: 08/16/15 10:55

Client ID: BUILDING 205_MID EXHAUST Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | 0.694 | 0.200 | -- | 2.39 | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | 2.39 | 0.200 | -- | 9.01 | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | 0.289 | 0.200 | -- | 1.23 | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-10 Date Collected: 08/16/15 10:55

Client ID: BUILDING 205_MID EXHAUST Date Received: 08/18/15

Sample Location: BUILDIING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 84 | | 60-140 |
| Bromochloromethane | 90 | | 60-140 |
| chlorobenzene-d5 | 89 | | 60-140 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1519907

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1519907-10
Client ID: BUILDING 205_MID EXHAUST
Sample Location: BUILDIING 205
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 23:49
Analyst: RY

Date Collected: 08/16/15 10:55
Date Received: 08/18/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | 0.026 | 0.020 | -- | 0.105 | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | 0.031 | 0.020 | -- | 0.210 | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 87 | | 60-140 |
| bromochloromethane | 92 | | 60-140 |
| chlorobenzene-d5 | 91 | | 60-140 |

**Project Name:** ESTCP 2013 **Lab Number:** L1519907

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 14:44

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-10 Batch: WG814443-4 | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.050 | -- | ND | 0.349 | -- | | 1 |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,3-Butadiene | ND | 0.020 | -- | ND | 0.044 | -- | | 1 |
| Bromomethane | ND | 0.020 | -- | ND | 0.078 | -- | | 1 |
| Chloroethane | ND | 0.020 | -- | ND | 0.053 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.050 | -- | ND | 0.281 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.050 | -- | ND | 0.383 | -- | | 1 |
| Halothane | ND | 0.050 | -- | ND | 0.404 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Chloroform | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Benzene | ND | 0.100 | -- | ND | 0.319 | -- | | 1 |
| Carbon tetrachloride | ND | 0.020 | -- | ND | 0.126 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |

**Project Name:** ESTCP 2013 **Lab Number:** L1519907

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 14:44

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-10 Batch: WG814443-4 | | | | | | | | |
| Bromodichloromethane | ND | 0.020 | -- | ND | 0.134 | -- | | 1 |
| 1,4-Dioxane | ND | 0.100 | -- | ND | 0.360 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Toluene | ND | 0.050 | -- | ND | 0.188 | -- | | 1 |
| Dibromochloromethane | ND | 0.020 | -- | ND | 0.170 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.020 | -- | ND | 0.154 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| Chlorobenzene | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |
| Ethylbenzene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| p/m-Xylene | ND | 0.040 | -- | ND | 0.174 | -- | | 1 |
| Bromoform | ND | 0.020 | -- | ND | 0.207 | -- | | 1 |
| Styrene | ND | 0.020 | -- | ND | 0.085 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| o-Xylene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |

**Project Name:** ESTCP 2013 **Lab Number:** L1519907

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15-SIM
Analytical Date: 08/21/15 14:44

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01-10 Batch: WG814443-4 | | | | | | | | |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Naphthalene | ND | 0.050 | -- | ND | 0.262 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.050 | -- | ND | 0.533 | -- | | 1 |

**Project Name:** ESTCP 2013 **Lab Number:** L1519907

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-10 Batch: WG814444-4 | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| tert-Butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** ESTCP 2013 **Lab Number:** L1519907

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-10 Batch: WG814444-4 | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Isopropyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Ethyl-Tert-Butyl-Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| Tertiary-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |

**Project Name:** ESTCP 2013 **Lab Number:** L1519907

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-10 Batch: WG814444-4 | | | | | | | | |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl Acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |

**Project Name:** ESTCP 2013 **Lab Number:** L1519907

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-10 Batch: WG814444-4 | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane (C9) | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| o-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| p-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane (C10) | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane (C12) | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-10 Batch: WG814444-4 | | | | | | | | |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| No Tentatively Identified Compounds | | | | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-10 Batch: WG814443-3 | | | | | | | | |
| Dichlorodifluoromethane | 87 | | - | | 70-130 | - | | 25 |
| Chloromethane | 101 | | - | | 70-130 | - | | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 100 | | - | | 70-130 | - | | 25 |
| Vinyl chloride | 100 | | - | | 70-130 | - | | 25 |
| 1,3-Butadiene | 106 | | - | | 70-130 | - | | 25 |
| Bromomethane | 97 | | - | | 70-130 | - | | 25 |
| Chloroethane | 92 | | - | | 70-130 | - | | 25 |
| Acetone | 102 | | - | | 70-130 | - | | 25 |
| Trichlorofluoromethane | 100 | | - | | 70-130 | - | | 25 |
| Acrylonitrile | 92 | | - | | 70-130 | - | | 25 |
| 1,1-Dichloroethene | 98 | | - | | 70-130 | - | | 25 |
| Methylene chloride | 107 | | - | | 70-130 | - | | 25 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 100 | | - | | 70-130 | - | | 25 |
| Halothane | 104 | | - | | 70-130 | - | | 25 |
| trans-1,2-Dichloroethene | 80 | | - | | 70-130 | - | | 25 |
| 1,1-Dichloroethane | 80 | | - | | 70-130 | - | | 25 |
| Methyl tert butyl ether | 81 | | - | | 70-130 | - | | 25 |
| 2-Butanone | 94 | | - | | 70-130 | - | | 25 |
| cis-1,2-Dichloroethene | 107 | | - | | 70-130 | - | | 25 |
| Chloroform | 97 | | - | | 70-130 | - | | 25 |
| 1,2-Dichloroethane | 94 | | - | | 70-130 | - | | 25 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-10 Batch: WG814443-3 | | | | | | | | |
| 1,1,1-Trichloroethane | 95 | | - | | 70-130 | - | | 25 |
| Benzene | 91 | | - | | 70-130 | - | | 25 |
| Carbon tetrachloride | 105 | | - | | 70-130 | - | | 25 |
| 1,2-Dichloropropane | 94 | | - | | 70-130 | - | | 25 |
| Bromodichloromethane | 97 | | - | | 70-130 | - | | 25 |
| 1,4-Dioxane | 93 | | - | | 70-130 | - | | 25 |
| Trichloroethene | 94 | | - | | 70-130 | - | | 25 |
| cis-1,3-Dichloropropene | 100 | | - | | 70-130 | - | | 25 |
| 4-Methyl-2-pentanone | 97 | | - | | 70-130 | - | | 25 |
| trans-1,3-Dichloropropene | 86 | | - | | 70-130 | - | | 25 |
| 1,1,2-Trichloroethane | 99 | | - | | 70-130 | - | | 25 |
| Toluene | 91 | | - | | 70-130 | - | | 25 |
| Dibromochloromethane | 96 | | - | | 70-130 | - | | 25 |
| 1,2-Dibromoethane | 97 | | - | | 70-130 | - | | 25 |
| Tetrachloroethene | 92 | | - | | 70-130 | - | | 25 |
| 1,1,1,2-Tetrachloroethane | 88 | | - | | 70-130 | - | | 25 |
| Chlorobenzene | 93 | | - | | 70-130 | - | | 25 |
| Ethylbenzene | 93 | | - | | 70-130 | - | | 25 |
| p/m-Xylene | 93 | | - | | 70-130 | - | | 25 |
| Bromoform | 96 | | - | | 70-130 | - | | 25 |
| Styrene | 95 | | - | | 70-130 | - | | 25 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-10 Batch: WG814443-3 | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 98 | | - | | 70-130 | - | | 25 |
| o-Xylene | 93 | | - | | 70-130 | - | | 25 |
| Isopropylbenzene | 91 | | - | | 70-130 | - | | 25 |
| 4-Ethyltoluene | 91 | | - | | 70-130 | - | | 25 |
| 1,3,5-Trimethylbenzene | 94 | | - | | 70-130 | - | | 25 |
| 1,2,4-Trimethylbenzene | 97 | | - | | 70-130 | - | | 25 |
| 1,3-Dichlorobenzene | 100 | | - | | 70-130 | - | | 25 |
| 1,4-Dichlorobenzene | 98 | | - | | 70-130 | - | | 25 |
| sec-Butylbenzene | 91 | | - | | 70-130 | - | | 25 |
| p-Isopropyltoluene | 86 | | - | | 70-130 | - | | 25 |
| 1,2-Dichlorobenzene | 99 | | - | | 70-130 | - | | 25 |
| n-Butylbenzene | 101 | | - | | 70-130 | - | | 25 |
| 1,2,4-Trichlorobenzene | 118 | | - | | 70-130 | - | | 25 |
| Naphthalene | 112 | | - | | 70-130 | - | | 25 |
| 1,2,3-Trichlorobenzene | 114 | | - | | 70-130 | - | | 25 |
| Hexachlorobutadiene | 107 | | - | | 70-130 | - | | 25 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-10 Batch: WG814444-3 | | | | | | | | |
| Chlorodifluoromethane | 92 | | - | | 70-130 | - | | |
| Propylene | 110 | | - | | 70-130 | - | | |
| Propane | 83 | | - | | 70-130 | - | | |
| Dichlorodifluoromethane | 92 | | - | | 70-130 | - | | |
| Chloromethane | 102 | | - | | 70-130 | - | | |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 106 | | - | | 70-130 | - | | |
| Methanol | 103 | | - | | 70-130 | - | | |
| Vinyl chloride | 105 | | - | | 70-130 | - | | |
| 1,3-Butadiene | 113 | | - | | 70-130 | - | | |
| Butane | 98 | | - | | 70-130 | - | | |
| Bromomethane | 99 | | - | | 70-130 | - | | |
| Chloroethane | 98 | | - | | 70-130 | - | | |
| Ethyl Alcohol | 107 | | - | | 70-130 | - | | |
| Dichlorofluoromethane | 94 | | - | | 70-130 | - | | |
| Vinyl bromide | 100 | | - | | 70-130 | - | | |
| Acrolein | 100 | | - | | 70-130 | - | | |
| Acetone | 108 | | - | | 70-130 | - | | |
| Acetonitrile | 102 | | - | | 70-130 | - | | |
| Trichlorofluoromethane | 99 | | - | | 70-130 | - | | |
| iso-Propyl Alcohol | 109 | | - | | 70-130 | - | | |
| Acrylonitrile | 96 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-10 Batch: WG814444-3 | | | | | | | | |
| Pentane | 87 | | - | | 70-130 | - | | |
| Ethyl ether | 93 | | - | | 70-130 | - | | |
| 1,1-Dichloroethene | 94 | | - | | 70-130 | - | | |
| tert-Butyl Alcohol | 91 | | - | | 70-130 | - | | |
| Methylene chloride | 98 | | - | | 70-130 | - | | |
| 3-Chloropropene | 101 | | - | | 70-130 | - | | |
| Carbon disulfide | 88 | | - | | 70-130 | - | | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 95 | | - | | 70-130 | - | | |
| trans-1,2-Dichloroethene | 79 | | - | | 70-130 | - | | |
| 1,1-Dichloroethane | 83 | | - | | 70-130 | - | | |
| Methyl tert butyl ether | 83 | | - | | 70-130 | - | | |
| Vinyl acetate | 88 | | - | | 70-130 | - | | |
| 2-Butanone | 80 | | - | | 70-130 | - | | |
| cis-1,2-Dichloroethene | 103 | | - | | 70-130 | - | | |
| Ethyl Acetate | 101 | | - | | 70-130 | - | | |
| Chloroform | 102 | | - | | 70-130 | - | | |
| Tetrahydrofuran | 94 | | - | | 70-130 | - | | |
| 2,2-Dichloropropane | 89 | | - | | 70-130 | - | | |
| 1,2-Dichloroethane | 97 | | - | | 70-130 | - | | |
| n-Hexane | 96 | | - | | 70-130 | - | | |
| Isopropyl Ether | 91 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-10 Batch: WG814444-3 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 90 | | - | | 70-130 | - | | |
| 1,1,1-Trichloroethane | 99 | | - | | 70-130 | - | | |
| 1,1-Dichloropropene | 94 | | - | | 70-130 | - | | |
| Benzene | 95 | | - | | 70-130 | - | | |
| Carbon tetrachloride | 103 | | - | | 70-130 | - | | |
| Cyclohexane | 100 | | - | | 70-130 | - | | |
| Tertiary-Amyl Methyl Ether | 88 | | - | | 70-130 | - | | |
| Dibromomethane | 94 | | - | | 70-130 | - | | |
| 1,2-Dichloropropane | 98 | | - | | 70-130 | - | | |
| Bromodichloromethane | 100 | | - | | 70-130 | - | | |
| 1,4-Dioxane | 100 | | - | | 70-130 | - | | |
| Trichloroethene | 99 | | - | | 70-130 | - | | |
| 2,2,4-Trimethylpentane | 96 | | - | | 70-130 | - | | |
| Methyl Methacrylate | 93 | | - | | 70-130 | - | | |
| Heptane | 96 | | - | | 70-130 | - | | |
| cis-1,3-Dichloropropene | 104 | | - | | 70-130 | - | | |
| 4-Methyl-2-pentanone | 102 | | - | | 70-130 | - | | |
| trans-1,3-Dichloropropene | 89 | | - | | 70-130 | - | | |
| 1,1,2-Trichloroethane | 101 | | - | | 70-130 | - | | |
| Toluene | 93 | | - | | 70-130 | - | | |
| 1,3-Dichloropropane | 89 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-10 Batch: WG814444-3 | | | | | | | | |
| 2-Hexanone | 101 | | - | | 70-130 | - | | |
| Dibromochloromethane | 100 | | - | | 70-130 | - | | |
| 1,2-Dibromoethane | 98 | | - | | 70-130 | - | | |
| Butyl Acetate | 95 | | - | | 70-130 | - | | |
| Octane | 86 | | - | | 70-130 | - | | |
| Tetrachloroethene | 94 | | - | | 70-130 | - | | |
| 1,1,1,2-Tetrachloroethane | 92 | | - | | 70-130 | - | | |
| Chlorobenzene | 95 | | - | | 70-130 | - | | |
| Ethylbenzene | 94 | | - | | 70-130 | - | | |
| p/m-Xylene | 96 | | - | | 70-130 | - | | |
| Bromoform | 95 | | - | | 70-130 | - | | |
| Styrene | 95 | | - | | 70-130 | - | | |
| 1,1,2,2-Tetrachloroethane | 102 | | - | | 70-130 | - | | |
| o-Xylene | 98 | | - | | 70-130 | - | | |
| 1,2,3-Trichloropropane | 92 | | - | | 70-130 | - | | |
| Nonane (C9) | 92 | | - | | 70-130 | - | | |
| Isopropylbenzene | 93 | | - | | 70-130 | - | | |
| Bromobenzene | 89 | | - | | 70-130 | - | | |
| o-Chlorotoluene | 89 | | - | | 70-130 | - | | |
| n-Propylbenzene | 92 | | - | | 70-130 | - | | |
| p-Chlorotoluene | 91 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-10 Batch: WG814444-3 | | | | | | | | |
| 4-Ethyltoluene | 89 | | - | | 70-130 | - | | |
| 1,3,5-Trimethylbenzene | 96 | | - | | 70-130 | - | | |
| tert-Butylbenzene | 91 | | - | | 70-130 | - | | |
| 1,2,4-Trimethylbenzene | 100 | | - | | 70-130 | - | | |
| Decane (C10) | 94 | | - | | 70-130 | - | | |
| Benzyl chloride | 97 | | - | | 70-130 | - | | |
| 1,3-Dichlorobenzene | 99 | | - | | 70-130 | - | | |
| 1,4-Dichlorobenzene | 97 | | - | | 70-130 | - | | |
| sec-Butylbenzene | 93 | | - | | 70-130 | - | | |
| p-Isopropyltoluene | 88 | | - | | 70-130 | - | | |
| 1,2-Dichlorobenzene | 98 | | - | | 70-130 | - | | |
| n-Butylbenzene | 98 | | - | | 70-130 | - | | |
| 1,2-Dibromo-3-chloropropane | 92 | | - | | 70-130 | - | | |
| Undecane | 103 | | - | | 70-130 | - | | |
| Dodecane (C12) | 125 | | - | | 70-130 | - | | |
| 1,2,4-Trichlorobenzene | 111 | | - | | 70-130 | - | | |
| Naphthalene | 110 | | - | | 70-130 | - | | |
| 1,2,3-Trichlorobenzene | 108 | | - | | 70-130 | - | | |
| Hexachlorobutadiene | 107 | | - | | 70-130 | - | | |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01-10 QC Batch ID: WG814443-5 QC Sample: L1520119-03 Client ID: DUP Sample | | | | | | |
| Vinyl chloride | ND | ND | ppbV | NC | | 25 |
| 1,1-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| cis-1,2-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| 1,1,1-Trichloroethane | ND | ND | ppbV | NC | | 25 |
| Carbon tetrachloride | 0.065 | 0.070 | ppbV | 7 | | 25 |
| Trichloroethene | ND | ND | ppbV | NC | | 25 |
| Tetrachloroethene | 0.058 | 0.060 | ppbV | 3 | | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-10 QC Batch ID: WG814444-5 QC Sample: L1520119-03 Client ID: DUP Sample | | | | | |
| Dichlorodifluoromethane | 0.386 | 0.406 | ppbV | 5 | 25 |
| Chloromethane | 0.761 | 0.699 | ppbV | 8 | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | ND | ppbV | NC | 25 |
| 1,3-Butadiene | ND | ND | ppbV | NC | 25 |
| Bromomethane | ND | ND | ppbV | NC | 25 |
| Chloroethane | ND | ND | ppbV | NC | 25 |
| Ethyl Alcohol | 11.1 | 11.3 | ppbV | 2 | 25 |
| Vinyl bromide | ND | ND | ppbV | NC | 25 |
| Acetone | 13.2 | 13.3 | ppbV | 1 | 25 |
| Trichlorofluoromethane | 0.243 | 0.247 | ppbV | 2 | 25 |
| iso-Propyl Alcohol | 1.96 | 1.88 | ppbV | 4 | 25 |
| tert-Butyl Alcohol | ND | ND | ppbV | NC | 25 |
| Methylene chloride | 2.17 | 2.02 | ppbV | 7 | 25 |
| 3-Chloropropene | ND | ND | ppbV | NC | 25 |
| Carbon disulfide | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | ND | ppbV | NC | 25 |
| trans-1,2-Dichloroethene | ND | ND | ppbV | NC | 25 |
| 1,1-Dichloroethane | ND | ND | ppbV | NC | 25 |
| Methyl tert butyl ether | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-10 QC Batch ID: WG814444-5 QC Sample: L1520119-03 Client ID: DUP Sample | | | | | |
| 2-Butanone | 0.799 | 0.769 | ppbV | 4 | 25 |
| Ethyl Acetate | ND | ND | ppbV | NC | 25 |
| Chloroform | ND | ND | ppbV | NC | 25 |
| Tetrahydrofuran | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloroethane | ND | ND | ppbV | NC | 25 |
| n-Hexane | 0.248 | 0.312 | ppbV | 23 | 25 |
| Benzene | 0.202 | 0.202 | ppbV | 0 | 25 |
| Cyclohexane | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloropropane | ND | ND | ppbV | NC | 25 |
| Bromodichloromethane | ND | ND | ppbV | NC | 25 |
| 1,4-Dioxane | ND | ND | ppbV | NC | 25 |
| 2,2,4-Trimethylpentane | ND | ND | ppbV | NC | 25 |
| Heptane | 0.214 | 0.231 | ppbV | 8 | 25 |
| cis-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 4-Methyl-2-pentanone | ND | ND | ppbV | NC | 25 |
| trans-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Toluene | 0.786 | 0.809 | ppbV | 3 | 25 |
| 2-Hexanone | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-10 QC Batch ID: WG814444-5 QC Sample: L1520119-03 Client ID: DUP Sample | | | | | |
| Dibromochloromethane | ND | ND | ppbV | NC | 25 |
| 1,2-Dibromoethane | ND | ND | ppbV | NC | 25 |
| Chlorobenzene | ND | ND | ppbV | NC | 25 |
| Ethylbenzene | ND | ND | ppbV | NC | 25 |
| p/m-Xylene | ND | ND | ppbV | NC | 25 |
| Bromoform | ND | ND | ppbV | NC | 25 |
| Styrene | ND | ND | ppbV | NC | 25 |
| 1,1,2,2-Tetrachloroethane | ND | ND | ppbV | NC | 25 |
| o-Xylene | ND | ND | ppbV | NC | 25 |
| 4-Ethyltoluene | ND | ND | ppbV | NC | 25 |
| 1,3,5-Trimethylbenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trimethylbenzene | ND | ND | ppbV | NC | 25 |
| Benzyl chloride | ND | ND | ppbV | NC | 25 |
| 1,3-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,4-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trichlorobenzene | ND | ND | ppbV | NC | 25 |
| Hexachlorobutadiene | ND | ND | ppbV | NC | 25 |

**Project Name:** ESTCP 2013

**Project Number:** TR0479

**Lab Number:** L1519907

**Report Date:** 08/25/15

## Canister and Flow Controller Information

| Samplenum | Client ID | Media ID | Media Type | Date Prepared | Bottle Order | Cleaning Batch ID | Can Leak Check | Initial Pressure (in. Hg) | Pressure on Receipt (in. Hg) | Flow Controler Leak Chk | Flow Out mL/min | Flow In mL/min | % RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1519907-01 | 205-IA-05-PS | 0508 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 215 | 211 | 2 |
| L1519907-01 | 205-IA-05-PS | 1554 | 6.0L Can | 08/13/15 | 207352 | L1518789-10 | Pass | -29.5 | -3.8 | - | - | - | - |
| L1519907-02 | 205-IA-06-PS-1 | 0705 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 221 | 218 | 1 |
| L1519907-02 | 205-IA-06-PS-1 | 1611 | 6.0L Can | 08/13/15 | 207352 | L1518789-08 | Pass | -29.5 | -3.4 | - | - | - | - |
| L1519907-03 | 205-IA-07-PW | 0672 | sv200 | 08/13/15 | 207352 | | - | - | - | Pass | 216 | 215 | 0 |
| L1519907-03 | 205-IA-07-PW | 1704 | 6.0L Can | 08/13/15 | 207352 | L1518789-02 | Pass | -29.4 | -3.8 | - | - | - | - |
| L1519907-04 | 205-IA-01-GS | 0523 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 217 | 218 | 0 |
| L1519907-04 | 205-IA-01-GS | 1053 | 6.0L Can | 08/13/15 | 207352 | L1518789-05 | Pass | -29.4 | -4.5 | - | - | - | - |
| L1519907-05 | 205-IA-02-GW | 0540 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 213 | 219 | 3 |
| L1519907-05 | 205-IA-02-GW | 1856 | 6.0L Can | 08/13/15 | 207352 | L1518789-06 | Pass | -29.3 | -4.8 | - | - | - | - |
| L1519907-06 | 205-IA-03-YS | 0527 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 219 | 219 | 0 |
| L1519907-06 | 205-IA-03-YS | 1984 | 6.0L Can | 08/13/15 | 207352 | L1518789-11 | Pass | -29.5 | -3.6 | - | - | - | - |
| L1519907-07 | 205-IA-04-YW | 0611 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 215 | 217 | 1 |
| L1519907-07 | 205-IA-04-YW | 1593 | 6.0L Can | 08/13/15 | 207352 | L1518789-12 | Pass | -29.3 | 0.0 | - | - | - | - |
| L1519907-08 | BUILDING 205_SOUTH EXHAUST | 0703 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 220 | 212 | 4 |

**Project Name:** ESTCP 2013

**Project Number:** TR0479

**Lab Number:** L1519907

**Report Date:** 08/25/15

## Canister and Flow Controller Information

| Samplenum | Client ID | Media ID | Media Type | Date Prepared | Bottle Order | Cleaning Batch ID | Can Leak Check | Initial Pressure (in. Hg) | Pressure on Receipt (in. Hg) | Flow Controler Leak Chk | Flow Out mL/min | Flow In mL/min | % RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1519907-08 | BUILDING 205_SOUTH EXHAUST | 811 | 6.0L Can | 08/13/15 | 207352 | L1518789-07 | Pass | -29.3 | 0.0 | - | - | - | - |
| L1519907-09 | BUILDING 205_NORTH EXHAUST | 0514 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 214 | 217 | 1 |
| L1519907-09 | BUILDING 205_NORTH EXHAUST | 1702 | 6.0L Can | 08/13/15 | 207352 | L1518789-04 | Pass | -29.5 | -0.9 | - | - | - | - |
| L1519907-10 | BUILDING 205_MID EXHAUST | 0518 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 216 | 213 | 1 |
| L1519907-10 | BUILDING 205_MID EXHAUST | 1715 | 6.0L Can | 08/13/15 | 207352 | L1518789-03 | Pass | -29.4 | 0.0 | - | - | - | - |
| L1519907-11 | UNUSED CAN #650 | 0691 | SV200 | 08/13/15 | 207352 | | - | - | - | Pass | 211 | 215 | 2 |
| L1519907-11 | UNUSED CAN #650 | 650 | 6.0L Can | 08/13/15 | 207352 | L1518789-01 | Pass | -29.3 | -29.1 | - | - | - | - |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV
**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-01
Client ID: CAN 650 FC 514
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 14:01
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-01 Date Collected: 08/07/15 15:46

Client ID: CAN 650 FC 514 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-01 Date Collected: 08/07/15 15:46

Client ID: CAN 650 FC 514 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-01 Date Collected: 08/07/15 15:46

Client ID: CAN 650 FC 514 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 95 | | 60-140 |
| Bromochloromethane | 97 | | 60-140 |
| chlorobenzene-d5 | 87 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-01
Client ID: CAN 650 FC 514
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 14:01
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 98 | | 60-140 |
| bromochloromethane | 100 | | 60-140 |
| chlorobenzene-d5 | 92 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV

**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-02
Client ID: CAN 1704 FC 672
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 14:35
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-02 Date Collected: 08/07/15 15:46

Client ID: CAN 1704 FC 672 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-02 Date Collected: 08/07/15 15:46

Client ID: CAN 1704 FC 672 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-02 Date Collected: 08/07/15 15:46

Client ID: CAN 1704 FC 672 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 90 | | 60-140 |
| Bromochloromethane | 91 | | 60-140 |
| chlorobenzene-d5 | 79 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-02
Client ID: CAN 1704 FC 672
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 14:35
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 93 | | 60-140 |
| bromochloromethane | 95 | | 60-140 |
| chlorobenzene-d5 | 85 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-03
Client ID: CAN 1715 FC 691
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 15:09
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-03 Date Collected: 08/07/15 15:46

Client ID: CAN 1715 FC 691 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-03 Date Collected: 08/07/15 15:46

Client ID: CAN 1715 FC 691 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-03 Date Collected: 08/07/15 15:46

Client ID: CAN 1715 FC 691 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 88 | | 60-140 |
| Bromochloromethane | 91 | | 60-140 |
| chlorobenzene-d5 | 78 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-03
Client ID: CAN 1715 FC 691
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 15:09
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 92 | | 60-140 |
| bromochloromethane | 94 | | 60-140 |
| chlorobenzene-d5 | 87 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV

**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-04
Client ID: CAN 1702 FC 518
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 15:44
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-04 Date Collected: 08/07/15 15:46

Client ID: CAN 1702 FC 518 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-04 Date Collected: 08/07/15 15:46

Client ID: CAN 1702 FC 518 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-04 Date Collected: 08/07/15 15:46

Client ID: CAN 1702 FC 518 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 93 | | 60-140 |
| Bromochloromethane | 94 | | 60-140 |
| chlorobenzene-d5 | 80 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-04
Client ID: CAN 1702 FC 518
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 15:44
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 96 | | 60-140 |
| bromochloromethane | 97 | | 60-140 |
| chlorobenzene-d5 | 87 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-05
Client ID: CAN 1053 FC 703
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 16:19
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-05 Date Collected: 08/07/15 15:46

Client ID: CAN 1053 FC 703 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-05 Date Collected: 08/07/15 15:46

Client ID: CAN 1053 FC 703 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-05 Date Collected: 08/07/15 15:46

Client ID: CAN 1053 FC 703 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 91 | | 60-140 |
| Bromochloromethane | 94 | | 60-140 |
| chlorobenzene-d5 | 83 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-05
Client ID: CAN 1053 FC 703
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 16:19
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 95 | | 60-140 |
| bromochloromethane | 98 | | 60-140 |
| chlorobenzene-d5 | 88 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV

**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-06
Client ID: CAN 1856 FC 611
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 16:53
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-06 Date Collected: 08/07/15 15:46

Client ID: CAN 1856 FC 611 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-06 Date Collected: 08/07/15 15:46

Client ID: CAN 1856 FC 611 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-06 Date Collected: 08/07/15 15:46

Client ID: CAN 1856 FC 611 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 92 | | 60-140 |
| Bromochloromethane | 93 | | 60-140 |
| chlorobenzene-d5 | 80 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-06
Client ID: CAN 1856 FC 611
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 16:53
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 95 | | 60-140 |
| bromochloromethane | 97 | | 60-140 |
| chlorobenzene-d5 | 87 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV

**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-07
Client ID: CAN 811 FC 523
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 17:28
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-07 Date Collected: 08/07/15 15:46

Client ID: CAN 811 FC 523 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-07 Date Collected: 08/07/15 15:46

Client ID: CAN 811 FC 523 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-07 Date Collected: 08/07/15 15:46

Client ID: CAN 811 FC 523 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 90 | | 60-140 |
| Bromochloromethane | 92 | | 60-140 |
| chlorobenzene-d5 | 78 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-07
Client ID: CAN 811 FC 523
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 17:28
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 93 | | 60-140 |
| bromochloromethane | 96 | | 60-140 |
| chlorobenzene-d5 | 85 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV
**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-08
Client ID: CAN 1611 FC 540
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 18:03
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-08 Date Collected: 08/07/15 15:46

Client ID: CAN 1611 FC 540 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-08 Date Collected: 08/07/15 15:46

Client ID: CAN 1611 FC 540 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-08 Date Collected: 08/07/15 15:46

Client ID: CAN 1611 FC 540 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 91 | | 60-140 |
| Bromochloromethane | 93 | | 60-140 |
| chlorobenzene-d5 | 82 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-08
Client ID: CAN 1611 FC 540
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 18:03
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 95 | | 60-140 |
| bromochloromethane | 98 | | 60-140 |
| chlorobenzene-d5 | 90 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV

**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-10
Client ID: CAN 1554 FC 527
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 19:11
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-10 Date Collected: 08/07/15 15:46

Client ID: CAN 1554 FC 527 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-10 Date Collected: 08/07/15 15:46

Client ID: CAN 1554 FC 527 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-10 Date Collected: 08/07/15 15:46

Client ID: CAN 1554 FC 527 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 89 | | 60-140 |
| Bromochloromethane | 91 | | 60-140 |
| chlorobenzene-d5 | 76 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV
**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-10
Client ID: CAN 1554 FC 527
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 19:11
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 92 | | 60-140 |
| bromochloromethane | 95 | | 60-140 |
| chlorobenzene-d5 | 86 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV
**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-11
Client ID: CAN 1984 FC 508
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 19:46
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-11 Date Collected: 08/07/15 15:46

Client ID: CAN 1984 FC 508 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-11 Date Collected: 08/07/15 15:46

Client ID: CAN 1984 FC 508 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-11 Date Collected: 08/07/15 15:46

Client ID: CAN 1984 FC 508 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 90 | | 60-140 |
| Bromochloromethane | 95 | | 60-140 |
| chlorobenzene-d5 | 78 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-11
Client ID: CAN 1984 FC 508
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 19:46
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 94 | | 60-140 |
| bromochloromethane | 96 | | 60-140 |
| chlorobenzene-d5 | 86 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV

**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-12
Client ID: CAN 1593 FC 705
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 20:20
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-12 Date Collected: 08/07/15 15:46

Client ID: CAN 1593 FC 705 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-12 Date Collected: 08/07/15 15:46

Client ID: CAN 1593 FC 705 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** INDIV. CANISTER CERTIFICATION **Lab Number:** L1518789

**Project Number:** CANISTER QC INDIV **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-12 Date Collected: 08/07/15 15:46

Client ID: CAN 1593 FC 705 Date Received: 08/07/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 90 | | 60-140 |
| Bromochloromethane | 93 | | 60-140 |
| chlorobenzene-d5 | 81 | | 60-140 |

**Project Name:** INDIV. CANISTER CERTIFICATION
**Project Number:** CANISTER QC INDIV
**Lab Number:** L1518789
**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518789-12
Client ID: CAN 1593 FC 705
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 20:20
Analyst: RY

Date Collected: 08/07/15 15:46
Date Received: 08/07/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 94 | | 60-140 |
| bromochloromethane | 96 | | 60-140 |
| chlorobenzene-d5 | 87 | | 60-140 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1519907
**Report Date:** 08/25/15

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

**Reagent H2O Preserved Vials Frozen on:** NA

**Cooler Information** **Custody Seal**
**Cooler**
N/A Present/Intact

**Container Information**

| Container ID | Container Type | Cooler | pH | Temp deg C | Pres | Seal | Analysis(*) |
|---|---|---|---|---|---|---|---|
| L1519907-01A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-02A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-03A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-04A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-05A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-06A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-07A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-08A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-09A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-10A | Canister - 6 Liter | N/A | N/A | | Y | Absent | TO15-LL(30),TO15-SIM(30) |
| L1519907-11A | Canister - 6 Liter | N/A | N/A | | Y | Absent | CLEAN-FEE() |

*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | ESTCP 2013 | **Lab Number:** | L1519907 |
| **Project Number:** | TR0479 | **Report Date:** | 08/25/15 |

## GLOSSARY

### *Acronyms*

| | |
|---|---|
| EDL | - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME). |
| EPA | - Environmental Protection Agency. |
| LCS | - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| LCSD | - Laboratory Control Sample Duplicate: Refer to LCS. |
| LFB | - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| MDL | - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| MS | - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. |
| MSD | - Matrix Spike Sample Duplicate: Refer to MS. |
| NA | - Not Applicable. |
| NC | - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit. |
| NI | - Not Ignitable. |
| NP | - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil. |
| RL | - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| RPD | - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report. |
| SRM | - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples. |
| TIC | - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations. |

### *Footnotes*

| | |
|---|---|
| 1 | - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method. |

### *Terms*

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### *Data Qualifiers*

| | |
|---|---|
| **A** | - Spectra identified as "Aldol Condensation Product". |
| **B** | - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone). |
| **C** | - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses. |

*Report Format:* Data Usability Report

| | | | |
|---|---|---|---|
| **Project Name:** | ESTCP 2013 | **Lab Number:** | L1519907 |
| **Project Number:** | TR0479 | **Report Date:** | 08/25/15 |

***Data Qualifiers***

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**ND** - Not detected at the reporting limit (RL) for the sample.

*Report Format:* Data Usability Report

## REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

Last revised December 16, 2014

**The following analytes are not included in our NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 524.2:** Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.
**EPA 8260C:** 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.
**EPA 8270D:** 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
**EPA 625:** 4-Chloroaniline, 4-Methylphenol.
**SM4500**: Soil: Total Phosphorus, TKN, NO2, NO3.
**EPA 9071:** Total Petroleum Hydrocarbons, Oil & Grease.

**Mansfield Facility**
**EPA 8270D:** Biphenyl.
**EPA 2540D:** TSS
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

***Drinking Water***
**EPA 200.8**: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
**EPA 300.0**: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
**EPA 332**: Perchlorate.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

***Non-Potable Water***
**EPA 200.8**: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
**EPA 200.7**: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
**EPA 624**: Volatile Halocarbons & Aromatics,
**EPA 608**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625**: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

# AIR ANALYSIS

PAGE 1 OF 1

**CHAIN OF CUSTODY**

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 8/18/15

ALPHA Job #: L1519907

## Client Information

Client: GeoSyntec
Address: 230 Research Ln
Guelph ON N1H 5G3 Canada
Phone: (519) 093-5754
Fax:
Email: dmali@geosyntec.com
☐ These samples have been previously analyzed by Alpha

## Project Information

Project Name: ESTCP 2013
Project Location: Buildings 205
Project #: TR0479
Project Manager: T. McAlary
ALPHA Quote #:

## Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved!)
Date Due: Time:

## Report Information - Data Deliverables

☐ FAX
☐ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
☒ EMAIL (standard pdf report)
☐ Additional Deliverables:
Report to: (if different than Project Manager)

## Billing Information

☒ Same as Client info PO #:

## Regulatory Requirements/Report Limits

| State/Fed | Program | Criteria |
|---|---|---|
| | | |
| | | |
| | | |

Other Project Specific Requirements/Comments:

**All Columns Below Must Be Filled Out**

| ALPHA Lab ID (Lab Use Only) | Sample ID | Collection Date | Start Time | End Time | Initial Vacuum | Final Vacuum | Sample Matrix* | Sampler's Initials | Can Size | I D Can | I D - Flow Controller | TO-14A by TO-15 | TO-15 | TO-15 SIM | APH | FIXED GASES | TO-13A | TO-4 / TO-10 | Sample Comments (i.e. PID) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19907-01 | 205-IA-05-PS | 8/16/15 | 12:56 | 13:22 | 29.66 | 3.87 | AA | WW | 6L | 1554 | 0508 | | ✓ | ✓ | | | | | |
| -02 | 205-IA-06-PS-1 | 8/16/15 | 12:56 | 13:22 | 29.77 | 3.44 | AA | WW | 6L | 16:11 | 0705 | | ✓ | ✓ | | | | | |
| -03 | 205-IA-07-PW | 8/16/15 | 12:56 | 13:22 | 29.71 | 3.80 | AA | WW | 6L | 1704 | 0672 | | ✓ | ✓ | | | | | |
| -04 | 205-IA-01-GS | 8/16/15 | 12:55 | 13:19 | 29.75 | 4.39 | AA | WW | 6L | 1053 | 0523 | | ✓ | ✓ | | | | | |
| -05 | 205-IA-02-GW | 8/16/15 | 12:55 | 13:19 | 29.77 | 4.62 | AA | WW | 6L | 1856 | 0540 | | ✓ | ✓ | | | | | |
| -06 | 205-IA-03-YS | 8/16/15 | 12:59 | 13:26 | 29.62 | 3.60 | AA | WW | 6L | 1984 | 0527 | | ✓ | ✓ | | | | | |
| -07 | 205-IA-04-YW | 8/16/15 | 12:59 | 13:26 | 29.83 | 3.18 | AA | WW | 6L | 1553 | 0611 | | ✓ | ✓ | | | | | |
| -08 | Building 205_South Exhaust | 8/16/15 | 10:07 | 10:54 | -29.76 | 0.17(psi) | AA | DM | 6L | 811 | 0703 | | | | | | | | |
| -09 | Building 205_North Exhaust | 8/16/15 | 10:23 | 10:56 | -30.35 | -0.18 | AA | DM | 6L | 1702 | 0514 | | | | | | | | |
| -10 | Building 205_Mid Exhaust | 8/16/15 | 10:15 | 10:55 | -30.42 | 0.20(psi) | AA | DM | 6L | 1715 | 0518 | | | | | | | | |

*SAMPLE MATRIX CODES
AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

| Relinquished By: | Date/Time | Received By: | Date/Time: |
|---|---|---|---|
| Fedex | 8/16/15 16:00 | Fedex | |
| Fedex | 8/18/15 10:03 | | 8/18/15 10:03 |

# ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L1520027 |
| Client: | Geosyntec Consultants<br>130 Research Lane<br>Suite 2<br>Guelph, ON N1G563 |
| ATTN: | Todd McAlary |
| Phone: | (609) 462-1198 |
| Project Name: | ESTCP 2013 |
| Project Number: | TR0479 |
| Report Date: | 08/25/15 |

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), ME (MA00030), PA (68-02089), VA (460194), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), USFWS (Permit #LE2069641), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L1520027-01 | 205-V3-01-10 | SOIL_VAPOR | BUILDING 205 | 08/16/15 14:45 | 08/19/15 |
| L1520027-02 | 205-V3-02-100 | SOIL_VAPOR | BUILDING 205 | 08/16/15 16:35 | 08/19/15 |
| L1520027-03 | 205-V3-03-1000 | SOIL_VAPOR | BUILDING 205 | 08/17/15 08:48 | 08/19/15 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** ESTCP 2013 **Lab Number:** L1520027
**Project Number:** TR0479 **Report Date:** 08/25/15

**Case Narrative (continued)**

Volatile Organics in Air

Canisters were released from the laboratory on August 12, 2015. The canister certification results are provided as an addendum.

Samples L1520027-02 and -03 The presence of Isopropyl Alcohol could not be determined in these samples due to a non-target compound interfering with the identification and quantification of this compound.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 08/25/15

# AIR

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

## SAMPLE RESULTS

Lab ID: L1520027-01
Client ID: 205-V3-01-10
Sample Location: BUILDING 205
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 08/22/15 00:21
Analyst: RY

Date Collected: 08/16/15 14:45
Date Received: 08/19/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.458 | 0.200 | -- | 2.26 | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 1.26 | 1.00 | -- | 2.99 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.277 | 0.200 | -- | 1.56 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1520027

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1520027-01 Date Collected: 08/16/15 14:45

Client ID: 205-V3-01-10 Date Received: 08/19/15

Sample Location: BUILDING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | 3.70 | 0.200 | -- | 18.1 | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Trichloroethene | 46.2 | 0.200 | -- | 248 | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1520027

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1520027-01 Date Collected: 08/16/15 14:45

Client ID: 205-V3-01-10 Date Received: 08/19/15

Sample Location: BUILDING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 87 | | 60-140 |
| Bromochloromethane | 87 | | 60-140 |
| chlorobenzene-d5 | 92 | | 60-140 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

## SAMPLE RESULTS

Lab ID: L1520027-02
Client ID: 205-V3-02-100
Sample Location: BUILDING 205
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 08/22/15 00:53
Analyst: RY

Date Collected: 08/16/15 16:35
Date Received: 08/19/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.591 | 0.200 | -- | 2.92 | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 1.47 | 1.00 | -- | 3.49 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.309 | 0.200 | -- | 1.74 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Methylene chloride | 1.17 | 0.500 | -- | 4.06 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

***Project Name:*** ESTCP 2013
***Project Number:*** TR0479

***Lab Number:*** L1520027
***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1520027-02
Client ID: 205-V3-02-100
Sample Location: BUILDING 205

Date Collected: 08/16/15 16:35
Date Received: 08/19/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | 3.75 | 0.200 | -- | 18.3 | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Trichloroethene | 45.7 | 0.200 | -- | 246 | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

## SAMPLE RESULTS

Lab ID: L1520027-02
Client ID: 205-V3-02-100
Sample Location: BUILDING 205

Date Collected: 08/16/15 16:35
Date Received: 08/19/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 81 | | 60-140 |
| Bromochloromethane | 79 | | 60-140 |
| chlorobenzene-d5 | 90 | | 60-140 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

## SAMPLE RESULTS

Lab ID: L1520027-03
Client ID: 205-V3-03-1000
Sample Location: BUILDING 205
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 08/22/15 01:26
Analyst: RY

Date Collected: 08/17/15 08:48
Date Received: 08/19/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.397 | 0.200 | -- | 1.96 | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 1.34 | 1.00 | -- | 3.18 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.326 | 0.200 | -- | 1.83 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Methylene chloride | 1.28 | 0.500 | -- | 4.45 | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1520027

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1520027-03 Date Collected: 08/17/15 08:48

Client ID: 205-V3-03-1000 Date Received: 08/19/15

Sample Location: BUILDING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | 4.00 | 0.200 | -- | 19.5 | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | 0.415 | 0.200 | -- | 1.46 | 0.705 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Trichloroethene | 44.7 | 0.200 | -- | 240 | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | 0.291 | 0.200 | -- | 1.19 | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |

***Project Name:*** ESTCP 2013 ***Lab Number:*** L1520027

***Project Number:*** TR0479 ***Report Date:*** 08/25/15

## *SAMPLE RESULTS*

Lab ID: L1520027-03 Date Collected: 08/17/15 08:48

Client ID: 205-V3-03-1000 Date Received: 08/19/15

Sample Location: BUILDING 205 Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 81 | | 60-140 |
| Bromochloromethane | 81 | | 60-140 |
| chlorobenzene-d5 | 87 | | 60-140 |

**Project Name:** ESTCP 2013 **Lab Number:** L1520027

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-03 Batch: WG814444-4 | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| tert-Butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** ESTCP 2013 **Lab Number:** L1520027

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-03 Batch: WG814444-4 | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Isopropyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Ethyl-Tert-Butyl-Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| Tertiary-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |

**Project Name:** ESTCP 2013 **Lab Number:** L1520027

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-03 Batch: WG814444-4 | | | | | | | | |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl Acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |

**Project Name:** ESTCP 2013 **Lab Number:** L1520027

**Project Number:** TR0479 **Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-03 Batch: WG814444-4 | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane (C9) | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| o-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| p-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane (C10) | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane (C12) | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 08/21/15 14:12

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01-03 Batch: WG814444-4 | | | | | | | | |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| No Tentatively Identified Compounds | | | | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** ESTCP 2013

**Project Number:** TR0479

**Lab Number:** L1520027

**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-03 Batch: WG814444-3 | | | | | | | | |
| Chlorodifluoromethane | 92 | | - | | 70-130 | - | | |
| Propylene | 110 | | - | | 70-130 | - | | |
| Propane | 83 | | - | | 70-130 | - | | |
| Dichlorodifluoromethane | 92 | | - | | 70-130 | - | | |
| Chloromethane | 102 | | - | | 70-130 | - | | |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 106 | | - | | 70-130 | - | | |
| Methanol | 103 | | - | | 70-130 | - | | |
| Vinyl chloride | 105 | | - | | 70-130 | - | | |
| 1,3-Butadiene | 113 | | - | | 70-130 | - | | |
| Butane | 98 | | - | | 70-130 | - | | |
| Bromomethane | 99 | | - | | 70-130 | - | | |
| Chloroethane | 98 | | - | | 70-130 | - | | |
| Ethyl Alcohol | 107 | | - | | 70-130 | - | | |
| Dichlorofluoromethane | 94 | | - | | 70-130 | - | | |
| Vinyl bromide | 100 | | - | | 70-130 | - | | |
| Acrolein | 100 | | - | | 70-130 | - | | |
| Acetone | 108 | | - | | 70-130 | - | | |
| Acetonitrile | 102 | | - | | 70-130 | - | | |
| Trichlorofluoromethane | 99 | | - | | 70-130 | - | | |
| iso-Propyl Alcohol | 109 | | - | | 70-130 | - | | |
| Acrylonitrile | 96 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-03 Batch: WG814444-3 | | | | | | | | |
| Pentane | 87 | | - | | 70-130 | - | | |
| Ethyl ether | 93 | | - | | 70-130 | - | | |
| 1,1-Dichloroethene | 94 | | - | | 70-130 | - | | |
| tert-Butyl Alcohol | 91 | | - | | 70-130 | - | | |
| Methylene chloride | 98 | | - | | 70-130 | - | | |
| 3-Chloropropene | 101 | | - | | 70-130 | - | | |
| Carbon disulfide | 88 | | - | | 70-130 | - | | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 95 | | - | | 70-130 | - | | |
| trans-1,2-Dichloroethene | 79 | | - | | 70-130 | - | | |
| 1,1-Dichloroethane | 83 | | - | | 70-130 | - | | |
| Methyl tert butyl ether | 83 | | - | | 70-130 | - | | |
| Vinyl acetate | 88 | | - | | 70-130 | - | | |
| 2-Butanone | 80 | | - | | 70-130 | - | | |
| cis-1,2-Dichloroethene | 103 | | - | | 70-130 | - | | |
| Ethyl Acetate | 101 | | - | | 70-130 | - | | |
| Chloroform | 102 | | - | | 70-130 | - | | |
| Tetrahydrofuran | 94 | | - | | 70-130 | - | | |
| 2,2-Dichloropropane | 89 | | - | | 70-130 | - | | |
| 1,2-Dichloroethane | 97 | | - | | 70-130 | - | | |
| n-Hexane | 96 | | - | | 70-130 | - | | |
| Isopropyl Ether | 91 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-03 Batch: WG814444-3 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 90 | | - | | 70-130 | - | | |
| 1,1,1-Trichloroethane | 99 | | - | | 70-130 | - | | |
| 1,1-Dichloropropene | 94 | | - | | 70-130 | - | | |
| Benzene | 95 | | - | | 70-130 | - | | |
| Carbon tetrachloride | 103 | | - | | 70-130 | - | | |
| Cyclohexane | 100 | | - | | 70-130 | - | | |
| Tertiary-Amyl Methyl Ether | 88 | | - | | 70-130 | - | | |
| Dibromomethane | 94 | | - | | 70-130 | - | | |
| 1,2-Dichloropropane | 98 | | - | | 70-130 | - | | |
| Bromodichloromethane | 100 | | - | | 70-130 | - | | |
| 1,4-Dioxane | 100 | | - | | 70-130 | - | | |
| Trichloroethene | 99 | | - | | 70-130 | - | | |
| 2,2,4-Trimethylpentane | 96 | | - | | 70-130 | - | | |
| Methyl Methacrylate | 93 | | - | | 70-130 | - | | |
| Heptane | 96 | | - | | 70-130 | - | | |
| cis-1,3-Dichloropropene | 104 | | - | | 70-130 | - | | |
| 4-Methyl-2-pentanone | 102 | | - | | 70-130 | - | | |
| trans-1,3-Dichloropropene | 89 | | - | | 70-130 | - | | |
| 1,1,2-Trichloroethane | 101 | | - | | 70-130 | - | | |
| Toluene | 93 | | - | | 70-130 | - | | |
| 1,3-Dichloropropane | 89 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-03 Batch: WG814444-3 | | | | | | | | |
| 2-Hexanone | 101 | | - | | 70-130 | - | | |
| Dibromochloromethane | 100 | | - | | 70-130 | - | | |
| 1,2-Dibromoethane | 98 | | - | | 70-130 | - | | |
| Butyl Acetate | 95 | | - | | 70-130 | - | | |
| Octane | 86 | | - | | 70-130 | - | | |
| Tetrachloroethene | 94 | | - | | 70-130 | - | | |
| 1,1,1,2-Tetrachloroethane | 92 | | - | | 70-130 | - | | |
| Chlorobenzene | 95 | | - | | 70-130 | - | | |
| Ethylbenzene | 94 | | - | | 70-130 | - | | |
| p/m-Xylene | 96 | | - | | 70-130 | - | | |
| Bromoform | 95 | | - | | 70-130 | - | | |
| Styrene | 95 | | - | | 70-130 | - | | |
| 1,1,2,2-Tetrachloroethane | 102 | | - | | 70-130 | - | | |
| o-Xylene | 98 | | - | | 70-130 | - | | |
| 1,2,3-Trichloropropane | 92 | | - | | 70-130 | - | | |
| Nonane (C9) | 92 | | - | | 70-130 | - | | |
| Isopropylbenzene | 93 | | - | | 70-130 | - | | |
| Bromobenzene | 89 | | - | | 70-130 | - | | |
| o-Chlorotoluene | 89 | | - | | 70-130 | - | | |
| n-Propylbenzene | 92 | | - | | 70-130 | - | | |
| p-Chlorotoluene | 91 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-03 Batch: WG814444-3 | | | | | | | | |
| 4-Ethyltoluene | 89 | | - | | 70-130 | - | | |
| 1,3,5-Trimethylbenzene | 96 | | - | | 70-130 | - | | |
| tert-Butylbenzene | 91 | | - | | 70-130 | - | | |
| 1,2,4-Trimethylbenzene | 100 | | - | | 70-130 | - | | |
| Decane (C10) | 94 | | - | | 70-130 | - | | |
| Benzyl chloride | 97 | | - | | 70-130 | - | | |
| 1,3-Dichlorobenzene | 99 | | - | | 70-130 | - | | |
| 1,4-Dichlorobenzene | 97 | | - | | 70-130 | - | | |
| sec-Butylbenzene | 93 | | - | | 70-130 | - | | |
| p-Isopropyltoluene | 88 | | - | | 70-130 | - | | |
| 1,2-Dichlorobenzene | 98 | | - | | 70-130 | - | | |
| n-Butylbenzene | 98 | | - | | 70-130 | - | | |
| 1,2-Dibromo-3-chloropropane | 92 | | - | | 70-130 | - | | |
| Undecane | 103 | | - | | 70-130 | - | | |
| Dodecane (C12) | 125 | | - | | 70-130 | - | | |
| 1,2,4-Trichlorobenzene | 111 | | - | | 70-130 | - | | |
| Naphthalene | 110 | | - | | 70-130 | - | | |
| 1,2,3-Trichlorobenzene | 108 | | - | | 70-130 | - | | |
| Hexachlorobutadiene | 107 | | - | | 70-130 | - | | |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG814444-5 QC Sample: L1520119-03 Client ID: DUP Sample | | | | | | |
| Dichlorodifluoromethane | 0.386 | 0.406 | ppbV | 5 | | 25 |
| Chloromethane | 0.761 | 0.699 | ppbV | 8 | | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | ND | ppbV | NC | | 25 |
| 1,3-Butadiene | ND | ND | ppbV | NC | | 25 |
| Bromomethane | ND | ND | ppbV | NC | | 25 |
| Chloroethane | ND | ND | ppbV | NC | | 25 |
| Ethyl Alcohol | 11.1 | 11.3 | ppbV | 2 | | 25 |
| Vinyl bromide | ND | ND | ppbV | NC | | 25 |
| Acetone | 13.2 | 13.3 | ppbV | 1 | | 25 |
| Trichlorofluoromethane | 0.243 | 0.247 | ppbV | 2 | | 25 |
| iso-Propyl Alcohol | 1.96 | 1.88 | ppbV | 4 | | 25 |
| tert-Butyl Alcohol | ND | ND | ppbV | NC | | 25 |
| Methylene chloride | 2.17 | 2.02 | ppbV | 7 | | 25 |
| 3-Chloropropene | ND | ND | ppbV | NC | | 25 |
| Carbon disulfide | ND | ND | ppbV | NC | | 25 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | ND | ppbV | NC | | 25 |
| trans-1,2-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| 1,1-Dichloroethane | ND | ND | ppbV | NC | | 25 |
| Methyl tert butyl ether | ND | ND | ppbV | NC | | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG814444-5 QC Sample: L1520119-03 Client ID: DUP Sample | | | | | |
| 2-Butanone | 0.799 | 0.769 | ppbV | 4 | 25 |
| Ethyl Acetate | ND | ND | ppbV | NC | 25 |
| Chloroform | ND | ND | ppbV | NC | 25 |
| Tetrahydrofuran | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloroethane | ND | ND | ppbV | NC | 25 |
| n-Hexane | 0.248 | 0.312 | ppbV | 23 | 25 |
| Benzene | 0.202 | 0.202 | ppbV | 0 | 25 |
| Cyclohexane | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloropropane | ND | ND | ppbV | NC | 25 |
| Bromodichloromethane | ND | ND | ppbV | NC | 25 |
| 1,4-Dioxane | ND | ND | ppbV | NC | 25 |
| 2,2,4-Trimethylpentane | ND | ND | ppbV | NC | 25 |
| Heptane | 0.214 | 0.231 | ppbV | 8 | 25 |
| cis-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 4-Methyl-2-pentanone | ND | ND | ppbV | NC | 25 |
| trans-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Toluene | 0.786 | 0.809 | ppbV | 3 | 25 |
| 2-Hexanone | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG814444-5 QC Sample: L1520119-03 Client ID: DUP Sample | | | | | |
| Dibromochloromethane | ND | ND | ppbV | NC | 25 |
| 1,2-Dibromoethane | ND | ND | ppbV | NC | 25 |
| Chlorobenzene | ND | ND | ppbV | NC | 25 |
| Ethylbenzene | ND | ND | ppbV | NC | 25 |
| p/m-Xylene | ND | ND | ppbV | NC | 25 |
| Bromoform | ND | ND | ppbV | NC | 25 |
| Styrene | ND | ND | ppbV | NC | 25 |
| 1,1,2,2-Tetrachloroethane | ND | ND | ppbV | NC | 25 |
| o-Xylene | ND | ND | ppbV | NC | 25 |
| 4-Ethyltoluene | ND | ND | ppbV | NC | 25 |
| 1,3,5-Trimethylbenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trimethylbenzene | ND | ND | ppbV | NC | 25 |
| Benzyl chloride | ND | ND | ppbV | NC | 25 |
| 1,3-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,4-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trichlorobenzene | ND | ND | ppbV | NC | 25 |
| Hexachlorobutadiene | ND | ND | ppbV | NC | 25 |

**Project Name:** ESTCP 2013

**Project Number:** TR0479

**Lab Number:** L1520027

**Report Date:** 08/25/15

## Canister and Flow Controller Information

| Samplenum | Client ID | Media ID | Media Type | Date Prepared | Bottle Order | Cleaning Batch ID | Can Leak Check | Initial Pressure (in. Hg) | Pressure on Receipt (in. Hg) | Flow Controler Leak Chk | Flow Out mL/min | Flow In mL/min | % RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1520027-01 | 205-V3-01-10 | 111 | 2.7L Can | 08/12/15 | 207454 | L1518830-01 | Pass | -29.4 | -2.2 | - | - | - | - |
| L1520027-02 | 205-V3-02-100 | 2073 | 2.7L Can | 08/12/15 | 207454 | L1518830-01 | Pass | -28.8 | -6.0 | - | - | - | - |
| L1520027-03 | 205-V3-03-1000 | 2026 | 2.7L Can | 08/12/15 | 207454 | L1518830-01 | Pass | -29.6 | -7.0 | - | - | - | - |

**Project Name:**

**Lab Number:** L1518830

**Project Number:** CANISTER QC BAT

**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518830-01
Client ID: CAN 2079 SHELF 7
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 08/08/15 15:01
Analyst: RY

Date Collected: 08/07/15 18:00
Date Received: 08/08/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| tert-Butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:**

**Lab Number:** L1518830

**Project Number:** CANISTER QC BAT

**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518830-01
Client ID: CAN 2079 SHELF 7
Sample Location:

Date Collected: 08/07/15 18:00
Date Received: 08/08/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Isopropyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Ethyl-Tert-Butyl-Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| Tertiary-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:**

**Lab Number:** L1518830

**Project Number:** CANISTER QC BAT

**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518830-01
Client ID: CAN 2079 SHELF 7
Sample Location:

Date Collected: 08/07/15 18:00
Date Received: 08/08/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl Acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane (C9) | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** **Lab Number:** L1518830

**Project Number:** CANISTER QC BAT **Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518830-01 Date Collected: 08/07/15 18:00

Client ID: CAN 2079 SHELF 7 Date Received: 08/08/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| o-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| p-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane (C10) | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane (C12) | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | **Results** | **Qualifier** | **Units** | **RDL** | **Dilution Factor** |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

No Tentatively Identified Compounds

**Project Name:**

**Lab Number:** L1518830

**Project Number:** CANISTER QC BAT

**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518830-01
Client ID: CAN 2079 SHELF 7
Sample Location:

Date Collected: 08/07/15 18:00
Date Received: 08/08/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 89 | | 60-140 |
| Bromochloromethane | 82 | | 60-140 |
| chlorobenzene-d5 | 87 | | 60-140 |

**Project Name:**

**Lab Number:** L1518830

**Project Number:** CANISTER QC BAT

**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518830-01
Client ID: CAN 2079 SHELF 7
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 08/08/15 15:01
Analyst: RY

Date Collected: 08/07/15 18:00
Date Received: 08/08/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.050 | -- | ND | 0.349 | -- | | 1 |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,3-Butadiene | ND | 0.020 | -- | ND | 0.044 | -- | | 1 |
| Bromomethane | ND | 0.020 | -- | ND | 0.078 | -- | | 1 |
| Chloroethane | ND | 0.020 | -- | ND | 0.053 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.050 | -- | ND | 0.281 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.050 | -- | ND | 0.383 | -- | | 1 |
| Halothane | ND | 0.050 | -- | ND | 0.404 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Chloroform | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Benzene | ND | 0.100 | -- | ND | 0.319 | -- | | 1 |
| Carbon tetrachloride | ND | 0.020 | -- | ND | 0.126 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |

**Project Name:**

**Lab Number:** L1518830

**Project Number:** CANISTER QC BAT

**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518830-01
Client ID: CAN 2079 SHELF 7
Sample Location:

Date Collected: 08/07/15 18:00
Date Received: 08/08/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Bromodichloromethane | ND | 0.020 | -- | ND | 0.134 | -- | | 1 |
| 1,4-Dioxane | ND | 0.100 | -- | ND | 0.360 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Toluene | ND | 0.050 | -- | ND | 0.188 | -- | | 1 |
| Dibromochloromethane | ND | 0.020 | -- | ND | 0.170 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.020 | -- | ND | 0.154 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| Chlorobenzene | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |
| Ethylbenzene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| p/m-Xylene | ND | 0.040 | -- | ND | 0.174 | -- | | 1 |
| Bromoform | ND | 0.020 | -- | ND | 0.207 | -- | | 1 |
| Styrene | ND | 0.020 | -- | ND | 0.085 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| o-Xylene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |

**Project Name:**

**Lab Number:** L1518830

**Project Number:** CANISTER QC BAT

**Report Date:** 08/25/15

# Air Canister Certification Results

Lab ID: L1518830-01
Client ID: CAN 2079 SHELF 7
Sample Location:

Date Collected: 08/07/15 18:00
Date Received: 08/08/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Naphthalene | ND | 0.050 | -- | ND | 0.262 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.050 | -- | ND | 0.533 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 89 | | 60-140 |
| bromochloromethane | 83 | | 60-140 |
| chlorobenzene-d5 | 88 | | 60-140 |

**Project Name:** ESTCP 2013
**Project Number:** TR0479

**Lab Number:** L1520027
**Report Date:** 08/25/15

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

**Reagent H2O Preserved Vials Frozen on:** NA

**Cooler Information** **Custody Seal**
**Cooler**
N/A Present/Intact

**Container Information**

| Container ID | Container Type | Cooler | pH | Temp deg C | Pres | Seal | Analysis(*) |
|---|---|---|---|---|---|---|---|
| L1520027-01A | Canister - 2.7 Liter | N/A | N/A | | Y | Absent | TO15-LL(30) |
| L1520027-02A | Canister - 2.7 Liter | N/A | N/A | | Y | Absent | TO15-LL(30) |
| L1520027-03A | Canister - 2.7 Liter | N/A | N/A | | Y | Absent | TO15-LL(30) |

*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | ESTCP 2013 | **Lab Number:** | L1520027 |
| **Project Number:** | TR0479 | **Report Date:** | 08/25/15 |

## GLOSSARY

### *Acronyms*

| | |
|---|---|
| EDL | - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME). |
| EPA | - Environmental Protection Agency. |
| LCS | - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| LCSD | - Laboratory Control Sample Duplicate: Refer to LCS. |
| LFB | - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| MDL | - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| MS | - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. |
| MSD | - Matrix Spike Sample Duplicate: Refer to MS. |
| NA | - Not Applicable. |
| NC | - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit. |
| NI | - Not Ignitable. |
| NP | - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil. |
| RL | - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| RPD | - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report. |
| SRM | - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples. |
| TIC | - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations. |

### *Footnotes*

| | |
|---|---|
| 1 | - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method. |

### *Terms*

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### *Data Qualifiers*

| | |
|---|---|
| **A** | - Spectra identified as "Aldol Condensation Product". |
| **B** | - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone). |
| **C** | - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses. |

*Report Format:* Data Usability Report

| | | | |
|---|---|---|---|
| **Project Name:** | ESTCP 2013 | **Lab Number:** | L1520027 |
| **Project Number:** | TR0479 | **Report Date:** | 08/25/15 |

***Data Qualifiers***

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**ND** - Not detected at the reporting limit (RL) for the sample.

*Report Format:* Data Usability Report

## REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

Last revised December 16, 2014

**The following analytes are not included in our NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 524.2:** Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.
**EPA 8260C:** 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.
**EPA 8270D:** 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
**EPA 625:** 4-Chloroaniline, 4-Methylphenol.
**SM4500**: Soil: Total Phosphorus, TKN, NO2, NO3.
**EPA 9071:** Total Petroleum Hydrocarbons, Oil & Grease.

**Mansfield Facility**
**EPA 8270D:** Biphenyl.
**EPA 2540D:** TSS
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

***Drinking Water***
**EPA 200.8**: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
**EPA 300.0**: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
**EPA 332**: Perchlorate.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

***Non-Potable Water***
**EPA 200.8**: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
**EPA 200.7**: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
**EPA 624**: Volatile Halocarbons & Aromatics,
**EPA 608**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625**: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

# AIR ANALYSIS

PAGE_____ OF _____

**CHAIN OF CUSTODY**

320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 8/19/15

ALPHA Job #: L1520027

## Client Information

Client: Geosyntec
Address: 230 Research Ln
Guelph ON N1H5G3 Canada
Phone: (519)993-5754
Fax:
Email: dmali@geosyntec.com
☐ These samples have been previously analyzed by Alpha

## Project Information

Project Name: ESTCP 2013
Project Location: Building 205
Project #: TR20479
Project Manager: Todd McAlary
ALPHA Quote #:

## Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)
Date Due: Time:

## Report Information - Data Deliverables

☐ FAX
☐ ADEx
Criteria Checker: _____
(Default based on Regulatory Criteria Indicated)
Other Formats: _____
☒ EMAIL (standard pdf report)
☐ Additional Deliverables: _____
Report to: (if different than Project Manager)

## Billing Information

☒ Same as Client info PO #:

## Regulatory Requirements/Report Limits

| State/Fed | Program | Criteria |
|---|---|---|
| | | |
| | | |
| | | |

Other Project Specific Requirements/Comments:

**All Columns Below Must Be Filled Out**

ANALYSIS

| ALPHA Lab ID (Lab Use Only) | Sample ID | Collection Date | Start Time | End Time | Initial Vacuum | Final Vacuum | Sample Matrix* | Sampler's Initials | Can Size | I D Can | I D - Flow Controller | TO-14A by TO-15 | TO-15 | TO-15 SIM | APH | FIXED GASES | TO-13A | TO-4 / TO-10 | Sample Comments (i.e. PID) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ~~Blank~~ | | | | | | | | | | | | | | | | | | |
| 20027-01 | 205-V3-01-10 | 8/16/15 | 1445 | 1485 | 29.61 | | SSD STACK | WW | 1L | 111 | NA | | ✓ | | | | | | NO VISIBLE VAC ON GAUGE WHEN OPENED |
| -02 | 205-V3-02-100 | 8/16/15 | 1635 | 1635 | 29.04 | | SSD STACK | WW | 1L | 203 | NA | | ✓ | | | | | | |
| -03 | 205-V3-03-1000 | 8/17/15 | 0848 | 0848 | 29.87 | | SSD STACK | EO | 1L | 2026 | NA | | ✓ | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
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*SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

| Relinquished By: | Date/Time | Received By: | Date/Time: |
|---|---|---|---|
| Fedex | 8/17/15 14:00 | Fedex | |
| | 8/19/15 10:30 | Bethany Bedard | 8/19/15 10:30 |

# ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L1521189 |
| Client: | Geosyntec Consultants<br>130 Research Lane<br>Suite 2<br>Guelph, ON N1G563 |
| ATTN: | Todd McAlary |
| Phone: | (609) 462-1198 |
| Project Name: | ESTCP |
| Project Number: | TR0479 |
| Report Date: | 09/08/15 |

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), ME (MA00030), PA (68-02089), VA (460194), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), USFWS (Permit #LE2069641), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L1521189-01 | HSF3-10000 | SOIL_VAPOR | B205 FAN 3 | 08/28/15 18:21 | 08/31/15 |

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

**Case Narrative (continued)**

Volatile Organics in Air

Canisters were released from the laboratory on August 28, 2015. The canister certification results are provided as an addendum.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 09/08/15

# AIR

***Project Name:*** ESTCP
***Project Number:*** TR0479

***Lab Number:*** L1521189
***Report Date:*** 09/08/15

## *SAMPLE RESULTS*

Lab ID: L1521189-01
Client ID: HSF3-10000
Sample Location: B205 FAN 3
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 09/03/15 22:54
Analyst: RY

Date Collected: 08/28/15 18:21
Date Received: 08/31/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | 0.503 | 0.200 | -- | 2.49 | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | 7.74 | 2.50 | -- | 14.6 | 4.71 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acetone | 12.3 | 1.00 | -- | 29.2 | 2.38 | -- | | 1 |
| Trichlorofluoromethane | 0.315 | 0.200 | -- | 1.77 | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | 1.49 | 0.500 | -- | 4.39 | 1.47 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | 5.34 | 0.200 | -- | 26.1 | 0.977 | -- | | 1 |
| Tetrahydrofuran | 1.11 | 0.500 | -- | 3.27 | 1.47 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |

***Project Name:*** ESTCP
***Project Number:*** TR0479

***Lab Number:*** L1521189
***Report Date:*** 09/08/15

## *SAMPLE RESULTS*

Lab ID: L1521189-01
Client ID: HSF3-10000
Sample Location: B205 FAN 3

Date Collected: 08/28/15 18:21
Date Received: 08/31/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Carbon tetrachloride | 0.201 | 0.200 | -- | 1.26 | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |

***Project Name:*** ESTCP
***Project Number:*** TR0479

***Lab Number:*** L1521189
***Report Date:*** 09/08/15

## *SAMPLE RESULTS*

Lab ID: L1521189-01
Client ID: HSF3-10000
Sample Location: B205 FAN 3

Date Collected: 08/28/15 18:21
Date Received: 08/31/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 91 | | 60-140 |
| Bromochloromethane | 91 | | 60-140 |
| chlorobenzene-d5 | 96 | | 60-140 |

***Project Name:*** ESTCP
***Project Number:*** TR0479
***Lab Number:*** L1521189
***Report Date:*** 09/08/15

## *SAMPLE RESULTS*

Lab ID: L1521189-01
Client ID: HSF3-10000
Sample Location: B205 FAN 3
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15-SIM
Analytical Date: 09/03/15 22:54
Analyst: RY

Date Collected: 08/28/15 18:21
Date Received: 08/31/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | 42.4 | 0.020 | -- | 228 | 0.107 | -- | | 1 |
| Tetrachloroethene | 0.382 | 0.020 | -- | 2.59 | 0.136 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 91 | | 60-140 |
| bromochloromethane | 91 | | 60-140 |
| chlorobenzene-d5 | 96 | | 60-140 |

**Project Name:** ESTCP
**Project Number:** TR0479
**Lab Number:** L1521189
**Report Date:** 09/08/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15-SIM
Analytical Date: 09/03/15 15:01

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab for sample(s): 01 Batch: WG818337-4 | | | | | | | | |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |

**Project Name:** ESTCP
**Project Number:** TR0479
**Lab Number:** L1521189
**Report Date:** 09/08/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 09/03/15 14:29

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG818339-4 | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| tert-Butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 09/03/15 14:29

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG818339-4 | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Isopropyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Ethyl-Tert-Butyl-Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| Tertiary-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |

**Project Name:** ESTCP
**Project Number:** TR0479
**Lab Number:** L1521189
**Report Date:** 09/08/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 09/03/15 14:29

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG818339-4 | | | | | | | | |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl Acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |

**Project Name:** ESTCP
**Project Number:** TR0479
**Lab Number:** L1521189
**Report Date:** 09/08/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 09/03/15 14:29

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG818339-4 | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane (C9) | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| o-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| p-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane (C10) | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane (C12) | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |

**Project Name:** ESTCP
**Project Number:** TR0479
**Lab Number:** L1521189
**Report Date:** 09/08/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 09/03/15 14:29

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG818339-4 | | | | | | | | |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| No Tentatively Identified Compounds | | | | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01 Batch: WG818337-3 | | | | | | | | |
| Dichlorodifluoromethane | 105 | | - | | 70-130 | - | | 25 |
| Chloromethane | 98 | | - | | 70-130 | - | | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 96 | | - | | 70-130 | - | | 25 |
| Vinyl chloride | 98 | | - | | 70-130 | - | | 25 |
| 1,3-Butadiene | 103 | | - | | 70-130 | - | | 25 |
| Bromomethane | 95 | | - | | 70-130 | - | | 25 |
| Chloroethane | 89 | | - | | 70-130 | - | | 25 |
| Acetone | 102 | | - | | 70-130 | - | | 25 |
| Trichlorofluoromethane | 98 | | - | | 70-130 | - | | 25 |
| Acrylonitrile | 91 | | - | | 70-130 | - | | 25 |
| 1,1-Dichloroethene | 97 | | - | | 70-130 | - | | 25 |
| Methylene chloride | 106 | | - | | 70-130 | - | | 25 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 98 | | - | | 70-130 | - | | 25 |
| Halothane | 104 | | - | | 70-130 | - | | 25 |
| trans-1,2-Dichloroethene | 84 | | - | | 70-130 | - | | 25 |
| 1,1-Dichloroethane | 91 | | - | | 70-130 | - | | 25 |
| Methyl tert butyl ether | 89 | | - | | 70-130 | - | | 25 |
| 2-Butanone | 90 | | - | | 70-130 | - | | 25 |
| cis-1,2-Dichloroethene | 106 | | - | | 70-130 | - | | 25 |
| Chloroform | 96 | | - | | 70-130 | - | | 25 |
| 1,2-Dichloroethane | 93 | | - | | 70-130 | - | | 25 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01 Batch: WG818337-3 | | | | | | | | |
| 1,1,1-Trichloroethane | 97 | | - | | 70-130 | - | | 25 |
| Benzene | 89 | | - | | 70-130 | - | | 25 |
| Carbon tetrachloride | 107 | | - | | 70-130 | - | | 25 |
| 1,2-Dichloropropane | 93 | | - | | 70-130 | - | | 25 |
| Bromodichloromethane | 99 | | - | | 70-130 | - | | 25 |
| 1,4-Dioxane | 91 | | - | | 70-130 | - | | 25 |
| Trichloroethene | 93 | | - | | 70-130 | - | | 25 |
| cis-1,3-Dichloropropene | 100 | | - | | 70-130 | - | | 25 |
| 4-Methyl-2-pentanone | 96 | | - | | 70-130 | - | | 25 |
| trans-1,3-Dichloropropene | 86 | | - | | 70-130 | - | | 25 |
| 1,1,2-Trichloroethane | 97 | | - | | 70-130 | - | | 25 |
| Toluene | 88 | | - | | 70-130 | - | | 25 |
| Dibromochloromethane | 95 | | - | | 70-130 | - | | 25 |
| 1,2-Dibromoethane | 95 | | - | | 70-130 | - | | 25 |
| Tetrachloroethene | 89 | | - | | 70-130 | - | | 25 |
| 1,1,1,2-Tetrachloroethane | 87 | | - | | 70-130 | - | | 25 |
| Chlorobenzene | 90 | | - | | 70-130 | - | | 25 |
| Ethylbenzene | 89 | | - | | 70-130 | - | | 25 |
| p/m-Xylene | 90 | | - | | 70-130 | - | | 25 |
| Bromoform | 95 | | - | | 70-130 | - | | 25 |
| Styrene | 91 | | - | | 70-130 | - | | 25 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01 Batch: WG818337-3 | | | | | | | | |
| 1,1,2,2-Tetrachloroethane | 96 | | - | | 70-130 | - | | 25 |
| o-Xylene | 90 | | - | | 70-130 | - | | 25 |
| Isopropylbenzene | 88 | | - | | 70-130 | - | | 25 |
| 4-Ethyltoluene | 88 | | - | | 70-130 | - | | 25 |
| 1,3,5-Trimethylbenzene | 91 | | - | | 70-130 | - | | 25 |
| 1,2,4-Trimethylbenzene | 95 | | - | | 70-130 | - | | 25 |
| 1,3-Dichlorobenzene | 96 | | - | | 70-130 | - | | 25 |
| 1,4-Dichlorobenzene | 96 | | - | | 70-130 | - | | 25 |
| sec-Butylbenzene | 90 | | - | | 70-130 | - | | 25 |
| p-Isopropyltoluene | 84 | | - | | 70-130 | - | | 25 |
| 1,2-Dichlorobenzene | 96 | | - | | 70-130 | - | | 25 |
| n-Butylbenzene | 99 | | - | | 70-130 | - | | 25 |
| 1,2,4-Trichlorobenzene | 112 | | - | | 70-130 | - | | 25 |
| Naphthalene | 108 | | - | | 70-130 | - | | 25 |
| 1,2,3-Trichlorobenzene | 106 | | - | | 70-130 | - | | 25 |
| Hexachlorobutadiene | 102 | | - | | 70-130 | - | | 25 |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** ESTCP

**Project Number:** TR0479

**Lab Number:** L1521189

**Report Date:** 09/08/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG818339-3 | | | | | | | | |
| Chlorodifluoromethane | 89 | | - | | 70-130 | - | | |
| Propylene | 106 | | - | | 70-130 | - | | |
| Propane | 76 | | - | | 70-130 | - | | |
| Dichlorodifluoromethane | 82 | | - | | 70-130 | - | | |
| Chloromethane | 103 | | - | | 70-130 | - | | |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 104 | | - | | 70-130 | - | | |
| Methanol | 100 | | - | | 70-130 | - | | |
| Vinyl chloride | 102 | | - | | 70-130 | - | | |
| 1,3-Butadiene | 110 | | - | | 70-130 | - | | |
| Butane | 95 | | - | | 70-130 | - | | |
| Bromomethane | 94 | | - | | 70-130 | - | | |
| Chloroethane | 99 | | - | | 70-130 | - | | |
| Ethyl Alcohol | 107 | | - | | 70-130 | - | | |
| Dichlorofluoromethane | 92 | | - | | 70-130 | - | | |
| Vinyl bromide | 97 | | - | | 70-130 | - | | |
| Acrolein | 99 | | - | | 70-130 | - | | |
| Acetone | 109 | | - | | 70-130 | - | | |
| Acetonitrile | 103 | | - | | 70-130 | - | | |
| Trichlorofluoromethane | 100 | | - | | 70-130 | - | | |
| iso-Propyl Alcohol | 111 | | - | | 70-130 | - | | |
| Acrylonitrile | 103 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** ESTCP

**Project Number:** TR0479

**Lab Number:** L1521189

**Report Date:** 09/08/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG818339-3 | | | | | | | | |
| Pentane | 94 | | - | | 70-130 | - | | |
| Ethyl ether | 98 | | - | | 70-130 | - | | |
| 1,1-Dichloroethene | 98 | | - | | 70-130 | - | | |
| tert-Butyl Alcohol | 98 | | - | | 70-130 | - | | |
| Methylene chloride | 107 | | - | | 70-130 | - | | |
| 3-Chloropropene | 106 | | - | | 70-130 | - | | |
| Carbon disulfide | 97 | | - | | 70-130 | - | | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 100 | | - | | 70-130 | - | | |
| trans-1,2-Dichloroethene | 86 | | - | | 70-130 | - | | |
| 1,1-Dichloroethane | 88 | | - | | 70-130 | - | | |
| Methyl tert butyl ether | 92 | | - | | 70-130 | - | | |
| Vinyl acetate | 103 | | - | | 70-130 | - | | |
| 2-Butanone | 97 | | - | | 70-130 | - | | |
| cis-1,2-Dichloroethene | 107 | | - | | 70-130 | - | | |
| Ethyl Acetate | 99 | | - | | 70-130 | - | | |
| Chloroform | 98 | | - | | 70-130 | - | | |
| Tetrahydrofuran | 91 | | - | | 70-130 | - | | |
| 2,2-Dichloropropane | 89 | | - | | 70-130 | - | | |
| 1,2-Dichloroethane | 97 | | - | | 70-130 | - | | |
| n-Hexane | 94 | | - | | 70-130 | - | | |
| Isopropyl Ether | 92 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG818339-3 | | | | | | | | |
| Ethyl-Tert-Butyl-Ether | 92 | | - | | 70-130 | - | | |
| 1,1,1-Trichloroethane | 97 | | - | | 70-130 | - | | |
| 1,1-Dichloropropene | 96 | | - | | 70-130 | - | | |
| Benzene | 92 | | - | | 70-130 | - | | |
| Carbon tetrachloride | 104 | | - | | 70-130 | - | | |
| Cyclohexane | 96 | | - | | 70-130 | - | | |
| Tertiary-Amyl Methyl Ether | 90 | | - | | 70-130 | - | | |
| Dibromomethane | 91 | | - | | 70-130 | - | | |
| 1,2-Dichloropropane | 96 | | - | | 70-130 | - | | |
| Bromodichloromethane | 98 | | - | | 70-130 | - | | |
| 1,4-Dioxane | 98 | | - | | 70-130 | - | | |
| Trichloroethene | 94 | | - | | 70-130 | - | | |
| 2,2,4-Trimethylpentane | 93 | | - | | 70-130 | - | | |
| Methyl Methacrylate | 93 | | - | | 70-130 | - | | |
| Heptane | 95 | | - | | 70-130 | - | | |
| cis-1,3-Dichloropropene | 102 | | - | | 70-130 | - | | |
| 4-Methyl-2-pentanone | 101 | | - | | 70-130 | - | | |
| trans-1,3-Dichloropropene | 90 | | - | | 70-130 | - | | |
| 1,1,2-Trichloroethane | 99 | | - | | 70-130 | - | | |
| Toluene | 89 | | - | | 70-130 | - | | |
| 1,3-Dichloropropane | 85 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG818339-3 | | | | | | | | |
| 2-Hexanone | 99 | | - | | 70-130 | - | | |
| Dibromochloromethane | 97 | | - | | 70-130 | - | | |
| 1,2-Dibromoethane | 95 | | - | | 70-130 | - | | |
| Butyl Acetate | 92 | | - | | 70-130 | - | | |
| Octane | 83 | | - | | 70-130 | - | | |
| Tetrachloroethene | 90 | | - | | 70-130 | - | | |
| 1,1,1,2-Tetrachloroethane | 88 | | - | | 70-130 | - | | |
| Chlorobenzene | 91 | | - | | 70-130 | - | | |
| Ethylbenzene | 91 | | - | | 70-130 | - | | |
| p/m-Xylene | 93 | | - | | 70-130 | - | | |
| Bromoform | 93 | | - | | 70-130 | - | | |
| Styrene | 92 | | - | | 70-130 | - | | |
| 1,1,2,2-Tetrachloroethane | 98 | | - | | 70-130 | - | | |
| o-Xylene | 94 | | - | | 70-130 | - | | |
| 1,2,3-Trichloropropane | 90 | | - | | 70-130 | - | | |
| Nonane (C9) | 89 | | - | | 70-130 | - | | |
| Isopropylbenzene | 91 | | - | | 70-130 | - | | |
| Bromobenzene | 88 | | - | | 70-130 | - | | |
| o-Chlorotoluene | 88 | | - | | 70-130 | - | | |
| n-Propylbenzene | 90 | | - | | 70-130 | - | | |
| p-Chlorotoluene | 88 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** ESTCP

**Project Number:** TR0479

**Lab Number:** L1521189

**Report Date:** 09/08/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG818339-3 | | | | | | | | |
| 4-Ethyltoluene | 90 | | - | | 70-130 | - | | |
| 1,3,5-Trimethylbenzene | 93 | | - | | 70-130 | - | | |
| tert-Butylbenzene | 90 | | - | | 70-130 | - | | |
| 1,2,4-Trimethylbenzene | 97 | | - | | 70-130 | - | | |
| Decane (C10) | 91 | | - | | 70-130 | - | | |
| Benzyl chloride | 96 | | - | | 70-130 | - | | |
| 1,3-Dichlorobenzene | 95 | | - | | 70-130 | - | | |
| 1,4-Dichlorobenzene | 94 | | - | | 70-130 | - | | |
| sec-Butylbenzene | 89 | | - | | 70-130 | - | | |
| p-Isopropyltoluene | 86 | | - | | 70-130 | - | | |
| 1,2-Dichlorobenzene | 93 | | - | | 70-130 | - | | |
| n-Butylbenzene | 96 | | - | | 70-130 | - | | |
| 1,2-Dibromo-3-chloropropane | 96 | | - | | 70-130 | - | | |
| Undecane | 99 | | - | | 70-130 | - | | |
| Dodecane (C12) | 124 | | - | | 70-130 | - | | |
| 1,2,4-Trichlorobenzene | 110 | | - | | 70-130 | - | | |
| Naphthalene | 106 | | - | | 70-130 | - | | |
| 1,2,3-Trichlorobenzene | 107 | | - | | 70-130 | - | | |
| Hexachlorobutadiene | 102 | | - | | 70-130 | - | | |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG818337-5 QC Sample: L1521189-01 Client ID: HSF3-10000 | | | | | | |
| Vinyl chloride | ND | ND | ppbV | NC | | 25 |
| 1,1-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| trans-1,2-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| 1,1-Dichloroethane | ND | ND | ppbV | NC | | 25 |
| cis-1,2-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| 1,2-Dichloroethane | ND | ND | ppbV | NC | | 25 |
| 1,1,1-Trichloroethane | ND | ND | ppbV | NC | | 25 |
| Trichloroethene | 42.4 | 44.7 | ppbV | 5 | | 25 |
| Tetrachloroethene | 0.382 | 0.387 | ppbV | 1 | | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG818339-5 QC Sample: L1521189-01 Client ID: HSF3-10000 | | | | | |
| Propylene | ND | ND | ppbV | NC | 25 |
| Dichlorodifluoromethane | 0.503 | 0.486 | ppbV | 3 | 25 |
| Chloromethane | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | ND | ppbV | NC | 25 |
| 1,3-Butadiene | ND | ND | ppbV | NC | 25 |
| Bromomethane | ND | ND | ppbV | NC | 25 |
| Chloroethane | ND | ND | ppbV | NC | 25 |
| Ethyl Alcohol | 7.74 | 7.59 | ppbV | 2 | 25 |
| Vinyl bromide | ND | ND | ppbV | NC | 25 |
| Acetone | 12.3 | 12.3 | ppbV | 0 | 25 |
| Trichlorofluoromethane | 0.315 | 0.299 | ppbV | 5 | 25 |
| iso-Propyl Alcohol | ND | ND | ppbV | NC | 25 |
| Methylene chloride | ND | ND | ppbV | NC | 25 |
| 3-Chloropropene | ND | ND | ppbV | NC | 25 |
| Carbon disulfide | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | ND | ppbV | NC | 25 |
| Methyl tert butyl ether | ND | ND | ppbV | NC | 25 |
| Vinyl acetate | ND | ND | ppbV | NC | 25 |
| 2-Butanone | 1.49 | 1.38 | ppbV | 8 | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG818339-5 QC Sample: L1521189-01 Client ID: HSF3-10000 | | | | | |
| Ethyl Acetate | ND | ND | ppbV | NC | 25 |
| Chloroform | 5.34 | 5.29 | ppbV | 1 | 25 |
| Tetrahydrofuran | 1.11 | 1.18 | ppbV | 6 | 25 |
| n-Hexane | ND | ND | ppbV | NC | 25 |
| Benzene | ND | ND | ppbV | NC | 25 |
| Carbon tetrachloride | 0.201 | 0.233 | ppbV | 15 | 25 |
| Cyclohexane | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloropropane | ND | ND | ppbV | NC | 25 |
| Bromodichloromethane | ND | ND | ppbV | NC | 25 |
| 1,4-Dioxane | ND | ND | ppbV | NC | 25 |
| 2,2,4-Trimethylpentane | ND | ND | ppbV | NC | 25 |
| Heptane | ND | ND | ppbV | NC | 25 |
| cis-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 4-Methyl-2-pentanone | ND | ND | ppbV | NC | 25 |
| trans-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Toluene | ND | ND | ppbV | NC | 25 |
| 2-Hexanone | ND | ND | ppbV | NC | 25 |
| Dibromochloromethane | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG818339-5 QC Sample: L1521189-01 Client ID: HSF3-10000 | | | | | |
| 1,2-Dibromoethane | ND | ND | ppbV | NC | 25 |
| Chlorobenzene | ND | ND | ppbV | NC | 25 |
| Ethylbenzene | ND | ND | ppbV | NC | 25 |
| p/m-Xylene | ND | ND | ppbV | NC | 25 |
| Bromoform | ND | ND | ppbV | NC | 25 |
| Styrene | ND | ND | ppbV | NC | 25 |
| 1,1,2,2-Tetrachloroethane | ND | ND | ppbV | NC | 25 |
| o-Xylene | ND | ND | ppbV | NC | 25 |
| 4-Ethyltoluene | ND | ND | ppbV | NC | 25 |
| 1,3,5-Trimethylbenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trimethylbenzene | ND | ND | ppbV | NC | 25 |
| Benzyl chloride | ND | ND | ppbV | NC | 25 |
| 1,3-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,4-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trichlorobenzene | ND | ND | ppbV | NC | 25 |
| Naphthalene | ND | ND | ppbV | NC | 25 |
| Hexachlorobutadiene | ND | ND | ppbV | NC | 25 |

**Project Name:** ESTCP

**Project Number:** TR0479

**Lab Number:** L1521189

**Report Date:** 09/08/15

## Canister and Flow Controller Information

| Samplenum | Client ID | Media ID | Media Type | Date Prepared | Bottle Order | Cleaning Batch ID | Can Leak Check | Initial Pressure (in. Hg) | Pressure on Receipt (in. Hg) | Flow Controler Leak Chk | Flow Out mL/min | Flow In mL/min | % RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1521189-01 | HSF3-10000 | 0015 | #90 SV | 08/28/15 | 208806 | | - | - | - | Pass | 164 | 177 | 8 |
| L1521189-01 | HSF3-10000 | 149B | 2.7L Can | 08/28/15 | 208806 | L1513470-01 | Pass | -29.6 | -0.5 | - | - | - | - |

**Project Name:**

**Lab Number:** L1513470

**Project Number:** CANISTER QC BAT

**Report Date:** 09/08/15

# Air Canister Certification Results

Lab ID: L1513470-01
Client ID: CAN 138 SHELF 1
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 06/17/15 17:19
Analyst: RY

Date Collected: 06/15/15 18:00
Date Received: 06/16/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethyl Alcohol | ND | 2.50 | -- | ND | 4.71 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| iso-Propyl Alcohol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| tert-Butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |

**Project Name:**

**Lab Number:** L1513470

**Project Number:** CANISTER QC BAT

**Report Date:** 09/08/15

# Air Canister Certification Results

Lab ID: L1513470-01
Client ID: CAN 138 SHELF 1
Sample Location:

Date Collected: 06/15/15 18:00
Date Received: 06/16/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Isopropyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Ethyl-Tert-Butyl-Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| Tertiary-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |

**Project Name:** **Lab Number:** L1513470

**Project Number:** CANISTER QC BAT **Report Date:** 09/08/15

# Air Canister Certification Results

Lab ID: L1513470-01 Date Collected: 06/15/15 18:00

Client ID: CAN 138 SHELF 1 Date Received: 06/16/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl Acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane (C9) | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| o-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |

**Project Name:** **Lab Number:** L1513470

**Project Number:** CANISTER QC BAT **Report Date:** 09/08/15

# Air Canister Certification Results

Lab ID: L1513470-01 Date Collected: 06/15/15 18:00

Client ID: CAN 138 SHELF 1 Date Received: 06/16/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| p-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane (C10) | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane (C12) | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | **Results** | **Qualifier** | **Units** | **RDL** | **Dilution Factor** |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

No Tentatively Identified Compounds

**Project Name:** **Lab Number:** L1513470

**Project Number:** CANISTER QC BAT **Report Date:** 09/08/15

# Air Canister Certification Results

Lab ID: L1513470-01 Date Collected: 06/15/15 18:00

Client ID: CAN 138 SHELF 1 Date Received: 06/16/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-Difluorobenzene | 93 | | 60-140 |
| Bromochloromethane | 92 | | 60-140 |
| chlorobenzene-d5 | 91 | | 60-140 |

**Project Name:**

**Lab Number:** L1513470

**Project Number:** CANISTER QC BAT

**Report Date:** 09/08/15

# Air Canister Certification Results

Lab ID: L1513470-01
Client ID: CAN 138 SHELF 1
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 06/17/15 17:19
Analyst: RY

Date Collected: 06/15/15 18:00
Date Received: 06/16/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | 0.050 | -- | ND | 0.349 | -- | | 1 |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,3-Butadiene | ND | 0.020 | -- | ND | 0.044 | -- | | 1 |
| Bromomethane | ND | 0.020 | -- | ND | 0.078 | -- | | 1 |
| Chloroethane | ND | 0.020 | -- | ND | 0.053 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.050 | -- | ND | 0.281 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | 0.050 | -- | ND | 0.383 | -- | | 1 |
| Halothane | ND | 0.050 | -- | ND | 0.404 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Chloroform | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Benzene | ND | 0.100 | -- | ND | 0.319 | -- | | 1 |
| Carbon tetrachloride | ND | 0.020 | -- | ND | 0.126 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |

**Project Name:**

**Lab Number:** L1513470

**Project Number:** CANISTER QC BAT

**Report Date:** 09/08/15

# Air Canister Certification Results

Lab ID: L1513470-01
Client ID: CAN 138 SHELF 1
Sample Location:

Date Collected: 06/15/15 18:00
Date Received: 06/16/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Bromodichloromethane | ND | 0.020 | -- | ND | 0.134 | -- | | 1 |
| 1,4-Dioxane | ND | 0.100 | -- | ND | 0.360 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Toluene | ND | 0.050 | -- | ND | 0.188 | -- | | 1 |
| Dibromochloromethane | ND | 0.020 | -- | ND | 0.170 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.020 | -- | ND | 0.154 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| Chlorobenzene | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |
| Ethylbenzene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| p/m-Xylene | ND | 0.040 | -- | ND | 0.174 | -- | | 1 |
| Bromoform | ND | 0.020 | -- | ND | 0.207 | -- | | 1 |
| Styrene | ND | 0.020 | -- | ND | 0.085 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| o-Xylene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |

**Project Name:**

**Lab Number:** L1513470

**Project Number:** CANISTER QC BAT

**Report Date:** 09/08/15

# Air Canister Certification Results

Lab ID: L1513470-01
Client ID: CAN 138 SHELF 1
Sample Location:

Date Collected: 06/15/15 18:00
Date Received: 06/16/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Naphthalene | ND | 0.050 | -- | ND | 0.262 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.050 | -- | ND | 0.533 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 95 | | 60-140 |
| bromochloromethane | 94 | | 60-140 |
| chlorobenzene-d5 | 93 | | 60-140 |

**Project Name:** ESTCP
**Project Number:** TR0479

**Lab Number:** L1521189
**Report Date:** 09/08/15

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

**Reagent H2O Preserved Vials Frozen on:** NA

**Cooler Information** **Custody Seal**
**Cooler**
N/A Absent

**Container Information**

| Container ID | Container Type | Cooler | pH | Temp deg C | Pres | Seal | Analysis(*) |
|---|---|---|---|---|---|---|---|
| L1521189-01A | Canister - 2.7 Liter | N/A | N/A | N/A | Y | Absent | TO15-LL(30),TO15-SIM(30) |

*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | ESTCP | **Lab Number:** | L1521189 |
| **Project Number:** | TR0479 | **Report Date:** | 09/08/15 |

## GLOSSARY

### *Acronyms*

| | |
|---|---|
| EDL | - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME). |
| EPA | - Environmental Protection Agency. |
| LCS | - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| LCSD | - Laboratory Control Sample Duplicate: Refer to LCS. |
| LFB | - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. |
| MDL | - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| MS | - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. |
| MSD | - Matrix Spike Sample Duplicate: Refer to MS. |
| NA | - Not Applicable. |
| NC | - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit. |
| NI | - Not Ignitable. |
| NP | - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil. |
| RL | - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable. |
| RPD | - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report. |
| SRM | - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples. |
| TIC | - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations. |

### *Footnotes*

| | |
|---|---|
| 1 | - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method. |

### *Terms*

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### *Data Qualifiers*

| | |
|---|---|
| **A** | - Spectra identified as "Aldol Condensation Product". |
| **B** | - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone). |
| **C** | - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses. |

*Report Format:* Data Usability Report

| | | | |
|---|---|---|---|
| **Project Name:** | ESTCP | **Lab Number:** | L1521189 |
| **Project Number:** | TR0479 | **Report Date:** | 09/08/15 |

***Data Qualifiers***

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**ND** - Not detected at the reporting limit (RL) for the sample.

*Report Format:* Data Usability Report

## REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

Last revised December 16, 2014

**The following analytes are not included in our NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 524.2:** Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.
**EPA 8260C:** 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.
**EPA 8270D:** 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
**EPA 625:** 4-Chloroaniline, 4-Methylphenol.
**SM4500**: Soil: Total Phosphorus, TKN, NO2, NO3.
**EPA 9071:** Total Petroleum Hydrocarbons, Oil & Grease.

**Mansfield Facility**
**EPA 8270D:** Biphenyl.
**EPA 2540D:** TSS
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

***Drinking Water***
**EPA 200.8**: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
**EPA 300.0**: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
**EPA 332**: Perchlorate.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

***Non-Potable Water***
**EPA 200.8**: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
**EPA 200.7**: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
**EPA 624**: Volatile Halocarbons & Aromatics,
**EPA 608**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625**: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

# AIR ANALYSIS

PAGE 1 OF 1

**CHAIN OF CUSTODY**

ALPHA ANALYTICAL
320 Forbes Blvd, Mansfield, MA 02048
TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 9/1/15

ALPHA Job #: L1521189

## Client Information

Client: Geosyntec
Address: 130 Research Ln
Guelph ON N1H 5G3
Phone: 519 822 2230
Fax:
Email: dmal@geosyntec.com
☐ These samples have been previously analyzed by Alpha

## Project Information

Project Name: ESTCP
Project Location: B205 Fan 3
Project #: TR0479
Project Manager: T. McAlary
ALPHA Quote #:

## Turn-Around Time

☑ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due: Time:

## Report Information - Data Deliverables

☐ FAX
☐ ADEx
Criteria Checker:
(Default based on Regulatory Criteria Indicated)
Other Formats:
☒ EMAIL (standard pdf report)
☐ Additional Deliverables:

Report to: (if different than Project Manager)
pnicholson@geosyntec.com

## Billing Information

☒ Same as Client info PO #:

## Regulatory Requirements/Report Limits

| State/Fed | Program | Criteria |
|---|---|---|
| | | |
| | | |
| | | |

Other Project Specific Requirements/Comments:

**All Columns Below Must Be Filled Out**

| ALPHA Lab ID (Lab Use Only) | Sample ID | Collection Date | Start Time | End Time | Initial Vacuum | Final Vacuum | Sample Matrix* | Sampler's Initials | Can Size | I D Can | I D - Flow Controller | TO-14A by TO-15 | TO-15 | TO-15 SIM | APH | FIXED GASES | TO-13A | TO-4 / TO-10 | Sample Comments (i.e. PID) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21189.01 | HSF3-10000 | 08/28/15 | 1806 | 1821 | 29.34 | 0.00 | SV | DM | 2.7 | 1498 | F0015 | | ✓ | ✓ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | |

*SAMPLE MATRIX CODES

AA = Ambient Air (Indoor/Outdoor)
SV = Soil Vapor/Landfill Gas/SVE
Other = Please Specify

Container Type

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

| Relinquished By: | Date/Time | Received By: | Date/Time: |
|---|---|---|---|
| Darias Mali | 08/29/15 747 | | |
| | 8-31-15 1830 | | 8-31-15 1830 |
| | 9-1-15 0020 | | 9/1/15 0020 |

# ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L1533080 |
| Client: | Geosyntec Consultants, Inc.<br>130 Stone Road West<br>Guelph, ON N1G 3Z2 |
| ATTN: | Paul Nicholson |
| Phone: | (519) 575-0864 |
| Project Name: | RARITAN ARSENAL |
| Project Number: | TR0479-02B |
| Report Date: | 12/21/15 |

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), ME (MA00030), PA (68-02089), VA (460194), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), USFWS (Permit #LE2069641), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L1533080-01 | HSF-03 | SOIL_VAPOR | EDISON, NJ | 12/14/15 11:10 | 12/15/15 |
| L1533080-02 | HSF-08 | SOIL_VAPOR | EDISON, NJ | 12/14/15 11:41 | 12/15/15 |
| L1533080-03 | UNUSED CAN #815 | SOIL_VAPOR | EDISON, NJ | | 12/15/15 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

**NJ DEP Data of Known Quality Protocols**
**Conformance/Non-Conformance**
**Summary Questionnaire**

| | | |
|---|---|---|
| 1 | For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards? | YES |
| 1a | Were the method specified handling, preservation, and holding time requirements met? | YES |
| 1b | EPH Method: Was the EPH Method conducted without significant modifications (see Section 11.3 of respective DKQ methods)? | N/A |
| 2 | Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)? | YES |
| 3 | Were all samples received at an appropriate temperature (4 ± 2° C)? | N/A |
| 4 | Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved? | YES |
| 5a | Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt? | YES |
| 5b | Were these reporting limits met? | YES |
| 6 | For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP? | YES |
| 7 | Are project-specific matrix spikes and/or laboratory duplicates included in this data set? | NO |

**Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1a or #1b is "No", the data package does not meet the requirements for "Data of Known Quality".**

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1533080 |
| **Project Number:** | TR0479-02B | **Report Date:** | 12/21/15 |

**Case Narrative (continued)**

NJDEP Volatile Organics in Air

Canisters were released from the laboratory on December 11, 2015. The canister certification results are provided as an addendum.

Any Manual integrations that were performed on L1533080 as well as its associated quality control samples and are noted on the individual quantitation reports. A listing of all manual integrations performed and the integration code definitions are provided in manual integration documentation section of the data package.

Please note, dilution analysis due to exceedance of the calibration range is not required for Ethanol or Isopropyl Alcohol.

GC column and trap information utilized for the analysis of this sample delivery group is detailed below:
Column Type: Restek RTX-1
Column Length: 60 Meters
Internal diameter: 0.52 mm
Film thickness: 1.00 um
Trap 1: Entech Cold Trap - no packing material
Trap 2: Entech Tenax - 20 cm packing material

Gaseous calibration standards were utilized for system calibration and quality control standards associated with this sample delivery group. These standards were purchased from Linde (formerly Spectra Gases).

Laboratory standard procedure for QC (i.e. method blanks, LCS) and sample analysis is to withdraw a 250 mL aliquot from the canister as the "1X" analysis. For some calibration levels and samples, subsequent dilutions will be performed as needed by decreasing aliquot volumes via the instrumentation, or performing a dilution using a second canister. Make-up air is not routinely added to canisters prior to sample analysis.

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

**Case Narrative (continued)**

Samples L1533080-01 and -02: Prior to sample analysis, the canisters were pressurized with UHP Nitrogen due to canister size. The pressurization resulted in a dilution of the samples. The reporting limits have been elevated accordingly.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 12/21/15

# AIR

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-01 D
Client ID: HSF-03
Sample Location: EDISON, NJ
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/17/15 22:20
Analyst: MB

Date Collected: 12/14/15 11:10
Date Received: 12/15/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | 0.43 | 0.42 | -- | 2 | 2 | -- | | 2.113 |
| Chloromethane | ND | 0.42 | -- | ND | 0.9 | -- | | 2.113 |
| Freon-114 | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| Vinyl chloride | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| 1,3-Butadiene | ND | 0.42 | -- | ND | 0.9 | -- | | 2.113 |
| Bromomethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Chloroethane | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| Ethanol | ND | 10 | -- | ND | 20 | -- | | 2.113 |
| Vinyl bromide | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Acetone | 12 | 2.1 | -- | 29 | 5.0 | -- | | 2.113 |
| Trichlorofluoromethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Isopropanol | 1.3 | 1.0 | -- | 3 | 2 | -- | | 2.113 |
| 1,1-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Tertiary butyl Alcohol | 27 | 1.0 | -- | 82 | 3.0 | -- | | 2.113 |
| Methylene chloride | ND | 1.0 | -- | ND | 3 | -- | | 2.113 |
| 3-Chloropropene | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| Carbon disulfide | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| Freon-113 | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| trans-1,2-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,1-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Methyl tert butyl ether | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 2-Butanone | ND | 1.0 | -- | ND | 3 | -- | | 2.113 |
| cis-1,2-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Chloroform | 3.0 | 0.42 | -- | 15 | 2.1 | -- | | 2.113 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-01 D
Client ID: HSF-03
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:10
Date Received: 12/15/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Tetrahydrofuran | ND | 1.0 | -- | ND | 3 | -- | | 2.113 |
| 1,2-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| n-Hexane | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| 1,1,1-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Benzene | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| Carbon tetrachloride | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| Cyclohexane | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| 1,2-Dichloropropane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Bromodichloromethane | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| 1,4-Dioxane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Trichloroethene | 46 | 0.42 | -- | 250 | 2.3 | -- | | 2.113 |
| 2,2,4-Trimethylpentane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Methyl Methacrylate | ND | 1.0 | -- | ND | 4 | -- | | 2.113 |
| Heptane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| cis-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 4-Methyl-2-pentanone | ND | 1.0 | -- | ND | 4 | -- | | 2.113 |
| trans-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,1,2-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Toluene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Dibromochloromethane | ND | 0.42 | -- | ND | 4 | -- | | 2.113 |
| 1,2-Dibromoethane | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| Tetrachloroethene | 0.42 | 0.42 | -- | 3 | 3 | -- | | 2.113 |
| Chlorobenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Ethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| p/m-Xylene | ND | 0.84 | -- | ND | 4 | -- | | 2.113 |
| Bromoform | ND | 0.42 | -- | ND | 4 | -- | | 2.113 |
| Styrene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,1,2,2-Tetrachloroethane | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

## SAMPLE RESULTS

Lab ID: L1533080-01 D
Client ID: HSF-03
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:10
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| o-Xylene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 2-Chlorotoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 4-Ethyltoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,3,5-Trimethybenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,2,4-Trimethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,3-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| 1,4-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| 1,2-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| 1,2,4-Trichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| Hexachlorobutadiene | ND | 0.42 | -- | ND | 4 | -- | | 2.113 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| unknown alkane | 46 | J | ppbV | | 2.113 |
| unknown alkene | 89 | J | ppbV | | 2.113 |
| unknown alkane | 190 | J | ppbV | | 2.113 |
| unknown alkene | 23 | J | ppbV | | 2.113 |
| Unknown Hydrocarbon | 15 | J | ppbV | | 2.113 |
| unknown alkane | 14 | J | ppbV | | 2.113 |
| unknown alkane | 13 | J | ppbV | | 2.113 |
| unknown alkane | 14 | J | ppbV | | 2.113 |
| unknown alkane | 15 | J | ppbV | | 2.113 |
| unknown alkane | 64 | J | ppbV | | 2.113 |
| unknown alkene | 15 | J | ppbV | | 2.113 |
| unknown alkane | 17 | J | ppbV | | 2.113 |
| unknown alkane | 40 | J | ppbV | | 2.113 |
| unknown alkane | 53 | J | ppbV | | 2.113 |
| unknown alkane | 13 | J | ppbV | | 2.113 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-01 D
Client ID: HSF-03
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:10
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 98 | | 60-140 |
| Bromochloromethane | 100 | | 60-140 |
| chlorobenzene-d5 | 106 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

## SAMPLE RESULTS

Lab ID: L1533080-02 D
Client ID: HSF-08
Sample Location: EDISON, NJ
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/17/15 23:28
Analyst: MB

Date Collected: 12/14/15 11:41
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Chloromethane | ND | 0.42 | -- | ND | 0.9 | -- | | 2.129 |
| Freon-114 | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Vinyl chloride | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| 1,3-Butadiene | ND | 0.42 | -- | ND | 0.9 | -- | | 2.129 |
| Bromomethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Chloroethane | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| Ethanol | ND | 11 | -- | ND | 20 | -- | | 2.129 |
| Vinyl bromide | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Acetone | 19 | 2.1 | -- | 45 | 5.0 | -- | | 2.129 |
| Trichlorofluoromethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Isopropanol | 2.3 | 1.1 | -- | 6 | 3 | -- | | 2.129 |
| 1,1-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Tertiary butyl Alcohol | 19 | 1.1 | -- | 58 | 3.3 | -- | | 2.129 |
| Methylene chloride | ND | 1.1 | -- | ND | 4 | -- | | 2.129 |
| 3-Chloropropene | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| Carbon disulfide | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| Freon-113 | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| trans-1,2-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,1-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Methyl tert butyl ether | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 2-Butanone | 1.6 | 1.1 | -- | 5 | 3 | -- | | 2.129 |
| cis-1,2-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Chloroform | 0.47 | 0.42 | -- | 2 | 2 | -- | | 2.129 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-02 D
Client ID: HSF-08
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:41
Date Received: 12/15/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Tetrahydrofuran | 1.4 | 1.1 | -- | 4 | 3 | -- | | 2.129 |
| 1,2-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| n-Hexane | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| 1,1,1-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Benzene | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| Carbon tetrachloride | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Cyclohexane | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| 1,2-Dichloropropane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Bromodichloromethane | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| 1,4-Dioxane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Trichloroethene | 8.2 | 0.42 | -- | 44 | 2.3 | -- | | 2.129 |
| 2,2,4-Trimethylpentane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Methyl Methacrylate | ND | 1.1 | -- | ND | 5 | -- | | 2.129 |
| Heptane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| cis-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 4-Methyl-2-pentanone | ND | 1.1 | -- | ND | 5 | -- | | 2.129 |
| trans-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,1,2-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Toluene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Dibromochloromethane | ND | 0.42 | -- | ND | 4 | -- | | 2.129 |
| 1,2-Dibromoethane | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Tetrachloroethene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Chlorobenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Ethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| p/m-Xylene | ND | 0.85 | -- | ND | 4 | -- | | 2.129 |
| Bromoform | ND | 0.42 | -- | ND | 4 | -- | | 2.129 |
| Styrene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,1,2,2-Tetrachloroethane | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

## SAMPLE RESULTS

Lab ID: L1533080-02 D
Client ID: HSF-08
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:41
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| o-Xylene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 2-Chlorotoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 4-Ethyltoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,3,5-Trimethybenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,2,4-Trimethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,3-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| 1,4-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| 1,2-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| 1,2,4-Trichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Hexachlorobutadiene | ND | 0.42 | -- | ND | 4 | -- | | 2.129 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| Unknown Hydrocarbon | 16 | J | ppbV | | 2.129 |
| unknown alkene | 60 | J | ppbV | | 2.129 |
| unknown alkane | 44 | J | ppbV | | 2.129 |
| unknown alkane | 13 | J | ppbV | | 2.129 |
| unknown alkane | 35 | J | ppbV | | 2.129 |
| unknown alkane | 160 | J | ppbV | | 2.129 |
| unknown alkane | 11 | J | ppbV | | 2.129 |
| unknown alkane | 42 | J | ppbV | | 2.129 |
| unknown alkane | 14 | J | ppbV | | 2.129 |
| unknown alkane | 11 | J | ppbV | | 2.129 |
| unknown alkane | 13 | J | ppbV | | 2.129 |
| unknown alkane | 58 | J | ppbV | | 2.129 |
| unknown alkane | 12 | J | ppbV | | 2.129 |
| unknown alkane | 12 | J | ppbV | | 2.129 |
| unknown alkane | 12 | J | ppbV | | 2.129 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-02 D
Client ID: HSF-08
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:41
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 102 | | 60-140 |
| Bromochloromethane | 104 | | 60-140 |
| chlorobenzene-d5 | 107 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/17/15 15:34

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG850745-4 | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chloromethane | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Freon-114 | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Vinyl chloride | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| 1,3-Butadiene | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Butane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Bromomethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroethane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Ethanol | ND | 5.0 | -- | ND | 9. | -- | | 1 |
| Vinyl bromide | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Acetone | ND | 1.0 | -- | ND | 2. | -- | | 1 |
| Trichlorofluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Isopropanol | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Methylene chloride | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| 3-Chloropropene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon disulfide | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Freon-113 | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 2-Butanone | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroform | ND | 0.20 | -- | ND | 1. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/17/15 15:34

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG850745-4 | | | | | | | | |
| Tetrahydrofuran | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| n-Hexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Benzene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon tetrachloride | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Cyclohexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Bromodichloromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dioxane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| Trichloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Methyl Methacrylate | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Heptane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Toluene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Dibromochloromethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Tetrachloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chlorobenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Ethylbenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| p/m-Xylene | ND | 0.40 | -- | ND | 2. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/17/15 15:34

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG850745-4 | | | | | | | | |
| Bromoform | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Styrene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| o-Xylene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 2-Chlorotoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 4-Ethyltoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Hexachlorobutadiene | ND | 0.20 | -- | ND | 2. | -- | | 1 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

No Tentatively Identified Compounds

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| Chlorodifluoromethane | 82 | | - | | 70-130 | - | | |
| Propylene | 97 | | - | | 70-130 | - | | |
| Dichlorodifluoromethane | 67 | | - | | 40-160 | - | | |
| Chloromethane | 97 | | - | | 70-130 | - | | |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 93 | | - | | 70-130 | - | | |
| Methanol | 92 | | - | | 70-130 | - | | |
| Vinyl chloride | 99 | | - | | 70-130 | - | | |
| 1,3-Butadiene | 100 | | - | | 70-130 | - | | |
| Butane | 94 | | - | | 70-130 | - | | |
| Bromomethane | 100 | | - | | 70-130 | - | | |
| Chloroethane | 99 | | - | | 70-130 | - | | |
| Ethyl Alcohol | 102 | | - | | 70-130 | - | | |
| Dichlorofluoromethane | 89 | | - | | 70-130 | - | | |
| Vinyl bromide | 92 | | - | | 70-130 | - | | |
| Acrolein | 100 | | - | | 70-130 | - | | |
| Acetone | 98 | | - | | 40-160 | - | | |
| Acetonitrile | 97 | | - | | 70-130 | - | | |
| Trichlorofluoromethane | 92 | | - | | 70-130 | - | | |
| iso-Propyl Alcohol | 104 | | - | | 70-130 | - | | |
| Acrylonitrile | 97 | | - | | 70-130 | - | | |
| Pentane | 97 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| Ethyl ether | 98 | | - | | 70-130 | - | | |
| 1,1-Dichloroethene | 97 | | - | | 70-130 | - | | |
| tert-Butyl Alcohol | 95 | | - | | 70-130 | - | | |
| Methylene chloride | 100 | | - | | 70-130 | - | | |
| 3-Chloropropene | 110 | | - | | 70-130 | - | | |
| Carbon disulfide | 98 | | - | | 70-130 | - | | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 95 | | - | | 70-130 | - | | |
| trans-1,2-Dichloroethene | 86 | | - | | 70-130 | - | | |
| 1,1-Dichloroethane | 91 | | - | | 70-130 | - | | |
| Methyl tert butyl ether | 94 | | - | | 70-130 | - | | |
| Vinyl acetate | 130 | | - | | 70-130 | - | | |
| 2-Butanone | 100 | | - | | 70-130 | - | | |
| cis-1,2-Dichloroethene | 110 | | - | | 70-130 | - | | |
| Ethyl Acetate | 96 | | - | | 70-130 | - | | |
| Chloroform | 94 | | - | | 70-130 | - | | |
| Tetrahydrofuran | 100 | | - | | 70-130 | - | | |
| 2,2-Dichloropropane | 86 | | - | | 70-130 | - | | |
| 1,2-Dichloroethane | 91 | | - | | 70-130 | - | | |
| n-Hexane | 110 | | - | | 70-130 | - | | |
| Isopropyl Ether | 100 | | - | | 70-130 | - | | |
| Ethyl-Tert-Butyl-Ether | 100 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| 1,1,1-Trichloroethane | 100 | | - | | 70-130 | - | | |
| 1,1-Dichloropropene | 100 | | - | | 70-130 | - | | |
| Benzene | 100 | | - | | 70-130 | - | | |
| Carbon tetrachloride | 100 | | - | | 70-130 | - | | |
| Cyclohexane | 110 | | - | | 70-130 | - | | |
| Tertiary-Amyl Methyl Ether | 100 | | - | | 70-130 | - | | |
| Dibromomethane | 99 | | - | | 70-130 | - | | |
| 1,2-Dichloropropane | 110 | | - | | 70-130 | - | | |
| Bromodichloromethane | 100 | | - | | 70-130 | - | | |
| 1,4-Dioxane | 110 | | - | | 40-160 | - | | |
| Trichloroethene | 100 | | - | | 70-130 | - | | |
| 2,2,4-Trimethylpentane | 110 | | - | | 70-130 | - | | |
| Methyl Methacrylate | 120 | | - | | 70-130 | - | | |
| Heptane | 120 | | - | | 70-130 | - | | |
| cis-1,3-Dichloropropene | 120 | | - | | 70-130 | - | | |
| 4-Methyl-2-pentanone | 120 | | - | | 70-130 | - | | |
| trans-1,3-Dichloropropene | 100 | | - | | 70-130 | - | | |
| 1,1,2-Trichloroethane | 110 | | - | | 70-130 | - | | |
| Toluene | 100 | | - | | 70-130 | - | | |
| 1,3-Dichloropropane | 95 | | - | | 70-130 | - | | |
| 2-Hexanone | 120 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| Dibromochloromethane | 97 | | - | | 70-130 | - | | |
| 1,2-Dibromoethane | 100 | | - | | 70-130 | - | | |
| Butyl Acetate | 96 | | - | | 70-130 | - | | |
| Octane | 96 | | - | | 70-130 | - | | |
| Tetrachloroethene | 94 | | - | | 70-130 | - | | |
| 1,1,1,2-Tetrachloroethane | 89 | | - | | 70-130 | - | | |
| Chlorobenzene | 98 | | - | | 70-130 | - | | |
| Ethylbenzene | 100 | | - | | 70-130 | - | | |
| p/m-Xylene | 100 | | - | | 70-130 | - | | |
| Bromoform | 95 | | - | | 70-130 | - | | |
| Styrene | 100 | | - | | 70-130 | - | | |
| 1,1,2,2-Tetrachloroethane | 110 | | - | | 70-130 | - | | |
| o-Xylene | 110 | | - | | 70-130 | - | | |
| 1,2,3-Trichloropropane | 95 | | - | | 70-130 | - | | |
| Nonane (C9) | 110 | | - | | 70-130 | - | | |
| Isopropylbenzene | 96 | | - | | 70-130 | - | | |
| Bromobenzene | 95 | | - | | 70-130 | - | | |
| o-Chlorotoluene | 93 | | - | | 70-130 | - | | |
| n-Propylbenzene | 94 | | - | | 70-130 | - | | |
| p-Chlorotoluene | 93 | | - | | 70-130 | - | | |
| 4-Ethyltoluene | 98 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| 1,3,5-Trimethylbenzene | 100 | | - | | 70-130 | - | | |
| tert-Butylbenzene | 96 | | - | | 70-130 | - | | |
| 1,2,4-Trimethylbenzene | 110 | | - | | 70-130 | - | | |
| Decane (C10) | 100 | | - | | 70-130 | - | | |
| Benzyl chloride | 110 | | - | | 70-130 | - | | |
| 1,3-Dichlorobenzene | 100 | | - | | 70-130 | - | | |
| 1,4-Dichlorobenzene | 100 | | - | | 70-130 | - | | |
| sec-Butylbenzene | 96 | | - | | 70-130 | - | | |
| p-Isopropyltoluene | 90 | | - | | 70-130 | - | | |
| 1,2-Dichlorobenzene | 100 | | - | | 70-130 | - | | |
| n-Butylbenzene | 100 | | - | | 70-130 | - | | |
| 1,2-Dibromo-3-chloropropane | 94 | | - | | 70-130 | - | | |
| Undecane | 110 | | - | | 70-130 | - | | |
| Dodecane (C12) | 120 | | - | | 70-130 | - | | |
| 1,2,4-Trichlorobenzene | 110 | | - | | 40-160 | - | | |
| Naphthalene | 99 | | - | | 40-160 | - | | |
| 1,2,3-Trichlorobenzene | 93 | | - | | 70-130 | - | | |
| Hexachlorobutadiene | 100 | | - | | 40-160 | - | | |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG850745-5 QC Sample: L1533080-01 Client ID: HSF-03 | | | | | | |
| Dichlorodifluoromethane | 0.43 | ND | ppbV | NC | | 25 |
| Chloromethane | ND | ND | ppbV | NC | | 25 |
| Freon-114 | ND | ND | ppbV | NC | | 25 |
| Vinyl chloride | ND | ND | ppbV | NC | | 25 |
| 1,3-Butadiene | ND | ND | ppbV | NC | | 25 |
| Bromomethane | ND | ND | ppbV | NC | | 25 |
| Chloroethane | ND | ND | ppbV | NC | | 25 |
| Ethanol | ND | ND | ppbV | NC | | 25 |
| Vinyl bromide | ND | ND | ppbV | NC | | 25 |
| Acetone | 12 | 12 | ppbV | 0 | | 25 |
| Trichlorofluoromethane | ND | ND | ppbV | NC | | 25 |
| Isopropanol | 1.3 | 1.4 | ppbV | 7 | | 25 |
| 1,1-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| Tertiary butyl Alcohol | 27 | 26 | ppbV | 4 | | 25 |
| Methylene chloride | ND | ND | ppbV | NC | | 25 |
| 3-Chloropropene | ND | ND | ppbV | NC | | 25 |
| Carbon disulfide | ND | ND | ppbV | NC | | 25 |
| Freon-113 | ND | ND | ppbV | NC | | 25 |
| trans-1,2-Dichloroethene | ND | ND | ppbV | NC | | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG850745-5 QC Sample: L1533080-01 Client ID: HSF-03 | | | | | |
| 1,1-Dichloroethane | ND | ND | ppbV | NC | 25 |
| Methyl tert butyl ether | ND | ND | ppbV | NC | 25 |
| 2-Butanone | ND | ND | ppbV | NC | 25 |
| cis-1,2-Dichloroethene | ND | ND | ppbV | NC | 25 |
| Chloroform | 3.0 | 3.0 | ppbV | 0 | 25 |
| Tetrahydrofuran | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloroethane | ND | ND | ppbV | NC | 25 |
| n-Hexane | ND | ND | ppbV | NC | 25 |
| 1,1,1-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Benzene | ND | ND | ppbV | NC | 25 |
| Carbon tetrachloride | ND | ND | ppbV | NC | 25 |
| Cyclohexane | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloropropane | ND | ND | ppbV | NC | 25 |
| Bromodichloromethane | ND | ND | ppbV | NC | 25 |
| 1,4-Dioxane | ND | ND | ppbV | NC | 25 |
| Trichloroethene | 46 | 44 | ppbV | 4 | 25 |
| 2,2,4-Trimethylpentane | ND | ND | ppbV | NC | 25 |
| Methyl Methacrylate | ND | ND | ppbV | NC | 25 |
| Heptane | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG850745-5 QC Sample: L1533080-01 Client ID: HSF-03 | | | | | |
| cis-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 4-Methyl-2-pentanone | ND | ND | ppbV | NC | 25 |
| trans-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Toluene | ND | ND | ppbV | NC | 25 |
| Dibromochloromethane | ND | ND | ppbV | NC | 25 |
| 1,2-Dibromoethane | ND | ND | ppbV | NC | 25 |
| Tetrachloroethene | 0.42 | ND | ppbV | NC | 25 |
| Chlorobenzene | ND | ND | ppbV | NC | 25 |
| Ethylbenzene | ND | ND | ppbV | NC | 25 |
| p/m-Xylene | ND | ND | ppbV | NC | 25 |
| Bromoform | ND | ND | ppbV | NC | 25 |
| Styrene | ND | ND | ppbV | NC | 25 |
| 1,1,2,2-Tetrachloroethane | ND | ND | ppbV | NC | 25 |
| o-Xylene | ND | ND | ppbV | NC | 25 |
| 2-Chlorotoluene | ND | ND | ppbV | NC | 25 |
| 4-Ethyltoluene | ND | ND | ppbV | NC | 25 |
| 1,3,5-Trimethybenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trimethylbenzene | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG850745-5 QC Sample: L1533080-01 Client ID: HSF-03 | | | | | |
| 1,3-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,4-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trichlorobenzene | ND | ND | ppbV | NC | 25 |
| Hexachlorobutadiene | ND | ND | ppbV | NC | 25 |

**Project Name:** RARITAN ARSENAL

**Lab Number:** L1533080

**Project Number:** TR0479-02B

**Report Date:** 12/21/15

## Canister and Flow Controller Information

| Samplenum | Client ID | Media ID | Media Type | Date Prepared | Bottle Order | Cleaning Batch ID | Can Leak Check | Initial Pressure (in. Hg) | Pressure on Receipt (in. Hg) | Flow Controler Leak Chk | Flow Out mL/min | Flow In mL/min | % RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1533080-01 | HSF-03 | 723 | 1.0L Can | 12/11/15 | 214177 | L1532196-02 | Pass | -29.6 | 0.0 | - | - | - | - |
| L1533080-02 | HSF-08 | 666 | 1.0L Can | 12/11/15 | 214177 | L1532196-02 | Pass | -29.9 | 0.3 | - | - | - | - |
| L1533080-03 | UNUSED CAN #815 | 815 | 1.0L Can | 12/11/15 | 214177 | L1532196-02 | Pass | -30.0 | -29.4 | - | - | - | - |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1532196
**Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02
Client ID: CAN 562 SHELF 16
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 12/08/15 19:03
Analyst: RY

Date Collected: 12/07/15 16:00
Date Received: 12/08/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 5.00 | -- | ND | 9.42 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02 Date Collected: 12/07/15 16:00

Client ID: CAN 562 SHELF 16 Date Received: 12/08/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02 Date Collected: 12/07/15 16:00

Client ID: CAN 562 SHELF 16 Date Received: 12/08/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1532196
**Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02
Client ID: CAN 562 SHELF 16
Sample Location:
Date Collected: 12/07/15 16:00
Date Received: 12/08/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | **Results** | **Qualifier** | **Units** | **RDL** | **Dilution Factor** |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| No Tentatively Identified Compounds | | | | | |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02 Date Collected: 12/07/15 16:00

Client ID: CAN 562 SHELF 16 Date Received: 12/08/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 95 | | 60-140 |
| Bromochloromethane | 95 | | 60-140 |
| chlorobenzene-d5 | 93 | | 60-140 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02
Client ID: CAN 562 SHELF 16
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 12/08/15 19:03
Analyst: RY

Date Collected: 12/07/15 16:00
Date Received: 12/08/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.050 | -- | ND | 0.349 | -- | | 1 |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,3-Butadiene | ND | 0.020 | -- | ND | 0.044 | -- | | 1 |
| Bromomethane | ND | 0.020 | -- | ND | 0.078 | -- | | 1 |
| Chloroethane | ND | 0.020 | -- | ND | 0.053 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.050 | -- | ND | 0.281 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| Freon-113 | ND | 0.050 | -- | ND | 0.383 | -- | | 1 |
| Halothane | ND | 0.050 | -- | ND | 0.404 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Chloroform | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Benzene | ND | 0.100 | -- | ND | 0.319 | -- | | 1 |
| Carbon tetrachloride | ND | 0.020 | -- | ND | 0.126 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1532196
**Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02
Client ID: CAN 562 SHELF 16
Sample Location:
Date Collected: 12/07/15 16:00
Date Received: 12/08/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Bromodichloromethane | ND | 0.020 | -- | ND | 0.134 | -- | | 1 |
| 1,4-Dioxane | ND | 0.100 | -- | ND | 0.360 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Toluene | ND | 0.050 | -- | ND | 0.188 | -- | | 1 |
| Dibromochloromethane | ND | 0.020 | -- | ND | 0.170 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.020 | -- | ND | 0.154 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| Chlorobenzene | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |
| Ethylbenzene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| p/m-Xylene | ND | 0.040 | -- | ND | 0.174 | -- | | 1 |
| Bromoform | ND | 0.020 | -- | ND | 0.207 | -- | | 1 |
| Styrene | ND | 0.020 | -- | ND | 0.085 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| o-Xylene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02 Date Collected: 12/07/15 16:00

Client ID: CAN 562 SHELF 16 Date Received: 12/08/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Naphthalene | ND | 0.050 | -- | ND | 0.262 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.050 | -- | ND | 0.533 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 98 | | 60-140 |
| bromochloromethane | 98 | | 60-140 |
| chlorobenzene-d5 | 93 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

**Cooler Information** **Custody Seal**
**Cooler**
N/A Present/Intact

**Container Information**

| Container ID | Container Type | Cooler | pH | Temp deg C | Pres | Seal | Analysis(*) |
|---|---|---|---|---|---|---|---|
| L1533080-01A | Canister - 1 Liter | N/A | N/A | N/A | Y | Absent | NJ-TO15(30) |
| L1533080-02A | Canister - 1 Liter | N/A | N/A | N/A | Y | Absent | NJ-TO15(30) |
| L1533080-03A | Canister - 1 Liter | N/A | N/A | | Y | Absent | CLEAN-FEE() |

*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1533080 |
| **Project Number:** | TR0479-02B | **Report Date:** | 12/21/15 |

## GLOSSARY

### *Acronyms*

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### *Footnotes*

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### *Terms*

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### *Data Qualifiers*

**A** - Spectra identified as "Aldol Condensation Product".

**B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

*Report Format:* Data Usability Report

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1533080 |
| **Project Number:** | TR0479-02B | **Report Date:** | 12/21/15 |

***Data Qualifiers***

**C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**ND** - Not detected at the reporting limit (RL) for the sample.

*Report Format:* Data Usability Report

## REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

**The following analytes are not included in our Primary NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.
**EPA 1010A:** NPW: Ignitability
**EPA 6010C:** NPW: Strontium; SCM: Strontium
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation
**EPA 9038:** NPW: Sulfate
**EPA 9050A:** NPW: Specific Conductance
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate
**EPA 9065:** NPW: Phenols
**EPA 9251:** NPW: Chloride
**SM3500:** NPW: Ferrous Iron
**SM4500**: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
**SM5310C:** DW: Dissolved Organic Carbon

**Mansfield Facility**
**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl
**EPA 2540D:** TSS
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

***Drinking Water***
**EPA 200.8**: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
**EPA 300.0**: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
**EPA 332**: Perchlorate.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

***Non-Potable Water***
**EPA 200.8**: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
**EPA 200.7**: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
**EPA 624**: Volatile Halocarbons & Aromatics,
**EPA 608**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625**: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Alpha Analytical
320 Forbes Blvd
Mansfield, MA 02048-1806
Tel: 508-822-9300
Fax: 508-822-3288

# AIR Chain-of-Custody - NJ

Date Rec'd in Lab: 12/16/15 | ALPHA Job#: L1533080

## Client Contact Information

Company: Geosyntec
Address: 130 Stone Rd West
City/State/Zip: Guelph ON N1G 3Z2
Phone: 519-575-0864
FAX:
Email: PNicholson@geosyntec.com
Site Contact: Matthew Mraw
Site Contact Phone: (609)-462-1108

## Project Information

Project Name: Raritan Arsenal
Project No: TR0479-02B
Site/Location: Edison, NJ
Project Manager: Paul Nicholson

## Analysis Turn-Around Time

Standard (Specify): 2 week
Rush (Specify):

## NJ DEP Information

Bureau: Division: Contract No:

## Report Information - Data Deliverables:

☐ FAX:
☐ ADEx ☐ Criteria Checker:
☑ EMail (standard pdf report)

## Billing Information

☐ Same as Client Info PO #:

1 of 1 COCs

| ALPHA LAB ID (Lab Use Only) | Sample Identification | Sample Date(s) | Time Start (24 hr clock) | Time Stop (24 hr clock) | Canister Pressure in Field (Hg) (Start) | Canister Pressure in Field (Hg) (Stop) | Interior Temp. (F) (Start) | Interior Temp. (F) (Stop) | Outgoing Canister Pressure (Hg) (Note1) | Incoming Canister Pressure (Hg) (Note 2) | Flow Reg. ID | Can ID | Can Size (L) | Flow Controller Readout (ml/min) (Note1) | Batch Cert ID (Note 1) | Analysis: TO-15 | Analysis: EPA 3C | Matrix: Indoor /Ambient Air | Matrix: Soil Gas |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33080.01 | HSF-03 | 12/14/15 | 1110 | 1110 | 29.6 | 0.8 | 55.4 | 55.4 | -29.6 | | — | 723 | 1 | — | L1532196-02 | ✓ | | | ✓ |
| .02 | HSF-08 | 12/14/15 | 1141 | 1141 | 29.9 | 0.8 | 56.1 | 56.1 | -29.9 | | — | 6666 | 1 | — | L1532196-02 | ✓ | | | ✓ |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

mm

Custody Seals:
Outgoing Seal No: (refer to crate seal) VB 036027
Incoming Seal No: (if applicable) 233

Temperature (Fahrenheit)

| | Ambient | Maximum | Minimum |
|---|---|---|---|
| Start | 55.4 | 55.4 | 55.4 |
| Stop | 56.1 | 56.1 | 56.1 |

Pressure (inches of Hg)

| | Ambient | Maximum | Minimum |
|---|---|---|---|
| Start | 29.90 | 29.90 | 29.90 |
| Stop | 29.87 | 29.87 | 29.87 |

Individual Preparing Canister/Containers and Laboratory Canister Certification
Name: Lisa Barrett
Signature:

Footnotes:
(1) Refer to equipment tags for these readings.
(2) Readings provided in data deliverable package.

Special Instructions/QC Requirements & Comments:

| Canisters Shipped by: | Date/Time: | Canisters Received by: | Date/Time: |
|---|---|---|---|
| Samples Relinquished by: | Date/Time: 12/15/15 1355 | Received by: | Date/Time: 12/15/15 1355 |
| Relinquished by: | Date/Time: 12/15/15 23:10 | Received by: Albert Williams | Date/Time: 12-15-15 23:10 |
| Albert Williams | 12-16-15 04:50 | | 12/16/15 04:50 |

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until all ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.



Note: Combined External Chain of Custody and NJDEP Field Test Data Sheet

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1/27/2016
Mr. Paul Nicholson
GeoSyntec Consultants
130 Stone Road West

Guelph, Ontario  N1G3Z2

Project Name: ESTCP
Project #: TR0479
Workorder #: 1601166

Dear Mr. Paul Nicholson

The following report includes the data for the above referenced project for sample(s) received on 1/14/2016 at Air Toxics Ltd.

The data and associated QC analyzed by Passive S.E. WMS are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs.  Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality.  Please feel free the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Ausha Scott

Project Manager

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# WORK ORDER #: 1601166

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Stone Road West<br>Guelph, Ontario N1G3Z2 | **BILL TO:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Stone Road West<br>Guelph, Ontario N1G3Z2 |
| **PHONE:** | 519-822-2230 | **P.O. #** | TR0479 |
| **FAX:** | 519-822-3151 | **PROJECT #** | TR0479 ESTCP |
| **DATE RECEIVED:** | 01/14/2016 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 01/20/2016 | | |

| FRACTION # | NAME | TEST |
|---|---|---|
| 01A | HSF-03 | Passive S.E. WMS |
| 02A | HSF-08 | Passive S.E. WMS |
| 03A | TB-01 | Passive S.E. WMS |
| 04A | Lab Blank | Passive S.E. WMS |
| 05A | LCS | Passive S.E. WMS |
| 05AA | LCSD | Passive S.E. WMS |

CERTIFIED BY:  DATE: 01/21/16

Technical Director

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

**LABORATORY NARRATIVE**
**Passive SE by Mod EPA TO-17**
**GeoSyntec Consultants**
**Workorder# 1601166**

Three WMS-SE samples were received on January 14, 2016. The laboratory analyzed the charcoal sorbent bed of the passive sampler following modified method EPA TO-17. The VOCs were chemically extracted using carbon disulfide and an aliquot of the extract was injected into a GC/MS for identification and quantification of volatile organic compounds (VOCs).

The mass of each target compound adsorbed by the sampler was converted to units of concentration using the sample deployment time and the sampling rate for each VOC. If sampling rates were calculated by the lab or the manufacturer, the concentration result has been flagged as an estimated value. Results are not corrected for desorption efficiency.

The reference method used for this procedure is EPA TO-17, which describes the collection of VOCs in ambient air using sorbents and analysis by GC/MS. Because TO-17 describes active sample collection using a pump and thermal desorption as the preparation step, several modifications are required. Modifications to TO-17 are listed in the table below:

| ***Requirement*** | ***TO-17*** | ***ATL Modifications*** |
|---|---|---|
| Sample Collection | Pump pulls measured air volume through sorbent tube | VOCs in air adsorbed onto sorbent bed passively through diffusion |
| Sample Preparation | Thermal extraction | Solvent extraction |
| Sorbent tube conditioning | Condition newly packed tubes prior to use | Charcoal-based sorbent is a single use media and conditioning is conducted by vendor. |
| Instrumentation | Thermal desorption introduction system | Liquid injection introduction system |
| Internal Standard | Gas-phase internal standard introduced on the tube or focusing trap during analysis | Liquid-phase internal standard introduced on the tube at the time of extraction |
| Media and sample storage | <4 deg C, 30 days | Media shelf life is determined by vendor; sample hold-time is 6 months for the RAD130 and WMS. Sample preservation requirements are storage in a cool, solvent-free refrigerator and optional use of ice during shipping. |
| Internal Standard Recovery | +/-40% of daily CCV area | -50% to +100% of daily CCV area |

**Receiving Notes**

There were no receiving discrepancies.

**Analytical Notes**

To calculate ug/m3 concentrations in the Lab Blank, a sampling duration of 43200 minutes was applied. The assumed temperature used for the uptake rate is listed on the data page. If the field

temperatures were provided, the rate was adjusted in the same manner as the field samples.

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page.

The Relative Percent Difference (RPD) of the LCS/LCSD exceeded acceptance limits for Hexane.

The Trip Blank sample TB-01 has reportable levels of target compounds present.

**Definition of Data Qualifying Flags**

Ten qualifiers may have been used on the data analysis sheets and indicate as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

C - Estimated concentration due to calculated sampling rate

CN - See case narrative explanation.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# VOC BY PASSIVE SAMPLER - GC/MS

**Client Sample ID: HSF-03**

**Lab ID#: 1601166-01A**

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloroform | 0.050 | 0.61 | 0.41 | 5.0 |
| Trichloroethene | 0.050 | 0.45 | 13 | 120 |
| Toluene | 0.050 | 0.37 | 0.092 | 0.69 |
| Tetrachloroethene | 0.050 | 0.30 | 0.32 | 1.9 |
| 1,4-Dichlorobenzene | 0.050 | 0.16 | 0.051 | 0.16 |

**Client Sample ID: HSF-08**

**Lab ID#: 1601166-02A**

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloroform | 0.050 | 0.61 | 0.070 | 0.86 |
| Trichloroethene | 0.050 | 0.45 | 1.2 | 11 |
| Toluene | 0.050 | 0.37 | 0.13 | 0.94 |
| Tetrachloroethene | 0.050 | 0.30 | 0.20 | 1.2 |
| m,p-Xylene | 0.050 | 0.28 | 0.11 | 0.63 |
| 1,2,4-Trimethylbenzene | 0.050 | 0.16 | 0.13 | 0.42 |
| 1,4-Dichlorobenzene | 0.050 | 0.16 | 0.067 | 0.21 |
| Naphthalene | 0.050 | 0.26 | 0.14 | 0.74 |

**Client Sample ID: TB-01**

**Lab ID#: 1601166-03A**

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Toluene | 0.050 | 0.37 | 0.089 | 0.66 |

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**Client Sample ID: HSF-03**

**Lab ID#: 1601166-01A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c011825sim** | **Date of Collection: 1/13/16 8:58:00 AM** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 04:45 PM** | |
| | | **Date of Extraction: 1/18/16** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 3.9 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 3.9 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 3.3 | Not Detected | Not Detected |
| Acetone | 0.20 | 3.6 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 0.72 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 1.4 | Not Detected | Not Detected |
| Hexane | 0.20 | 3.1 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 0.72 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 0.77 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 0.61 | Not Detected | Not Detected |
| Chloroform | 0.050 | 0.61 | 0.41 | 5.0 |
| Cyclohexane | 0.050 | 0.58 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 0.77 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 0.64 | Not Detected | Not Detected |
| Benzene | 0.20 | 2.1 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 0.53 | Not Detected | Not Detected |
| Heptane | 0.050 | 0.55 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 0.45 | 13 | 120 |
| 4-Methyl-2-pentanone | 0.10 | 0.93 | Not Detected | Not Detected |
| Toluene | 0.050 | 0.37 | 0.092 | 0.69 |
| 1,1,2-Trichloroethane | 0.050 | 0.45 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 0.30 | 0.32 | 1.9 |
| Chlorobenzene | 0.050 | 0.32 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 0.28 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 0.28 | Not Detected | Not Detected |
| o-Xylene | 0.050 | 0.26 | Not Detected | Not Detected |
| Styrene | 0.050 | 0.26 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 0.26 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 0.20 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 0.18 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 0.16 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.050 | 0.16 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 0.16 | 0.051 | 0.16 |
| 1,2-Dichlorobenzene | 0.050 | 0.14 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 0.26 | Not Detected | Not Detected |

Temperature = 30F , duration time = 43058 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

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**Client Sample ID: HSF-03**

**Lab ID#: 1601166-01A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c011825sim** | **Date of Collection: 1/13/16 8:58:00 AM** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 04:45 PM** |
| | | **Date of Extraction: 1/18/16** |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 105 | 70-130 |

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**Client Sample ID: HSF-08**

**Lab ID#: 1601166-02A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c011826sim** | **Date of Collection: 1/13/16 9:08:00 AM** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 05:09 PM** | |
| | | **Date of Extraction: 1/18/16** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 3.9 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 3.9 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 3.3 | Not Detected | Not Detected |
| Acetone | 0.20 | 3.6 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 0.73 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 1.4 | Not Detected | Not Detected |
| Hexane | 0.20 | 3.1 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 0.73 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 0.77 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 0.61 | Not Detected | Not Detected |
| Chloroform | 0.050 | 0.61 | 0.070 | 0.86 |
| Cyclohexane | 0.050 | 0.58 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 0.77 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 0.64 | Not Detected | Not Detected |
| Benzene | 0.20 | 2.1 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 0.53 | Not Detected | Not Detected |
| Heptane | 0.050 | 0.55 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 0.45 | 1.2 | 11 |
| 4-Methyl-2-pentanone | 0.10 | 0.93 | Not Detected | Not Detected |
| Toluene | 0.050 | 0.37 | 0.13 | 0.94 |
| 1,1,2-Trichloroethane | 0.050 | 0.45 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 0.30 | 0.20 | 1.2 |
| Chlorobenzene | 0.050 | 0.32 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 0.28 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 0.28 | 0.11 | 0.63 |
| o-Xylene | 0.050 | 0.26 | Not Detected | Not Detected |
| Styrene | 0.050 | 0.26 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 0.26 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 0.20 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 0.18 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 0.16 | 0.13 | 0.42 |
| 1,3-Dichlorobenzene | 0.050 | 0.16 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 0.16 | 0.067 | 0.21 |
| 1,2-Dichlorobenzene | 0.050 | 0.14 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 0.26 | 0.14 | 0.74 |

Temperature = 30F , duration time = 43037 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

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**Client Sample ID: HSF-08**

**Lab ID#: 1601166-02A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c011826sim** | **Date of Collection: 1/13/16 9:08:00 AM** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 05:09 PM** |
| | | **Date of Extraction: 1/18/16** |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 104 | 70-130 |

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**Client Sample ID: TB-01**

**Lab ID#: 1601166-03A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c011812sim** | **Date of Collection: 1/13/16 12:00:00 PM** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 11:32 AM** | |
| | | **Date of Extraction: 1/18/16** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 3.8 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 3.8 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 3.3 | Not Detected | Not Detected |
| Acetone | 0.20 | 3.6 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 0.72 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 1.4 | Not Detected | Not Detected |
| Hexane | 0.20 | 3.1 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 0.72 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 0.77 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 0.61 | Not Detected | Not Detected |
| Chloroform | 0.050 | 0.61 | Not Detected | Not Detected |
| Cyclohexane | 0.050 | 0.58 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 0.77 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 0.64 | Not Detected | Not Detected |
| Benzene | 0.20 | 2.1 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 0.53 | Not Detected | Not Detected |
| Heptane | 0.050 | 0.55 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 0.44 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 0.10 | 0.92 | Not Detected | Not Detected |
| Toluene | 0.050 | 0.37 | 0.089 | 0.66 |
| 1,1,2-Trichloroethane | 0.050 | 0.44 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 0.30 | Not Detected | Not Detected |
| Chlorobenzene | 0.050 | 0.32 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 0.28 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 0.28 | Not Detected | Not Detected |
| o-Xylene | 0.050 | 0.26 | Not Detected | Not Detected |
| Styrene | 0.050 | 0.26 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 0.26 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 0.20 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 0.18 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 0.16 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.050 | 0.16 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 0.16 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.050 | 0.14 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 0.26 | Not Detected | Not Detected |

Temperature = 30F , duration time = 43200 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

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**Client Sample ID: TB-01**

**Lab ID#: 1601166-03A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c011812sim** | **Date of Collection: 1/13/16 12:00:00 PM** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 11:32 AM** |
| | | **Date of Extraction: 1/18/16** |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 106 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1601166-04A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c011810sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 10:44 AM** | |
| | | **Date of Extraction: 1/18/16** | |

| Compound | Rpt. Limit (ug) | Rpt. Limit (ug/m3) | Amount (ug) | Amount (ug/m3) |
|---|---|---|---|---|
| Chloromethane | 0.20 | 3.8 | Not Detected | Not Detected |
| Vinyl Chloride | 0.20 | 3.8 | Not Detected | Not Detected |
| 1,1-Dichloroethene | 0.20 | 3.3 | Not Detected | Not Detected |
| Acetone | 0.20 | 3.6 | Not Detected | Not Detected |
| Methyl tert-butyl ether | 0.050 | 0.72 | Not Detected | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | 1.4 | Not Detected | Not Detected |
| Hexane | 0.20 | 3.1 | Not Detected | Not Detected |
| 1,1-Dichloroethane | 0.050 | 0.72 | Not Detected | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.050 | 0.77 | Not Detected | Not Detected |
| cis-1,2-Dichloroethene | 0.050 | 0.61 | Not Detected | Not Detected |
| Chloroform | 0.050 | 0.61 | Not Detected | Not Detected |
| Cyclohexane | 0.050 | 0.58 | Not Detected | Not Detected |
| 1,1,1-Trichloroethane | 0.050 | 0.77 | Not Detected | Not Detected |
| Carbon Tetrachloride | 0.050 | 0.64 | Not Detected | Not Detected |
| Benzene | 0.20 | 2.1 | Not Detected | Not Detected |
| 1,2-Dichloroethane | 0.050 | 0.53 | Not Detected | Not Detected |
| Heptane | 0.050 | 0.55 | Not Detected | Not Detected |
| Trichloroethene | 0.050 | 0.44 | Not Detected | Not Detected |
| 4-Methyl-2-pentanone | 0.10 | 0.92 | Not Detected | Not Detected |
| Toluene | 0.050 | 0.37 | Not Detected | Not Detected |
| 1,1,2-Trichloroethane | 0.050 | 0.44 | Not Detected | Not Detected |
| Tetrachloroethene | 0.050 | 0.30 | Not Detected | Not Detected |
| Chlorobenzene | 0.050 | 0.32 | Not Detected | Not Detected |
| Ethyl Benzene | 0.050 | 0.28 | Not Detected | Not Detected |
| m,p-Xylene | 0.050 | 0.28 | Not Detected | Not Detected |
| o-Xylene | 0.050 | 0.26 | Not Detected | Not Detected |
| Styrene | 0.050 | 0.26 | Not Detected | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.050 | 0.26 | Not Detected | Not Detected |
| Propylbenzene | 0.050 | 0.20 | Not Detected | Not Detected |
| 1,3,5-Trimethylbenzene | 0.050 | 0.18 | Not Detected | Not Detected |
| 1,2,4-Trimethylbenzene | 0.050 | 0.16 | Not Detected | Not Detected |
| 1,3-Dichlorobenzene | 0.050 | 0.16 | Not Detected | Not Detected |
| 1,4-Dichlorobenzene | 0.050 | 0.16 | Not Detected | Not Detected |
| 1,2-Dichlorobenzene | 0.050 | 0.14 | Not Detected | Not Detected |
| Naphthalene | 0.050 | 0.26 | Not Detected | Not Detected |

Temperature = 30F , duration time = 43200 minutes.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1601166-04A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c011810sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 10:44 AM** | |
| | | **Date of Extraction: 1/18/16** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 104 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1601166-05A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c011807sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 09:30 AM** | |
| | | **Date of Extraction: 1/18/16** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Chloromethane | 119 | 50-140 |
| Vinyl Chloride | 69 | 50-140 |
| 1,1-Dichloroethene | 73 | 70-130 |
| Acetone | 62 Q | 70-130 |
| Methyl tert-butyl ether | 76 | 70-130 |
| trans-1,2-Dichloroethene | 70 | 70-130 |
| Hexane | 65 Q | 70-130 |
| 1,1-Dichloroethane | 77 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 73 | 70-130 |
| cis-1,2-Dichloroethene | 76 | 70-130 |
| Chloroform | 71 | 70-130 |
| Cyclohexane | 80 | 70-130 |
| 1,1,1-Trichloroethane | 86 | 70-130 |
| Carbon Tetrachloride | 86 | 70-130 |
| Benzene | 71 | 70-130 |
| 1,2-Dichloroethane | 83 | 70-130 |
| Heptane | 95 | 70-130 |
| Trichloroethene | 84 | 70-130 |
| 4-Methyl-2-pentanone | 79 | 70-130 |
| Toluene | 79 | 70-130 |
| 1,1,2-Trichloroethane | 80 | 70-130 |
| Tetrachloroethene | 82 | 70-130 |
| Chlorobenzene | 72 | 70-130 |
| Ethyl Benzene | 82 | 70-130 |
| m,p-Xylene | 78 | 70-130 |
| o-Xylene | 74 | 70-130 |
| Styrene | 55 | 20-100 |
| 1,1,2,2-Tetrachloroethane | 75 | 60-130 |
| Propylbenzene | 78 | 70-130 |
| 1,3,5-Trimethylbenzene | 80 | 70-130 |
| 1,2,4-Trimethylbenzene | 76 | 70-130 |
| 1,3-Dichlorobenzene | 66 | 60-130 |
| 1,4-Dichlorobenzene | 69 | 60-130 |
| 1,2-Dichlorobenzene | 58 Q | 60-130 |
| Naphthalene | 17 | 5-80 |

Q = Exceeds Quality Control limits.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 102 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1601166-05A**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c011807sim** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 09:30 AM** |
| | | **Date of Extraction: 1/18/16** |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1601166-05AA**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **c011809sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 10:20 AM** | |
| | | **Date of Extraction: 1/18/16** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Chloromethane | 127 | 50-140 |
| Vinyl Chloride | 72 | 50-140 |
| 1,1-Dichloroethene | 73 | 70-130 |
| Acetone | 64 Q | 70-130 |
| Methyl tert-butyl ether | 78 | 70-130 |
| trans-1,2-Dichloroethene | 77 | 70-130 |
| Hexane | 90 | 70-130 |
| 1,1-Dichloroethane | 76 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 71 | 70-130 |
| cis-1,2-Dichloroethene | 76 | 70-130 |
| Chloroform | 77 | 70-130 |
| Cyclohexane | 79 | 70-130 |
| 1,1,1-Trichloroethane | 78 | 70-130 |
| Carbon Tetrachloride | 79 | 70-130 |
| Benzene | 75 | 70-130 |
| 1,2-Dichloroethane | 76 | 70-130 |
| Heptane | 87 | 70-130 |
| Trichloroethene | 84 | 70-130 |
| 4-Methyl-2-pentanone | 78 | 70-130 |
| Toluene | 80 | 70-130 |
| 1,1,2-Trichloroethane | 80 | 70-130 |
| Tetrachloroethene | 83 | 70-130 |
| Chlorobenzene | 73 | 70-130 |
| Ethyl Benzene | 84 | 70-130 |
| m,p-Xylene | 79 | 70-130 |
| o-Xylene | 76 | 70-130 |
| Styrene | 56 | 20-100 |
| 1,1,2,2-Tetrachloroethane | 77 | 60-130 |
| Propylbenzene | 79 | 70-130 |
| 1,3,5-Trimethylbenzene | 82 | 70-130 |
| 1,2,4-Trimethylbenzene | 77 | 70-130 |
| 1,3-Dichlorobenzene | 68 | 60-130 |
| 1,4-Dichlorobenzene | 71 | 60-130 |
| 1,2-Dichlorobenzene | 61 | 60-130 |
| Naphthalene | 19 | 5-80 |

Q = Exceeds Quality Control limits.

**Container Type: WMS-SE**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 103 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1601166-05AA**

**VOC BY PASSIVE SAMPLER - GC/MS**

| | | |
|---|---|---|
| **File Name:** | **c011809sim** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 1/18/16 10:20 AM** |
| | | **Date of Extraction: 1/18/16** |

# Radon Test Report

**Geosyntec Consultants, Inc.**
**Paul Nicholson**
**130 Stone Road West**
**Guelph ON NI6563**

**EMLab ID#:** 1480508
**Project ID:** TRO479
**Date Received:** January 18, 2016
**Date Analyzed:** January 19, 2020
**Certification #:** NRPP#102969AL
NRPP#106267RT

**Methods**: Rad Elec E-PERM Electret Ion Chamber System samples were analyzed via a SPER-1 Electret Reader, Serial Number SIN00702. Long-term radon tests are intended to give you an indication of the radon levels during the measurement period in the areas tested. The results of the radon measurements that you performed are as follows:

**Deployment Information**

Start Test: 12/14/2015 12:00 AM
Finish Test: 1/13/2016 12:00 PM
Test State: NJ
Elevation (ft): 88

**Project Description:**
ESTCP

**Results**

| Electret Serial # | | Sample Location | Device Type | Analysis Date | Analyst | Radon pCi/L | (+/-) pCi/L |
|---|---|---|---|---|---|---|---|
| LR3105 | | IA-08 | SLT | January 19, 2020 | TEG | 2.6 | 0.3 |
| LR3133 | | IA-05 | SLT | January 19, 2020 | TEG | 1.4 | 0.2 |
| LR3136 | | OA-01 | SLT | January 19, 2020 | TEG | 1.0 | 0.2 |
| LR3142 | | IA-07 | SLT | January 19, 2020 | TEG | 2.2 | 0.3 |
| LR3148 | | IA-12 | SLT | January 19, 2020 | TEG | 1.5 | 0.2 |
| LR3277 | * | HVAC-03 | SLT | January 19, 2020 | TEG | 86.7 | 4.3 |
| LR3321 | | IA-09 | SLT | January 19, 2020 | TEG | 1.4 | 0.2 |
| LR3329 | | IA-03 | SLT | January 19, 2020 | TEG | 2.2 | 0.3 |
| LR3459 | | IA-01 | SLT | January 19, 2020 | TEG | 1.9 | 0.2 |
| LR3471 | | IA-04 | SLT | January 19, 2020 | TEG | 1.1 | 0.2 |

EMLab P&K
A TestAmerica Company

# Radon Test Report

**Geosyntec Consultants, Inc.**
**Paul Nicholson**
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**Methods**: Rad Elec E-PERM Electret Ion Chamber System samples were analyzed via a SPER-1 Electret Reader, Serial Number SIN00702. Long-term radon tests are intended to give you an indication of the radon levels during the measurement period in the areas tested. The results of the radon measurements that you performed are as follows:

**Deployment Information**

Start Test: 12/14/2015 12:00 AM
Finish Test: 1/13/2016 12:00 PM
Test State: NJ
Elevation (ft): 88

**Project Description:**
ESTCP

**Results**

| Electret Serial # | | Sample Location | Device Type | Analysis Date | Analyst | Radon pCi/L | (+/-) pCi/L |
|---|---|---|---|---|---|---|---|
| LR3496 | | Dup-01 | SLT | January 19, 2020 | TEG | 1.5 | 0.2 |
| LR7717 | | IA-02 | SLT | January 19, 2020 | TEG | 2.2 | 0.3 |
| LR7812 | | Dup-02 | SLT | January 19, 2020 | TEG | 1.2 | 0.2 |
| LR7913 | | OA-02 | SLT | January 19, 2020 | TEG | 1.0 | 0.2 |
| LR7940 | | IA-06 | SLT | January 19, 2020 | TEG | 1.4 | 0.2 |
| LR8007 | | IA-11 | SLT | January 19, 2020 | TEG | 2.1 | 0.3 |
| LS3770 | ** | HVAC-02 | SLT | January 19, 2020 | TEG | 112.7 | 5.6 |
| LS3680 | | IA-10 | SLT | January 19, 2020 | TEG | 2.2 | 0.3 |
| LS3892 | | HVAC-01 | SLT | January 19, 2020 | TEG | 1.3 | 0.2 |

**Client has been informed that EMLab is not certified in this region.**

* Radon canister returned with loose cap. Most likely contributed to the high readings

** Radon Canister Electret not tightly secured to the bottom of the canister. Also, the label on the electret was removed. Indicates possible corruption of the electret. Most likely reson for high readings.

Authorized Signature/Date:_____

**Certified Radon Analyst**

EMLab P&K
A TestAmerica Company

**What Do My Test Results Mean?**

The concentration of radon is measured in picocuries per liter of air (pCi/L). If your average radon level is less than 4.0 pCi/L, no action is necessary. However, radon levels less than 4.0 pCi/L can still pose some health risk, and in many cases can be reduced. The national average indoor radon level is about 1.3 pCi/L while the average outdoor radon concentration is about 0.4 pCi/L. The higher the radon concentration in the test area, the greater the health risks are to those in the immediate area.

**What Do I Do If My Test Results Are Greater than 4.0 pCi/L?**

If the test results are 4.0 pCi/L or greater, the EPA recommends that you mitigate to reduce the radon concentrations to an acceptable level. There are simple ways to fix a radon problem that aren't too costly, and even very high concentrations can be reduced to acceptable levels.

**What Is the Health Risk Associated with Radon Gas?**

Radon is a radioactive gas that comes from the natural breakdown of uranium in the soil. Radon is estimated to cause many thousands of deaths each year from lung cancer, and in fact, it is the second leading cause of lung cancer after smoking. If you smoke, and the test area has high radon levels, your risk of lung cancer is especially high.

**Where Can I Get Additional Information on Radon?**

For more information, please refer to http://www.epa.gov/radon/index.html

**Data Qualifiers**

The *Data Qualifiers* identify issues or events that are relevant to your analytical results. A data qualifier includes information about the validity, the source of the data whether calculated, entered or estimated, and the value of an observation. In each case the data qualifiers provide significant information vital to the interpretation of the laboratory data.

# Site #2: Building 200

# Former Raritan Arsenal

EMLab P&K
A TestAmerica Company

# Radon Test Report

**Geosyntec Consultants, Inc**
**Paul Nicholson**
**130 Research Lane Suite 2**
**Guelph, ON N1G5A5 Canada**

**EMLab ID#:** 1425076
**Project ID:** TR0479
**Date Received:** September 17, 2015
**Date Analyzed:** September 17, 2015
**Certification #:** NRPP#102969AL
NRPP#103751RT

**Methods**: Rad Elec E-PERM Electret Ion Chamber System samples were analyzed via a SPER-1 Electret Reader, Serial Number SIN00702. Short-term radon tests are intended to give you an indication of the radon levels during the measurement period in the areas tested. The results of the radon measurements that you performed are as follows:

**Deployment Information**

Start Test: 8/16/2015 2:15 PM
Finish Test: 9/15/2015 9:15 AM
Test State: NJ
Elevation (ft): 88

Project Description: **ESTCP**

**Results**

| Electret Serial # | Sample Location | Device Type | Analysis Date | Analyst | Radon pCi/L | (+/-) pCi/L |
|---|---|---|---|---|---|---|
| SIE366 | C-5 | SST | September 17, 2015 | TEG | 0.4 | 0.1 |
| SIE416 | C-211 | SST | September 17, 2015 | TEG | 0.3 | 0.1 |
| SIE437 | C-125 | SST | September 17, 2015 | TEG | 0.3 | 0.1 |
| SIE454 | C-204 | SST | September 17, 2015 | TEG | 0.5 | 0.1 |
| SIE574 | C-5 | SST | September 17, 2015 | TEG | 0.3 | 0.1 |
| SIE619 | C-77 | SST | September 17, 2015 | TEG | 0.6 | 0.1 |

Authorized Signature/Date:_____

**Certified Radon Analyst**

EMLab P&K
A TestAmerica Company

**What Do My Test Results Mean?**

The concentration of radon is measured in picocuries per liter of air (pCi/L). If your average radon level is less than 4.0 pCi/L, no action is necessary. However, radon levels less than 4.0 pCi/L can still pose some health risk, and in many cases can be reduced. The national average indoor radon level is about 1.3 pCi/L while the average outdoor radon concentration is about 0.4 pCi/L. The higher the radon concentration in the test area, the greater the health risks are to those in the immediate area.

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If the test results are 4.0 pCi/L or greater, the EPA recommends that you mitigate to reduce the radon concentrations to an acceptable level. There are simple ways to fix a radon problem that aren't too costly, and even very high concentrations can be reduced to acceptable levels.

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Radon is a radioactive gas that comes from the natural breakdown of uranium in the soil. Radon is estimated to cause many thousands of deaths each year from lung cancer, and in fact, it is the second leading cause of lung cancer after smoking. If you smoke, and the test area has high radon levels, your risk of lung cancer is especially high.

**Where Can I Get Additional Information on Radon?**

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**Data Qualifiers**

The *Data Qualifiers* identify issues or events that are relevant to your analytical results. A data qualifier includes information about the validity, the source of the data whether calculated, entered or estimated, and the value of an observation. In each case the data qualifiers provide significant information vital to the interpretation of the laboratory data.

~24 Radon in Building 200

Reading

Uncertainty

Time

1001 0.00±56.1 B Sniff
SAT 15-AUG-15 15:26
29.0°C RH: 7% B:6.82V

1002 60.3±68.0 B Sniff
SAT 15-AUG-15 15:56
29.0°C RH: 9% B:6.82V

1003 21.9±63.6 B Sniff
SAT 15-AUG-15 16:26
28.7°C RH: 5% B:6.42V

1004 32.9±65.8 B Sniff
SAT 15-AUG-15 16:56
28.7°C RH: 5% B:6.79V

1005 16.5±65.9 B Sniff
SAT 15-AUG-15 17:26
28.4°C RH: 4% B:6.76V

1006 0.00±60.0 B Sniff
SAT 15-AUG-15 17:56
27.7°C RH: 4% B:6.76V

1007 18.5±30.1 B Normal
SAT 15-AUG-15 18:26
26.5°C RH: 4% B:6.79V

1008 23.8±31.2 B Normal
SAT 15-AUG-15 18:56
26.5°C RH: 4% B:6.82V

1009 18.5±27.1 B Normal
SAT 15-AUG-15 19:26
27.1°C RH: 4% B:6.64V

1010 5.29±27.1 B Normal
SAT 15-AUG-15 19:56
26.2°C RH: 4% B:6.67V

1011 5.29±29.6 B Normal
SAT 15-AUG-15 20:26
26.2°C RH: 4% B:6.82V

1012 0.00±22.9 B Normal
SAT 15-AUG-15 20:56
26.8°C RH: 4% B:6.58V

1013 15.9±26.5 B Normal
SAT 15-AUG-15 21:26
27.1°C RH: 4% B:6.61V

1014 2.65±25.8 B Normal
SAT 15-AUG-15 21:56
26.5°C RH: 3% B:6.91V

1015 18.5±27.1 B Normal
SAT 15-AUG-15 22:26
26.2°C RH: 3% B:6.91V

1016 0.00±24.4 B Normal
SAT 15-AUG-15 22:56
26.5°C RH: 3% B:6.94V

1017 7.95±27.8 B Normal
SAT 15-AUG-15 23:26
26.8°C RH: 3% B:6.94V

1018 13.2±25.8 B Normal
SAT 15-AUG-15 23:56
26.8°C RH: 3% B:6.94V

1019 13.2±30.1 B Normal
SUN 16-AUG-15 00:26
26.5°C RH: 3% B:6.94V

1020 15.9±26.5 B Normal
SUN 16-AUG-15 00:56
26.5°C RH: 3% B:6.94V

1021 2.65±23.6 B Normal
SUN 16-AUG-15 01:26
26.5°C RH: 3% B:6.94V

1022 18.5±29.0 B Normal
SUN 16-AUG-15 01:56
26.8°C RH: 3% B:6.94V

1023 18.5±26.5 B Normal
SUN 16-AUG-15 02:26
26.8°C RH: 3% B:6.94V

1024 5.30±22.9 B Normal
SUN 16-AUG-15 02:56
27.1°C RH: 3% B:6.94V

1025 21.2±25.8 B Normal
SUN 16-AUG-15 03:26
26.8°C RH: 3% B:6.94V

1026 18.5±25.1 B Normal
SUN 16-AUG-15 03:56
26.2°C RH: 3% B:6.94V

1027 10.6±24.4 B Normal
SUN 16-AUG-15 04:26
26.5°C RH: 3% B:6.91V

1028 10.6±22.9 B Normal
SUN 16-AUG-15 04:56
26.5°C RH: 3% B:6.94V

1029 10.6±24.4 B Normal
SUN 16-AUG-15 05:26
26.8°C RH: 3% B:6.94V

1030 18.5±25.1 B Normal
SUN 16-AUG-15 05:56
26.8°C RH: 3% B:6.97V

1031 0.00±20.3 B Normal
SUN 16-AUG-15 06:26
27.1°C RH: 3% B:6.91V

1032 10.6±22.1 B Normal
SUN 16-AUG-15 06:56
27.1°C RH: 3% B:6.94V

1033 5.29±20.3 B Normal
SUN 16-AUG-15 07:26
27.1°C RH: 3% B:6.94V

1034 0.00±17.1 B Normal
SUN 16-AUG-15 07:56
26.5°C RH: 3% B:6.94V

1035 21.2±23.6 B Normal
SUN 16-AUG-15 08:26
26.2°C RH: 3% B:6.94V

1036 10.6±22.9 B Normal
SUN 16-AUG-15 08:56
25.9°C RH: 3% B:6.94V

1037 10.6±19.3 B Normal
SUN 16-AUG-15 09:27
26.2°C RH: 3% B:6.94V

1038 10.6±22.0 B Normal
SUN 16-AUG-15 09:57
26.5°C RH: 3% B:6.94V

1039 23.8±26.5 B Normal
SUN 16-AUG-15 10:27
26.5°C RH: 3% B:6.97V

1040 0.00±20.3 B Normal
SUN 16-AUG-15 10:57
26.2°C RH: 3% B:6.94V

1041 0.00±17.1 B Normal
SUN 16-AUG-15 11:27
25.9°C RH: 3% B:6.97V

1042 5.29±19.3 B Normal
SUN 16-AUG-15 11:57
25.6°C RH: 3% B:6.97V

08:37

SS3 overnight

POWER OFF
08-06-15 08:37:37

CURRENT JOB
rm 191

OMNIGUARD
08-13-15 21:31:05
ALARM 1 @ +0.040" WC
ALARM 2 @ -0.060" WC

NORMAL OP 21:31:10

NEW NORMAL LOG RATE
5 min

NEW ALARM LOG RATE
1 min

END JOB
rm 191

JOB SUMMARY

JOB NAME:
rm 191
JOB START:
05-11-15 08:11
JOB END:
08-13-15 21:35
TIME IN NORMAL OP:
22 days 15 hrs 17 mins
NUMBER OF ALARMS:
4
TIME IN ALARM:
7 mins 37 secs

START

START JOB
buildng 200 SS3

OMNIGUARD
08-13-15 21:36:20
ALARM 1 @ +0.040" WC
ALARM 2 @ -0.060" WC

NORMAL OP 21:36:24

PRINTER ON

JOB REPORT
ENTIRE JOB
08-14-15 07:51:25

JOB NAME:

buildng 200 SS3

CONTRACTOR:

Geosynvec

SUPERVISOR:

JOB SUMMARY

JOB START:
08-13-15 21:36
TIME IN NORMAL OP:
10 hrs 15 mins
NUMBER OF ALARMS:
0
TIME IN ALARM:
Never

START JOB
buildng 200 SS3

OMNIGUARD
08-13-15 21:36:20
ALARM 1 @ +0.040" WC
ALARM 2 @ -0.060" WC

NORMAL OP 21:36:24

PRINTER OFF

NEW UNITS
Pascals

NEW ALARM 1
+63.0Pa

NEW ALARM 2
-63.0Pa

| TIME | HI Pa | LO Pa |
|---|---|---|
| 21:41 | 0.0 | -0.5 |
| 21:46 | +2.5 | -4.5 |
| 21:51 | -2.0 | -3.5 |
| 21:56 | -2.0 | -2.0 |
| 22:01 | -2.0 | -3.5 |
| 22:06 | -2.0 | -3.5 |
| 22:11 | -2.0 | -2.0 |
| 22:16 | -2.0 | -3.0 |
| 22:21 | -2.0 | -3.0 |
| 22:26 | -2.0 | -2.0 |
| 22:31 | -2.0 | -3.0 |
| 22:36 | -2.0 | -3.0 |
| 22:41 | -2.0 | -2.0 |
| 22:46 | -2.0 | -3.0 |
| 22:51 | -2.0 | -3.0 |
| 22:56 | -2.0 | -2.0 |
| 23:01 | -2.0 | -3.0 |
| 23:06 | -2.0 | -3.0 |
| 23:11 | -2.0 | -2.0 |
| 23:16 | -2.0 | -3.0 |
| 23:21 | -2.0 | -3.0 |
| 23:26 | -2.0 | -2.0 |
| 23:31 | -2.0 | -3.0 |
| 23:36 | -1.5 | -3.0 |
| 23:41 | -1.5 | -2.0 |
| 23:46 | -2.0 | -2.0 |
| 23:51 | -1.5 | -3.0 |
| 23:56 | -2.0 | -2.0 |

08-14-15

| TIME | HI Pa | LO Pa |
|---|---|---|
| 00:01 | -1.5 | -2.0 |
| 00:06 | -1.5 | -2.5 |
| 00:11 | -2.0 | -3.0 |
| 00:16 | -2.0 | -2.0 |
| 00:21 | -1.5 | -2.0 |
| 00:26 | -1.5 | -2.0 |
| 00:31 | -2.0 | -2.0 |
| 00:36 | -1.5 | -2.0 |
| 00:41 | -1.5 | -2.0 |
| 00:46 | -2.0 | -2.0 |
| 00:51 | -2.0 | -2.0 |
| 00:56 | -1.5 | -2.0 |
| 01:01 | -1.5 | -2.0 |
| 01:06 | -2.0 | -2.0 |
| 01:11 | -2.0 | -2.0 |
| 01:16 | -1.5 | -2.0 |
| 01:21 | -2.0 | -2.0 |
| 01:26 | -1.5 | -2.0 |
| 01:31 | -1.5 | -2.0 |
| 01:36 | -1.5 | -2.0 |
| 01:41 | -1.5 | -2.0 |
| 01:46 | -1.5 | -2.0 |
| 01:51 | -1.5 | -2.0 |
| 01:56 | -1.5 | -2.0 |
| 02:01 | -1.5 | -2.0 |
| 02:06 | -1.5 | -2.0 |
| 02:11 | -1.5 | -2.0 |
| 02:16 | -1.5 | -2.0 |
| 02:21 | -1.5 | -2.0 |
| 02:26 | -1.5 | -2.0 |
| 02:31 | -1.5 | -2.0 |
| 02:36 | -1.5 | -1.5 |
| 02:41 | -1.5 | -1.5 |
| 02:46 | -1.5 | -2.0 |
| 02:51 | -1.5 | -1.5 |
| 02:56 | -1.5 | -2.0 |
| 03:01 | -1.5 | -1.5 |
| 03:06 | -1.5 | -2.0 |
| 03:11 | -1.5 | -1.5 |
| 03:16 | -1.5 | -2.0 |
| 03:21 | -1.5 | -2.0 |
| 03:26 | -1.5 | -2.0 |
| 03:31 | -1.5 | -2.0 |
| 03:36 | -1.5 | -2.0 |
| 03:41 | -1.5 | -1.5 |
| 03:46 | -1.5 | -2.0 |
| 03:51 | -2.0 | -2.0 |
| 03:56 | -1.5 | -2.0 |
| 04:01 | -1.5 | -2.0 |
| 04:06 | -1.5 | -2.0 |
| 04:11 | -1.5 | -2.0 |
| 04:16 | -1.5 | -2.0 |
| 04:21 | -1.5 | -2.0 |
| 04:26 | -1.5 | -2.0 |
| 04:31 | -1.5 | -2.0 |
| 04:36 | -1.5 | -2.0 |
| 04:41 | -1.5 | -2.0 |
| 04:46 | -1.5 | -2.0 |
| 04:51 | -1.5 | -2.0 |
| 04:56 | -1.5 | -2.0 |
| 05:01 | -1.5 | -2.0 |
| 05:06 | -1.5 | -2.0 |
| 05:11 | -1.5 | -2.0 |
| 05:16 | -1.5 | -2.0 |

| | | |
|---|---|---|
| 05:21 | -1.5 | -2.0 |
| 05:26 | -1.5 | -2.0 |
| 05:31 | -1.5 | -2.0 |
| 05:36 | -1.5 | -2.0 |
| 05:41 | -1.5 | -2.0 |
| 05:46 | -1.5 | -2.0 |
| 05:51 | -1.5 | -2.0 |
| 05:56 | -1.5 | -2.0 |
| 06:01 | -1.5 | -2.0 |
| 06:06 | -1.5 | -2.0 |
| 06:11 | -1.5 | -2.0 |
| 06:16 | -1.5 | -2.0 |
| 06:21 | -1.5 | -2.0 |
| 06:26 | -2.0 | -2.0 |
| 06:31 | -2.0 | -2.0 |
| 06:36 | -1.5 | -2.0 |
| 06:41 | -1.5 | -2.0 |
| 06:46 | -1.5 | -2.0 |
| 06:51 | -1.5 | -2.0 |
| 06:56 | -1.5 | -2.0 |
| 07:01 | -1.5 | -2.0 |
| 07:06 | -1.5 | -2.0 |
| 07:11 | -1.5 | -2.0 |
| 07:16 | -1.5 | -2.0 |
| 07:21 | -1.5 | -2.0 |
| 07:26 | -1.5 | -2.0 |
| 07:31 | -1.5 | -2.0 |
| 07:36 | -1.5 | -2.0 |
| 07:41 | -1.5 | -2.0 |
| 07:46 | -1.5 | -2.0 |

PRINTER ON

End of report.

| | | |
|---|---|---|
| 07:54 | -1.5 | -2.0 |
| 07:59 | -1.5 | -2.0 |
| 08:04 | -1.0 | -1.5 |
| 08:09 | -1.0 | -2.0 |
| 08:14 | -1.0 | -2.0 |

JOB REPORT
ENTIRE JOB
08-14-15 08:18:36

JOB NAME: Phase 1

building 200 SS1

---

CONTRACTOR:

geosyntec

---

SUPERVISOR:

---

JOB SUMMARY

JOB START:
08-13-15 21:51
TIME IN NORMAL OP:
10 hrs 27 mins
NUMBER OF ALARMS:
0
TIME IN ALARM:
Never

---

START JOB
building 200 SS1

OMNIGUARD
08-13-15 21:51:48
ALARM 1 @ +64.0Pa
ALARM 2 @ -64.0Pa

NORMAL OP 21:51:49

| TIME | HI Pa | LO Pa |
|---|---|---|
| 21:56 | -50.5 | -52.0 |
| 22:01 | -50.5 | -52.0 |
| 22:06 | -48.0 | -50.5 |
| 22:11 | -50.5 | -51.5 |
| 22:16 | -50.5 | -51.5 |
| 22:21 | -50.5 | -50.5 |
| 22:26 | -50.5 | -51.5 |
| 22:31 | -50.5 | -51.5 |
| 22:36 | -50.5 | -51.0 |
| 22:41 | -50.5 | -51.5 |
| 22:46 | -50.5 | -51.5 |
| 22:51 | -50.5 | -51.0 |
| 22:56 | -51.0 | -52.0 |
| 23:01 | -50.5 | -51.5 |
| 23:06 | -50.5 | -51.0 |
| 23:11 | -51.0 | -52.0 |
| 23:16 | -51.0 | -52.0 |
| 23:21 | -50.5 | -51.0 |
| 23:26 | -51.0 | -52.0 |
| 23:31 | -50.5 | -52.0 |
| 23:36 | -50.5 | -51.0 |
| 23:41 | -50.5 | -51.0 |
| 23:46 | -50.5 | -52.0 |
| 23:51 | -50.5 | -51.0 |
| 23:56 | -50.5 | -51.0 |

08-14-15

| TIME | HI Pa | LO Pa |
|---|---|---|
| 00:01 | -50.5 | -52.0 |
| 00:06 | -51.0 | -52.0 |
| 00:11 | -51.0 | -51.0 |
| 00:16 | -50.5 | -51.0 |
| 00:21 | -51.0 | -51.0 |
| 00:26 | -51.0 | -51.0 |
| 00:31 | -50.5 | -51.0 |
| 00:36 | -50.5 | -51.0 |
| 00:41 | -51.0 | -51.0 |
| 00:46 | -51.0 | -51.0 |
| 00:51 | -51.0 | -51.0 |
| 00:56 | -51.0 | -51.0 |
| 01:01 | -51.0 | -51.0 |
| 01:06 | -51.0 | -51.5 |
| 01:11 | -51.0 | -51.0 |
| 01:16 | -51.0 | -51.0 |
| 01:21 | -51.0 | -51.0 |
| 01:26 | -51.0 | -51.0 |
| 01:31 | -51.0 | -51.0 |
| 01:36 | -51.0 | -51.0 |
| 01:41 | -51.0 | -51.0 |
| 01:46 | -51.0 | -51.5 |
| 01:51 | -51.0 | -51.5 |
| 01:56 | -51.0 | -51.5 |
| 02:01 | -51.0 | -51.5 |
| 02:06 | -51.0 | -51.0 |
| 02:11 | -51.0 | -51.5 |
| 02:16 | -51.0 | -51.5 |
| 02:21 | -51.0 | -51.5 |
| 02:26 | -51.0 | -51.5 |
| 02:31 | -51.0 | -51.5 |
| 02:36 | -51.0 | -51.5 |
| 02:41 | -51.0 | -51.5 |
| 02:46 | -51.0 | -51.5 |
| 02:51 | -51.0 | -51.5 |
| 02:56 | -51.0 | -51.5 |
| 03:01 | -51.5 | -51.5 |
| 03:06 | -51.0 | -51.5 |
| 03:11 | -51.5 | -51.5 |
| 03:16 | -51.5 | -51.5 |
| 03:21 | -51.5 | -51.5 |
| 03:26 | -51.5 | -51.5 |
| 03:31 | -51.5 | -51.5 |
| 03:36 | -51.5 | -51.5 |
| 03:41 | -51.5 | -51.5 |
| 03:46 | -51.5 | -52.0 |
| 03:51 | -51.5 | -52.0 |
| 03:56 | -51.5 | -52.0 |
| 04:01 | -51.5 | -51.5 |
| 04:06 | -51.5 | -51.5 |
| 04:11 | -51.5 | -51.5 |
| 04:16 | -51.5 | -51.5 |
| 04:21 | -51.5 | -52.0 |
| 04:26 | -51.5 | -52.0 |
| 04:31 | -51.5 | -52.0 |
| 04:36 | -51.5 | -52.0 |
| 04:41 | -51.5 | -52.0 |
| 04:46 | -51.5 | -52.0 |
| 04:51 | -51.5 | -52.0 |
| 04:56 | -51.5 | -52.0 |
| 05:01 | -51.5 | -52.0 |
| 05:06 | -51.5 | -52.0 |
| 05:11 | -51.5 | -52.0 |
| 05:16 | -51.5 | -52.0 |
| 05:21 | -51.5 | -52.0 |
| 05:26 | -51.5 | -52.0 |
| 05:31 | -51.5 | -52.0 |
| 05:36 | -51.5 | -52.0 |
| 05:41 | -51.5 | -52.0 |
| 05:46 | -51.5 | -52.0 |
| 05:51 | -51.5 | -52.0 |
| 05:56 | -51.5 | -52.0 |
| 06:01 | -52.0 | -52.5 |
| 06:06 | -51.5 | -52.0 |
| 06:11 | -52.0 | -52.0 |
| 06:16 | -52.0 | -52.0 |
| 06:21 | -52.0 | -52.5 |
| 06:26 | -52.0 | -52.0 |
| 06:31 | -51.5 | -52.0 |
| 06:36 | -51.5 | -52.0 |
| 06:41 | -51.5 | -52.0 |
| 06:46 | -51.5 | -52.0 |
| 06:51 | -51.5 | -52.0 |
| 06:56 | -51.5 | -52.0 |
| 07:01 | -51.5 | -52.0 |
| 07:06 | -51.5 | -51.5 |
| 07:11 | -51.5 | -52.0 |
| 07:16 | -51.5 | -51.5 |
| 07:21 | -51.5 | -51.5 |
| 07:26 | -51.5 | -51.5 |
| 07:31 | -51.0 | -51.5 |
| 07:36 | -51.5 | -51.5 |
| 07:41 | -51.5 | -51.5 |
| 07:46 | -46.5 | -51.5 |
| 07:51 | -49.0 | -51.0 |
| 07:56 | -50.5 | -51.0 |
| 08:01 | -42.5 | -51.0 |
| 08:06 | 0.0 | -50.0 |
| 08:11 | -37.5 | -51.5 |
| 08:16 | -34.0 | -50.0 |

End of report.

# ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L1533080 |
| Client: | Geosyntec Consultants, Inc.<br>130 Stone Road West<br>Guelph, ON N1G 3Z2 |
| ATTN: | Paul Nicholson |
| Phone: | (519) 575-0864 |
| Project Name: | RARITAN ARSENAL |
| Project Number: | TR0479-02B |
| Report Date: | 12/21/15 |

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), ME (MA00030), PA (68-02089), VA (460194), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), USFWS (Permit #LE2069641), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L1533080-01 | HSF-03 | SOIL_VAPOR | EDISON, NJ | 12/14/15 11:10 | 12/15/15 |
| L1533080-02 | HSF-08 | SOIL_VAPOR | EDISON, NJ | 12/14/15 11:41 | 12/15/15 |
| L1533080-03 | UNUSED CAN #815 | SOIL_VAPOR | EDISON, NJ | | 12/15/15 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

**NJ DEP Data of Known Quality Protocols**
**Conformance/Non-Conformance**
**Summary Questionnaire**

| | | |
|---|---|---|
| 1 | For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards? | YES |
| 1a | Were the method specified handling, preservation, and holding time requirements met? | YES |
| 1b | EPH Method: Was the EPH Method conducted without significant modifications (see Section 11.3 of respective DKQ methods)? | N/A |
| 2 | Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)? | YES |
| 3 | Were all samples received at an appropriate temperature (4 ± 2° C)? | N/A |
| 4 | Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved? | YES |
| 5a | Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt? | YES |
| 5b | Were these reporting limits met? | YES |
| 6 | For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP? | YES |
| 7 | Are project-specific matrix spikes and/or laboratory duplicates included in this data set? | NO |

**Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1a or #1b is "No", the data package does not meet the requirements for "Data of Known Quality".**

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1533080 |
| **Project Number:** | TR0479-02B | **Report Date:** | 12/21/15 |

**Case Narrative (continued)**

NJDEP Volatile Organics in Air

Canisters were released from the laboratory on December 11, 2015. The canister certification results are provided as an addendum.

Any Manual integrations that were performed on L1533080 as well as its associated quality control samples and are noted on the individual quantitation reports. A listing of all manual integrations performed and the integration code definitions are provided in manual integration documentation section of the data package.

Please note, dilution analysis due to exceedance of the calibration range is not required for Ethanol or Isopropyl Alcohol.

GC column and trap information utilized for the analysis of this sample delivery group is detailed below:
Column Type: Restek RTX-1
Column Length: 60 Meters
Internal diameter: 0.52 mm
Film thickness: 1.00 um
Trap 1: Entech Cold Trap - no packing material
Trap 2: Entech Tenax - 20 cm packing material

Gaseous calibration standards were utilized for system calibration and quality control standards associated with this sample delivery group. These standards were purchased from Linde (formerly Spectra Gases).

Laboratory standard procedure for QC (i.e. method blanks, LCS) and sample analysis is to withdraw a 250 mL aliquot from the canister as the "1X" analysis. For some calibration levels and samples, subsequent dilutions will be performed as needed by decreasing aliquot volumes via the instrumentation, or performing a dilution using a second canister. Make-up air is not routinely added to canisters prior to sample analysis.

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

**Case Narrative (continued)**

Samples L1533080-01 and -02: Prior to sample analysis, the canisters were pressurized with UHP Nitrogen due to canister size. The pressurization resulted in a dilution of the samples. The reporting limits have been elevated accordingly.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 12/21/15

# AIR

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-01 D
Client ID: HSF-03
Sample Location: EDISON, NJ
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/17/15 22:20
Analyst: MB

Date Collected: 12/14/15 11:10
Date Received: 12/15/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | 0.43 | 0.42 | -- | 2 | 2 | -- | | 2.113 |
| Chloromethane | ND | 0.42 | -- | ND | 0.9 | -- | | 2.113 |
| Freon-114 | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| Vinyl chloride | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| 1,3-Butadiene | ND | 0.42 | -- | ND | 0.9 | -- | | 2.113 |
| Bromomethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Chloroethane | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| Ethanol | ND | 10 | -- | ND | 20 | -- | | 2.113 |
| Vinyl bromide | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Acetone | 12 | 2.1 | -- | 29 | 5.0 | -- | | 2.113 |
| Trichlorofluoromethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Isopropanol | 1.3 | 1.0 | -- | 3 | 2 | -- | | 2.113 |
| 1,1-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Tertiary butyl Alcohol | 27 | 1.0 | -- | 82 | 3.0 | -- | | 2.113 |
| Methylene chloride | ND | 1.0 | -- | ND | 3 | -- | | 2.113 |
| 3-Chloropropene | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| Carbon disulfide | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| Freon-113 | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| trans-1,2-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,1-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Methyl tert butyl ether | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 2-Butanone | ND | 1.0 | -- | ND | 3 | -- | | 2.113 |
| cis-1,2-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Chloroform | 3.0 | 0.42 | -- | 15 | 2.1 | -- | | 2.113 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-01 D
Client ID: HSF-03
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:10
Date Received: 12/15/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Tetrahydrofuran | ND | 1.0 | -- | ND | 3 | -- | | 2.113 |
| 1,2-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| n-Hexane | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| 1,1,1-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Benzene | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| Carbon tetrachloride | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| Cyclohexane | ND | 0.42 | -- | ND | 1 | -- | | 2.113 |
| 1,2-Dichloropropane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Bromodichloromethane | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| 1,4-Dioxane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Trichloroethene | 46 | 0.42 | -- | 250 | 2.3 | -- | | 2.113 |
| 2,2,4-Trimethylpentane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Methyl Methacrylate | ND | 1.0 | -- | ND | 4 | -- | | 2.113 |
| Heptane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| cis-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 4-Methyl-2-pentanone | ND | 1.0 | -- | ND | 4 | -- | | 2.113 |
| trans-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,1,2-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Toluene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Dibromochloromethane | ND | 0.42 | -- | ND | 4 | -- | | 2.113 |
| 1,2-Dibromoethane | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| Tetrachloroethene | 0.42 | 0.42 | -- | 3 | 3 | -- | | 2.113 |
| Chlorobenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| Ethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| p/m-Xylene | ND | 0.84 | -- | ND | 4 | -- | | 2.113 |
| Bromoform | ND | 0.42 | -- | ND | 4 | -- | | 2.113 |
| Styrene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,1,2,2-Tetrachloroethane | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

## SAMPLE RESULTS

Lab ID: L1533080-01 D
Client ID: HSF-03
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:10
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| o-Xylene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 2-Chlorotoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 4-Ethyltoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,3,5-Trimethybenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,2,4-Trimethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.113 |
| 1,3-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| 1,4-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| 1,2-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| 1,2,4-Trichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.113 |
| Hexachlorobutadiene | ND | 0.42 | -- | ND | 4 | -- | | 2.113 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| unknown alkane | 46 | J | ppbV | | 2.113 |
| unknown alkene | 89 | J | ppbV | | 2.113 |
| unknown alkane | 190 | J | ppbV | | 2.113 |
| unknown alkene | 23 | J | ppbV | | 2.113 |
| Unknown Hydrocarbon | 15 | J | ppbV | | 2.113 |
| unknown alkane | 14 | J | ppbV | | 2.113 |
| unknown alkane | 13 | J | ppbV | | 2.113 |
| unknown alkane | 14 | J | ppbV | | 2.113 |
| unknown alkane | 15 | J | ppbV | | 2.113 |
| unknown alkane | 64 | J | ppbV | | 2.113 |
| unknown alkene | 15 | J | ppbV | | 2.113 |
| unknown alkane | 17 | J | ppbV | | 2.113 |
| unknown alkane | 40 | J | ppbV | | 2.113 |
| unknown alkane | 53 | J | ppbV | | 2.113 |
| unknown alkane | 13 | J | ppbV | | 2.113 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-01 D
Client ID: HSF-03
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:10
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 98 | | 60-140 |
| Bromochloromethane | 100 | | 60-140 |
| chlorobenzene-d5 | 106 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

## SAMPLE RESULTS

Lab ID: L1533080-02 D
Client ID: HSF-08
Sample Location: EDISON, NJ
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/17/15 23:28
Analyst: MB

Date Collected: 12/14/15 11:41
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Chloromethane | ND | 0.42 | -- | ND | 0.9 | -- | | 2.129 |
| Freon-114 | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Vinyl chloride | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| 1,3-Butadiene | ND | 0.42 | -- | ND | 0.9 | -- | | 2.129 |
| Bromomethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Chloroethane | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| Ethanol | ND | 11 | -- | ND | 20 | -- | | 2.129 |
| Vinyl bromide | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Acetone | 19 | 2.1 | -- | 45 | 5.0 | -- | | 2.129 |
| Trichlorofluoromethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Isopropanol | 2.3 | 1.1 | -- | 6 | 3 | -- | | 2.129 |
| 1,1-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Tertiary butyl Alcohol | 19 | 1.1 | -- | 58 | 3.3 | -- | | 2.129 |
| Methylene chloride | ND | 1.1 | -- | ND | 4 | -- | | 2.129 |
| 3-Chloropropene | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| Carbon disulfide | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| Freon-113 | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| trans-1,2-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,1-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Methyl tert butyl ether | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 2-Butanone | 1.6 | 1.1 | -- | 5 | 3 | -- | | 2.129 |
| cis-1,2-Dichloroethene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Chloroform | 0.47 | 0.42 | -- | 2 | 2 | -- | | 2.129 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-02 D
Client ID: HSF-08
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:41
Date Received: 12/15/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Tetrahydrofuran | 1.4 | 1.1 | -- | 4 | 3 | -- | | 2.129 |
| 1,2-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| n-Hexane | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| 1,1,1-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Benzene | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| Carbon tetrachloride | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Cyclohexane | ND | 0.42 | -- | ND | 1 | -- | | 2.129 |
| 1,2-Dichloropropane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Bromodichloromethane | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| 1,4-Dioxane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Trichloroethene | 8.2 | 0.42 | -- | 44 | 2.3 | -- | | 2.129 |
| 2,2,4-Trimethylpentane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Methyl Methacrylate | ND | 1.1 | -- | ND | 5 | -- | | 2.129 |
| Heptane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| cis-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 4-Methyl-2-pentanone | ND | 1.1 | -- | ND | 5 | -- | | 2.129 |
| trans-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,1,2-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Toluene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Dibromochloromethane | ND | 0.42 | -- | ND | 4 | -- | | 2.129 |
| 1,2-Dibromoethane | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Tetrachloroethene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Chlorobenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| Ethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| p/m-Xylene | ND | 0.85 | -- | ND | 4 | -- | | 2.129 |
| Bromoform | ND | 0.42 | -- | ND | 4 | -- | | 2.129 |
| Styrene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,1,2,2-Tetrachloroethane | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

## SAMPLE RESULTS

Lab ID: L1533080-02 D
Client ID: HSF-08
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:41
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| o-Xylene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 2-Chlorotoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 4-Ethyltoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,3,5-Trimethybenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,2,4-Trimethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.129 |
| 1,3-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| 1,4-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| 1,2-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| 1,2,4-Trichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.129 |
| Hexachlorobutadiene | ND | 0.42 | -- | ND | 4 | -- | | 2.129 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| Unknown Hydrocarbon | 16 | J | ppbV | | 2.129 |
| unknown alkene | 60 | J | ppbV | | 2.129 |
| unknown alkane | 44 | J | ppbV | | 2.129 |
| unknown alkane | 13 | J | ppbV | | 2.129 |
| unknown alkane | 35 | J | ppbV | | 2.129 |
| unknown alkane | 160 | J | ppbV | | 2.129 |
| unknown alkane | 11 | J | ppbV | | 2.129 |
| unknown alkane | 42 | J | ppbV | | 2.129 |
| unknown alkane | 14 | J | ppbV | | 2.129 |
| unknown alkane | 11 | J | ppbV | | 2.129 |
| unknown alkane | 13 | J | ppbV | | 2.129 |
| unknown alkane | 58 | J | ppbV | | 2.129 |
| unknown alkane | 12 | J | ppbV | | 2.129 |
| unknown alkane | 12 | J | ppbV | | 2.129 |
| unknown alkane | 12 | J | ppbV | | 2.129 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1533080
***Report Date:*** 12/21/15

## *SAMPLE RESULTS*

Lab ID: L1533080-02 D
Client ID: HSF-08
Sample Location: EDISON, NJ
Date Collected: 12/14/15 11:41
Date Received: 12/15/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 102 | | 60-140 |
| Bromochloromethane | 104 | | 60-140 |
| chlorobenzene-d5 | 107 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/17/15 15:34

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG850745-4 | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chloromethane | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Freon-114 | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Vinyl chloride | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| 1,3-Butadiene | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Butane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Bromomethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroethane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Ethanol | ND | 5.0 | -- | ND | 9. | -- | | 1 |
| Vinyl bromide | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Acetone | ND | 1.0 | -- | ND | 2. | -- | | 1 |
| Trichlorofluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Isopropanol | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Methylene chloride | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| 3-Chloropropene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon disulfide | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Freon-113 | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 2-Butanone | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroform | ND | 0.20 | -- | ND | 1. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/17/15 15:34

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG850745-4 | | | | | | | | |
| Tetrahydrofuran | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| n-Hexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Benzene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon tetrachloride | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Cyclohexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Bromodichloromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dioxane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| Trichloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Methyl Methacrylate | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Heptane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Toluene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Dibromochloromethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Tetrachloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chlorobenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Ethylbenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| p/m-Xylene | ND | 0.40 | -- | ND | 2. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1533080
**Report Date:** 12/21/15

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/17/15 15:34

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01-02 Batch: WG850745-4 | | | | | | | | |
| Bromoform | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Styrene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| o-Xylene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 2-Chlorotoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 4-Ethyltoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Hexachlorobutadiene | ND | 0.20 | -- | ND | 2. | -- | | 1 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

No Tentatively Identified Compounds

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| Chlorodifluoromethane | 82 | | - | | 70-130 | - | | |
| Propylene | 97 | | - | | 70-130 | - | | |
| Dichlorodifluoromethane | 67 | | - | | 40-160 | - | | |
| Chloromethane | 97 | | - | | 70-130 | - | | |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 93 | | - | | 70-130 | - | | |
| Methanol | 92 | | - | | 70-130 | - | | |
| Vinyl chloride | 99 | | - | | 70-130 | - | | |
| 1,3-Butadiene | 100 | | - | | 70-130 | - | | |
| Butane | 94 | | - | | 70-130 | - | | |
| Bromomethane | 100 | | - | | 70-130 | - | | |
| Chloroethane | 99 | | - | | 70-130 | - | | |
| Ethyl Alcohol | 102 | | - | | 70-130 | - | | |
| Dichlorofluoromethane | 89 | | - | | 70-130 | - | | |
| Vinyl bromide | 92 | | - | | 70-130 | - | | |
| Acrolein | 100 | | - | | 70-130 | - | | |
| Acetone | 98 | | - | | 40-160 | - | | |
| Acetonitrile | 97 | | - | | 70-130 | - | | |
| Trichlorofluoromethane | 92 | | - | | 70-130 | - | | |
| iso-Propyl Alcohol | 104 | | - | | 70-130 | - | | |
| Acrylonitrile | 97 | | - | | 70-130 | - | | |
| Pentane | 97 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| Ethyl ether | 98 | | - | | 70-130 | - | | |
| 1,1-Dichloroethene | 97 | | - | | 70-130 | - | | |
| tert-Butyl Alcohol | 95 | | - | | 70-130 | - | | |
| Methylene chloride | 100 | | - | | 70-130 | - | | |
| 3-Chloropropene | 110 | | - | | 70-130 | - | | |
| Carbon disulfide | 98 | | - | | 70-130 | - | | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 95 | | - | | 70-130 | - | | |
| trans-1,2-Dichloroethene | 86 | | - | | 70-130 | - | | |
| 1,1-Dichloroethane | 91 | | - | | 70-130 | - | | |
| Methyl tert butyl ether | 94 | | - | | 70-130 | - | | |
| Vinyl acetate | 130 | | - | | 70-130 | - | | |
| 2-Butanone | 100 | | - | | 70-130 | - | | |
| cis-1,2-Dichloroethene | 110 | | - | | 70-130 | - | | |
| Ethyl Acetate | 96 | | - | | 70-130 | - | | |
| Chloroform | 94 | | - | | 70-130 | - | | |
| Tetrahydrofuran | 100 | | - | | 70-130 | - | | |
| 2,2-Dichloropropane | 86 | | - | | 70-130 | - | | |
| 1,2-Dichloroethane | 91 | | - | | 70-130 | - | | |
| n-Hexane | 110 | | - | | 70-130 | - | | |
| Isopropyl Ether | 100 | | - | | 70-130 | - | | |
| Ethyl-Tert-Butyl-Ether | 100 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| 1,1,1-Trichloroethane | 100 | | - | | 70-130 | - | | |
| 1,1-Dichloropropene | 100 | | - | | 70-130 | - | | |
| Benzene | 100 | | - | | 70-130 | - | | |
| Carbon tetrachloride | 100 | | - | | 70-130 | - | | |
| Cyclohexane | 110 | | - | | 70-130 | - | | |
| Tertiary-Amyl Methyl Ether | 100 | | - | | 70-130 | - | | |
| Dibromomethane | 99 | | - | | 70-130 | - | | |
| 1,2-Dichloropropane | 110 | | - | | 70-130 | - | | |
| Bromodichloromethane | 100 | | - | | 70-130 | - | | |
| 1,4-Dioxane | 110 | | - | | 40-160 | - | | |
| Trichloroethene | 100 | | - | | 70-130 | - | | |
| 2,2,4-Trimethylpentane | 110 | | - | | 70-130 | - | | |
| Methyl Methacrylate | 120 | | - | | 70-130 | - | | |
| Heptane | 120 | | - | | 70-130 | - | | |
| cis-1,3-Dichloropropene | 120 | | - | | 70-130 | - | | |
| 4-Methyl-2-pentanone | 120 | | - | | 70-130 | - | | |
| trans-1,3-Dichloropropene | 100 | | - | | 70-130 | - | | |
| 1,1,2-Trichloroethane | 110 | | - | | 70-130 | - | | |
| Toluene | 100 | | - | | 70-130 | - | | |
| 1,3-Dichloropropane | 95 | | - | | 70-130 | - | | |
| 2-Hexanone | 120 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| Dibromochloromethane | 97 | | - | | 70-130 | - | | |
| 1,2-Dibromoethane | 100 | | - | | 70-130 | - | | |
| Butyl Acetate | 96 | | - | | 70-130 | - | | |
| Octane | 96 | | - | | 70-130 | - | | |
| Tetrachloroethene | 94 | | - | | 70-130 | - | | |
| 1,1,1,2-Tetrachloroethane | 89 | | - | | 70-130 | - | | |
| Chlorobenzene | 98 | | - | | 70-130 | - | | |
| Ethylbenzene | 100 | | - | | 70-130 | - | | |
| p/m-Xylene | 100 | | - | | 70-130 | - | | |
| Bromoform | 95 | | - | | 70-130 | - | | |
| Styrene | 100 | | - | | 70-130 | - | | |
| 1,1,2,2-Tetrachloroethane | 110 | | - | | 70-130 | - | | |
| o-Xylene | 110 | | - | | 70-130 | - | | |
| 1,2,3-Trichloropropane | 95 | | - | | 70-130 | - | | |
| Nonane (C9) | 110 | | - | | 70-130 | - | | |
| Isopropylbenzene | 96 | | - | | 70-130 | - | | |
| Bromobenzene | 95 | | - | | 70-130 | - | | |
| o-Chlorotoluene | 93 | | - | | 70-130 | - | | |
| n-Propylbenzene | 94 | | - | | 70-130 | - | | |
| p-Chlorotoluene | 93 | | - | | 70-130 | - | | |
| 4-Ethyltoluene | 98 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1533080

**Report Date:** 12/21/15

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 Batch: WG850745-3 | | | | | | | | |
| 1,3,5-Trimethylbenzene | 100 | | - | | 70-130 | - | | |
| tert-Butylbenzene | 96 | | - | | 70-130 | - | | |
| 1,2,4-Trimethylbenzene | 110 | | - | | 70-130 | - | | |
| Decane (C10) | 100 | | - | | 70-130 | - | | |
| Benzyl chloride | 110 | | - | | 70-130 | - | | |
| 1,3-Dichlorobenzene | 100 | | - | | 70-130 | - | | |
| 1,4-Dichlorobenzene | 100 | | - | | 70-130 | - | | |
| sec-Butylbenzene | 96 | | - | | 70-130 | - | | |
| p-Isopropyltoluene | 90 | | - | | 70-130 | - | | |
| 1,2-Dichlorobenzene | 100 | | - | | 70-130 | - | | |
| n-Butylbenzene | 100 | | - | | 70-130 | - | | |
| 1,2-Dibromo-3-chloropropane | 94 | | - | | 70-130 | - | | |
| Undecane | 110 | | - | | 70-130 | - | | |
| Dodecane (C12) | 120 | | - | | 70-130 | - | | |
| 1,2,4-Trichlorobenzene | 110 | | - | | 40-160 | - | | |
| Naphthalene | 99 | | - | | 40-160 | - | | |
| 1,2,3-Trichlorobenzene | 93 | | - | | 70-130 | - | | |
| Hexachlorobutadiene | 100 | | - | | 40-160 | - | | |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG850745-5 QC Sample: L1533080-01 Client ID: HSF-03 | | | | | | |
| Dichlorodifluoromethane | 0.43 | ND | ppbV | NC | | 25 |
| Chloromethane | ND | ND | ppbV | NC | | 25 |
| Freon-114 | ND | ND | ppbV | NC | | 25 |
| Vinyl chloride | ND | ND | ppbV | NC | | 25 |
| 1,3-Butadiene | ND | ND | ppbV | NC | | 25 |
| Bromomethane | ND | ND | ppbV | NC | | 25 |
| Chloroethane | ND | ND | ppbV | NC | | 25 |
| Ethanol | ND | ND | ppbV | NC | | 25 |
| Vinyl bromide | ND | ND | ppbV | NC | | 25 |
| Acetone | 12 | 12 | ppbV | 0 | | 25 |
| Trichlorofluoromethane | ND | ND | ppbV | NC | | 25 |
| Isopropanol | 1.3 | 1.4 | ppbV | 7 | | 25 |
| 1,1-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| Tertiary butyl Alcohol | 27 | 26 | ppbV | 4 | | 25 |
| Methylene chloride | ND | ND | ppbV | NC | | 25 |
| 3-Chloropropene | ND | ND | ppbV | NC | | 25 |
| Carbon disulfide | ND | ND | ppbV | NC | | 25 |
| Freon-113 | ND | ND | ppbV | NC | | 25 |
| trans-1,2-Dichloroethene | ND | ND | ppbV | NC | | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG850745-5 QC Sample: L1533080-01 Client ID: HSF-03 | | | | | |
| 1,1-Dichloroethane | ND | ND | ppbV | NC | 25 |
| Methyl tert butyl ether | ND | ND | ppbV | NC | 25 |
| 2-Butanone | ND | ND | ppbV | NC | 25 |
| cis-1,2-Dichloroethene | ND | ND | ppbV | NC | 25 |
| Chloroform | 3.0 | 3.0 | ppbV | 0 | 25 |
| Tetrahydrofuran | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloroethane | ND | ND | ppbV | NC | 25 |
| n-Hexane | ND | ND | ppbV | NC | 25 |
| 1,1,1-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Benzene | ND | ND | ppbV | NC | 25 |
| Carbon tetrachloride | ND | ND | ppbV | NC | 25 |
| Cyclohexane | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloropropane | ND | ND | ppbV | NC | 25 |
| Bromodichloromethane | ND | ND | ppbV | NC | 25 |
| 1,4-Dioxane | ND | ND | ppbV | NC | 25 |
| Trichloroethene | 46 | 44 | ppbV | 4 | 25 |
| 2,2,4-Trimethylpentane | ND | ND | ppbV | NC | 25 |
| Methyl Methacrylate | ND | ND | ppbV | NC | 25 |
| Heptane | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG850745-5 QC Sample: L1533080-01 Client ID: HSF-03 | | | | | |
| cis-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 4-Methyl-2-pentanone | ND | ND | ppbV | NC | 25 |
| trans-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Toluene | ND | ND | ppbV | NC | 25 |
| Dibromochloromethane | ND | ND | ppbV | NC | 25 |
| 1,2-Dibromoethane | ND | ND | ppbV | NC | 25 |
| Tetrachloroethene | 0.42 | ND | ppbV | NC | 25 |
| Chlorobenzene | ND | ND | ppbV | NC | 25 |
| Ethylbenzene | ND | ND | ppbV | NC | 25 |
| p/m-Xylene | ND | ND | ppbV | NC | 25 |
| Bromoform | ND | ND | ppbV | NC | 25 |
| Styrene | ND | ND | ppbV | NC | 25 |
| 1,1,2,2-Tetrachloroethane | ND | ND | ppbV | NC | 25 |
| o-Xylene | ND | ND | ppbV | NC | 25 |
| 2-Chlorotoluene | ND | ND | ppbV | NC | 25 |
| 4-Ethyltoluene | ND | ND | ppbV | NC | 25 |
| 1,3,5-Trimethybenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trimethylbenzene | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01-02 QC Batch ID: WG850745-5 QC Sample: L1533080-01 Client ID: HSF-03 | | | | | |
| 1,3-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,4-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trichlorobenzene | ND | ND | ppbV | NC | 25 |
| Hexachlorobutadiene | ND | ND | ppbV | NC | 25 |

**Project Name:** RARITAN ARSENAL

**Lab Number:** L1533080

**Project Number:** TR0479-02B

**Report Date:** 12/21/15

## Canister and Flow Controller Information

| Samplenum | Client ID | Media ID | Media Type | Date Prepared | Bottle Order | Cleaning Batch ID | Can Leak Check | Initial Pressure (in. Hg) | Pressure on Receipt (in. Hg) | Flow Controler Leak Chk | Flow Out mL/min | Flow In mL/min | % RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1533080-01 | HSF-03 | 723 | 1.0L Can | 12/11/15 | 214177 | L1532196-02 | Pass | -29.6 | 0.0 | - | - | - | - |
| L1533080-02 | HSF-08 | 666 | 1.0L Can | 12/11/15 | 214177 | L1532196-02 | Pass | -29.9 | 0.3 | - | - | - | - |
| L1533080-03 | UNUSED CAN #815 | 815 | 1.0L Can | 12/11/15 | 214177 | L1532196-02 | Pass | -30.0 | -29.4 | - | - | - | - |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1532196
**Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02
Client ID: CAN 562 SHELF 16
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 12/08/15 19:03
Analyst: RY

Date Collected: 12/07/15 16:00
Date Received: 12/08/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 5.00 | -- | ND | 9.42 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02 Date Collected: 12/07/15 16:00

Client ID: CAN 562 SHELF 16 Date Received: 12/08/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02 Date Collected: 12/07/15 16:00

Client ID: CAN 562 SHELF 16 Date Received: 12/08/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1532196
**Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02
Client ID: CAN 562 SHELF 16
Sample Location:
Date Collected: 12/07/15 16:00
Date Received: 12/08/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | **Results** | **Qualifier** | **Units** | **RDL** | **Dilution Factor** |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| No Tentatively Identified Compounds | | | | | |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02 Date Collected: 12/07/15 16:00

Client ID: CAN 562 SHELF 16 Date Received: 12/08/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 95 | | 60-140 |
| Bromochloromethane | 95 | | 60-140 |
| chlorobenzene-d5 | 93 | | 60-140 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02
Client ID: CAN 562 SHELF 16
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 12/08/15 19:03
Analyst: RY

Date Collected: 12/07/15 16:00
Date Received: 12/08/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.050 | -- | ND | 0.349 | -- | | 1 |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,3-Butadiene | ND | 0.020 | -- | ND | 0.044 | -- | | 1 |
| Bromomethane | ND | 0.020 | -- | ND | 0.078 | -- | | 1 |
| Chloroethane | ND | 0.020 | -- | ND | 0.053 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.050 | -- | ND | 0.281 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| Freon-113 | ND | 0.050 | -- | ND | 0.383 | -- | | 1 |
| Halothane | ND | 0.050 | -- | ND | 0.404 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Chloroform | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Benzene | ND | 0.100 | -- | ND | 0.319 | -- | | 1 |
| Carbon tetrachloride | ND | 0.020 | -- | ND | 0.126 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1532196
**Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02
Client ID: CAN 562 SHELF 16
Sample Location:
Date Collected: 12/07/15 16:00
Date Received: 12/08/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Bromodichloromethane | ND | 0.020 | -- | ND | 0.134 | -- | | 1 |
| 1,4-Dioxane | ND | 0.100 | -- | ND | 0.360 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Toluene | ND | 0.050 | -- | ND | 0.188 | -- | | 1 |
| Dibromochloromethane | ND | 0.020 | -- | ND | 0.170 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.020 | -- | ND | 0.154 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| Chlorobenzene | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |
| Ethylbenzene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| p/m-Xylene | ND | 0.040 | -- | ND | 0.174 | -- | | 1 |
| Bromoform | ND | 0.020 | -- | ND | 0.207 | -- | | 1 |
| Styrene | ND | 0.020 | -- | ND | 0.085 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| o-Xylene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1532196

**Project Number:** CANISTER QC BAT **Report Date:** 12/21/15

# Air Canister Certification Results

Lab ID: L1532196-02 Date Collected: 12/07/15 16:00

Client ID: CAN 562 SHELF 16 Date Received: 12/08/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Naphthalene | ND | 0.050 | -- | ND | 0.262 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.050 | -- | ND | 0.533 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 98 | | 60-140 |
| bromochloromethane | 98 | | 60-140 |
| chlorobenzene-d5 | 93 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1533080
**Report Date:** 12/21/15

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

**Cooler Information** **Custody Seal**
**Cooler**
N/A Present/Intact

**Container Information**

| Container ID | Container Type | Cooler | pH | Temp deg C | Pres | Seal | Analysis(*) |
|---|---|---|---|---|---|---|---|
| L1533080-01A | Canister - 1 Liter | N/A | N/A | N/A | Y | Absent | NJ-TO15(30) |
| L1533080-02A | Canister - 1 Liter | N/A | N/A | N/A | Y | Absent | NJ-TO15(30) |
| L1533080-03A | Canister - 1 Liter | N/A | N/A | | Y | Absent | CLEAN-FEE() |

*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1533080 |
| **Project Number:** | TR0479-02B | **Report Date:** | 12/21/15 |

## GLOSSARY

### *Acronyms*

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### *Footnotes*

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### *Terms*

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### *Data Qualifiers*

**A** - Spectra identified as "Aldol Condensation Product".

**B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

*Report Format:* Data Usability Report

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1533080 |
| **Project Number:** | TR0479-02B | **Report Date:** | 12/21/15 |

***Data Qualifiers***

**C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**ND** - Not detected at the reporting limit (RL) for the sample.

*Report Format:* Data Usability Report

## REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

**The following analytes are not included in our Primary NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.
**EPA 1010A:** NPW: Ignitability
**EPA 6010C:** NPW: Strontium; SCM: Strontium
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation
**EPA 9038:** NPW: Sulfate
**EPA 9050A:** NPW: Specific Conductance
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate
**EPA 9065:** NPW: Phenols
**EPA 9251:** NPW: Chloride
**SM3500:** NPW: Ferrous Iron
**SM4500**: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
**SM5310C:** DW: Dissolved Organic Carbon

**Mansfield Facility**
**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl
**EPA 2540D:** TSS
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

***Drinking Water***
**EPA 200.8**: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
**EPA 300.0**: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
**EPA 332**: Perchlorate.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

***Non-Potable Water***
**EPA 200.8**: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
**EPA 200.7**: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
**EPA 624**: Volatile Halocarbons & Aromatics,
**EPA 608**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625**: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Alpha Analytical
320 Forbes Blvd
Mansfield, MA 02048-1806
Tel: 508-822-9300
Fax: 508-822-3288

# AIR Chain-of-Custody - NJ

Date Rec'd in Lab: 12/16/15 | ALPHA Job#: L1533080

## Client Contact Information

Company: Geosyntec
Address: 130 Stone Rd West
City/State/Zip: Guelph ON N1G 3Z2
Phone: 519-575-0864
FAX:
Email: PNicholson@geosyntec.com
Site Contact: Matthew Mraw
Site Contact Phone: (609)-462-1108

## Project Information

Project Name: Raritan Arsenal
Project No: TR0479-02B
Site/Location: Edison, NJ
Project Manager: Paul Nicholson

## Analysis Turn-Around Time

Standard (Specify): 2 week
Rush (Specify):

## NJ DEP Information

Bureau: Division: Contract No:

## Report Information - Data Deliverables:

☐ FAX:
☐ ADEx ☐ Criteria Checker:
☑ EMail (standard pdf report)

## Billing Information

☐ Same as Client Info PO #:

1 of 1 COCs

| ALPHA LAB ID (Lab Use Only) | Sample Identification | Sample Date(s) | Time Start (24 hr clock) | Time Stop (24 hr clock) | Canister Pressure in Field (Hg) (Start) | Canister Pressure in Field (Hg) (Stop) | Interior Temp. (F) (Start) | Interior Temp. (F) (Stop) | Outgoing Canister Pressure (Hg) (Note1) | Incoming Canister Pressure (Hg) (Note 2) | Flow Reg. ID | Can ID | Can Size (L) | Flow Controller Readout (ml/min) (Note1) | Batch Cert ID (Note 1) | Analysis: TO-15 | Analysis: EPA 3C | Matrix: Indoor /Ambient Air | Matrix: Soil Gas |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33080.01 | HSF-03 | 12/14/15 | 1110 | 1110 | 29.6 | 0.8 | 55.4 | 55.4 | -29.6 | | — | 723 | 1 | — | L1532196-02 | ✓ | | | ✓ |
| .02 | HSF-08 | 12/14/15 | 1141 | 1141 | 29.9 | 0.8 | 56.1 | 56.1 | -29.9 | | — | 6666 | 1 | — | L1532196-02 | ✓ | | | ✓ |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

mm

Custody Seals:
Outgoing Seal No: (refer to crate seal) VB 036027
Incoming Seal No: (if applicable) 233

Temperature (Fahrenheit)

| | Ambient | Maximum | Minimum |
|---|---|---|---|
| Start | 55.4 | 55.4 | 55.4 |
| Stop | 56.1 | 56.1 | 56.1 |

Pressure (inches of Hg)

| | Ambient | Maximum | Minimum |
|---|---|---|---|
| Start | 29.90 | 29.90 | 29.90 |
| Stop | 29.87 | 29.87 | 29.87 |

Individual Preparing Canister/Containers and Laboratory Canister Certification
Name: Lisa Barrett
Signature:

Footnotes:
(1) Refer to equipment tags for these readings.
(2) Readings provided in data deliverable package.

Special Instructions/QC Requirements & Comments:

| Canisters Shipped by: | Date/Time: | Canisters Received by: | Date/Time: |
|---|---|---|---|
| Samples Relinquished by: | Date/Time: 12/15/15 1355 | Received by: | Date/Time: 12/15/15 1355 |
| Relinquished by: | Date/Time: 12/15/15 23:10 | Received by: Albert Williams | Date/Time: 12-15-15 23:10 |
| Albert Williams | 12-16-15 04:50 | | 12/16/15 04:50 |

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until all ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.



Note: Combined External Chain of Custody and NJDEP Field Test Data Sheet

# ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L1534153 |
| Client: | Geosyntec Consultants, Inc.<br>130 Stone Road West<br>Guelph, ON N1G 3Z2 |
| ATTN: | Paul Nicholson |
| Phone: | (519) 575-0864 |
| Project Name: | RARITAN ARSENAL |
| Project Number: | TR0479-02B |
| Report Date: | 01/06/16 |

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), ME (MA00030), PA (68-02089), VA (460194), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), USFWS (Permit #LE2069641), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1534153
**Report Date:** 01/06/16

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L1534153-01 | 4-SSDS-200 | SOIL_VAPOR | EDISON, NJ | 12/23/15 09:00 | 12/23/15 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1534153
**Report Date:** 01/06/16

**NJ DEP Data of Known Quality Protocols**
**Conformance/Non-Conformance**
**Summary Questionnaire**

| | | |
|---|---|---|
| 1 | For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards? | YES |
| 1a | Were the method specified handling, preservation, and holding time requirements met? | YES |
| 1b | EPH Method: Was the EPH Method conducted without significant modifications (see Section 11.3 of respective DKQ methods)? | N/A |
| 2 | Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)? | YES |
| 3 | Were all samples received at an appropriate temperature (4 ± 2° C)? | N/A |
| 4 | Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved? | YES |
| 5a | Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt? | YES |
| 5b | Were these reporting limits met? | YES |
| 6 | For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP? | YES |
| 7 | Are project-specific matrix spikes and/or laboratory duplicates included in this data set? | NO |

**Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1a or #1b is "No", the data package does not meet the requirements for "Data of Known Quality".**

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1534153
**Report Date:** 01/06/16

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

**Project Name:** RARITAN ARSENAL **Lab Number:** L1534153
**Project Number:** TR0479-02B **Report Date:** 01/06/16

**Case Narrative (continued)**

NJDEP Volatile Organics in Air
Canisters were released from the laboratory on December 22, 2015. The canister certification results are provided as an addendum.

Any Manual integrations that were performed on L1534153 as well as its associated quality control samples and are noted on the individual quantitation reports. A listing of all manual integrations performed and the integration code definitions are provided in manual integration documentation section of the data package.

Please note, dilution analysis due to exceedance of the calibration range is not required for Ethanol or Isopropyl Alcohol.

GC column and trap information utilized for the analysis of this sample delivery group is detailed below:
Column Type: Restek RTX-1
Column Length: 60 Meters
Internal diameter: 0.52 mm
Film thickness: 1.00 um
Trap 1: Entech Cold Trap - no packing material
Trap 2: Entech Tenax - 20 cm packing material

Gaseous calibration standards were utilized for system calibration and quality control standards associated with this sample delivery group. These standards were purchased from Linde (formerly Spectra Gases).

Laboratory standard procedure for QC (i.e. method blanks, LCS) and sample analysis is to withdraw a 250 mL aliquot from the canister as the "1X" analysis. For some calibration levels and samples, subsequent dilutions will be performed as needed by decreasing aliquot volumes via the instrumentation, or performing a dilution using a second canister. Make-up air is not routinely added to canisters prior to sample analysis.

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1534153 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/06/16 |

**Case Narrative (continued)**

Prior to sample analysis, the canister was pressurized with UHP Nitrogen due to canister size. The pressurization resulted in a dilution of the sample. The reporting limits have been elevated accordingly.

The results for Acetone should be considered estimated due to co-elution with a non-target peak.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 01/06/16

# AIR

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1534153
***Report Date:*** 01/06/16

## *SAMPLE RESULTS*

Lab ID: L1534153-01 D
Client ID: 4-SSDS-200
Sample Location: EDISON, NJ
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 12/31/15 18:23
Analyst: RY

Date Collected: 12/23/15 09:00
Date Received: 12/23/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Chloromethane | ND | 0.42 | -- | ND | 0.9 | -- | | 2.085 |
| Freon-114 | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| Vinyl chloride | ND | 0.42 | -- | ND | 1 | -- | | 2.085 |
| 1,3-Butadiene | ND | 0.42 | -- | ND | 0.9 | -- | | 2.085 |
| Bromomethane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Chloroethane | ND | 0.42 | -- | ND | 1 | -- | | 2.085 |
| Ethanol | ND | 10 | -- | ND | 20 | -- | | 2.085 |
| Vinyl bromide | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Acetone | 5.0 | 2.1 | -- | 12 | 5.0 | -- | | 2.085 |
| Trichlorofluoromethane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Isopropanol | 1.3 | 1.0 | -- | 3 | 2 | -- | | 2.085 |
| 1,1-Dichloroethene | 1.8 | 0.42 | -- | 7 | 2 | -- | | 2.085 |
| Tertiary butyl Alcohol | ND | 1.0 | -- | ND | 3 | -- | | 2.085 |
| Methylene chloride | ND | 1.0 | -- | ND | 3 | -- | | 2.085 |
| 3-Chloropropene | ND | 0.42 | -- | ND | 1 | -- | | 2.085 |
| Carbon disulfide | ND | 0.42 | -- | ND | 1 | -- | | 2.085 |
| Freon-113 | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| trans-1,2-Dichloroethene | 2.5 | 0.42 | -- | 10 | 2 | -- | | 2.085 |
| 1,1-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Methyl tert butyl ether | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| 2-Butanone | ND | 1.0 | -- | ND | 3 | -- | | 2.085 |
| cis-1,2-Dichloroethene | 13 | 0.42 | -- | 52 | 1.7 | -- | | 2.085 |
| Chloroform | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1534153
***Report Date:*** 01/06/16

## *SAMPLE RESULTS*

Lab ID: L1534153-01 D
Client ID: 4-SSDS-200
Sample Location: EDISON, NJ
Date Collected: 12/23/15 09:00
Date Received: 12/23/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Tetrahydrofuran | ND | 1.0 | -- | ND | 3 | -- | | 2.085 |
| 1,2-Dichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| n-Hexane | ND | 0.42 | -- | ND | 1 | -- | | 2.085 |
| 1,1,1-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Benzene | ND | 0.42 | -- | ND | 1 | -- | | 2.085 |
| Carbon tetrachloride | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| Cyclohexane | ND | 0.42 | -- | ND | 1 | -- | | 2.085 |
| 1,2-Dichloropropane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Bromodichloromethane | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| 1,4-Dioxane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Trichloroethene | 190 | 0.42 | -- | 1000 | 2.3 | -- | | 2.085 |
| 2,2,4-Trimethylpentane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Methyl Methacrylate | ND | 1.0 | -- | ND | 4 | -- | | 2.085 |
| Heptane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| cis-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| 4-Methyl-2-pentanone | ND | 1.0 | -- | ND | 4 | -- | | 2.085 |
| trans-1,3-Dichloropropene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| 1,1,2-Trichloroethane | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Toluene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Dibromochloromethane | ND | 0.42 | -- | ND | 4 | -- | | 2.085 |
| 1,2-Dibromoethane | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| Tetrachloroethene | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| Chlorobenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| Ethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| p/m-Xylene | ND | 0.83 | -- | ND | 4 | -- | | 2.085 |
| Bromoform | ND | 0.42 | -- | ND | 4 | -- | | 2.085 |
| Styrene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| 1,1,2,2-Tetrachloroethane | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1534153
**Report Date:** 01/06/16

## SAMPLE RESULTS

Lab ID: L1534153-01 D
Client ID: 4-SSDS-200
Sample Location: EDISON, NJ
Date Collected: 12/23/15 09:00
Date Received: 12/23/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| o-Xylene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| 2-Chlorotoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| 4-Ethyltoluene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| 1,3,5-Trimethybenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| 1,2,4-Trimethylbenzene | ND | 0.42 | -- | ND | 2 | -- | | 2.085 |
| 1,3-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| 1,4-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| 1,2-Dichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| 1,2,4-Trichlorobenzene | ND | 0.42 | -- | ND | 3 | -- | | 2.085 |
| Hexachlorobutadiene | ND | 0.42 | -- | ND | 4 | -- | | 2.085 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| Pentane, 2,4-dimethyl- | 8.1 | NJ | ppbV | | 2.085 |
| Butane, 2,2-dimethyl- | 37 | NJ | ppbV | | 2.085 |
| Butane, 2,2,3-trimethyl- | 8.4 | NJ | ppbV | | 2.085 |
| unknown alkane | 5.2 | J | ppbV | | 2.085 |
| unknown alkane | 10 | J | ppbV | | 2.085 |
| Pentane, 2-methyl- | 64 | NJ | ppbV | | 2.085 |
| Pentane, 3,3-dimethyl- | 16 | NJ | ppbV | | 2.085 |
| unknown alkane | 5.9 | J | ppbV | | 2.085 |
| Butane, 2,3-Dimethyl- | 49 | NJ | ppbV | | 2.085 |
| Pentane, 2,2-dimethyl- | 3.8 | NJ | ppbV | | 2.085 |
| Unknown | 42 | J | ppbV | | 2.085 |
| unknown alkane | 26 | J | ppbV | | 2.085 |
| Pentane, 2,3-dimethyl- | 8.6 | NJ | ppbV | | 2.085 |
| Unknown | 5.8 | J | ppbV | | 2.085 |
| unknown alkane | 4.8 | J | ppbV | | 2.085 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1534153
***Report Date:*** 01/06/16

## *SAMPLE RESULTS*

Lab ID: L1534153-01 D
Client ID: 4-SSDS-200
Sample Location: EDISON, NJ
Date Collected: 12/23/15 09:00
Date Received: 12/23/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 103 | | 60-140 |
| Bromochloromethane | 97 | | 60-140 |
| chlorobenzene-d5 | 96 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1534153
**Report Date:** 01/06/16

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/31/15 14:13

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG854315-4 | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chloromethane | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Freon-114 | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Vinyl chloride | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| 1,3-Butadiene | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Butane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Bromomethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroethane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Ethanol | ND | 5.0 | -- | ND | 9. | -- | | 1 |
| Vinyl bromide | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Acetone | ND | 1.0 | -- | ND | 2. | -- | | 1 |
| Trichlorofluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Isopropanol | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Methylene chloride | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| 3-Chloropropene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon disulfide | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Freon-113 | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 2-Butanone | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroform | ND | 0.20 | -- | ND | 1. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1534153
**Report Date:** 01/06/16

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/31/15 14:13

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG854315-4 | | | | | | | | |
| Tetrahydrofuran | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| n-Hexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Benzene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon tetrachloride | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Cyclohexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Bromodichloromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dioxane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| Trichloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Methyl Methacrylate | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Heptane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Toluene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Dibromochloromethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Tetrachloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chlorobenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Ethylbenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| p/m-Xylene | ND | 0.40 | -- | ND | 2. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1534153
**Report Date:** 01/06/16

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 12/31/15 14:13

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG854315-4 | | | | | | | | |
| Bromoform | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Styrene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| o-Xylene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 2-Chlorotoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 4-Ethyltoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Hexachlorobutadiene | ND | 0.20 | -- | ND | 2. | -- | | 1 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

No Tentatively Identified Compounds

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1534153
**Report Date:** 01/06/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG854315-3 | | | | | | | | |
| Chlorodifluoromethane | 82 | | - | | 70-130 | - | | |
| Propylene | 83 | | - | | 70-130 | - | | |
| Dichlorodifluoromethane | 90 | | - | | 40-160 | - | | |
| Chloromethane | 84 | | - | | 70-130 | - | | |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 100 | | - | | 70-130 | - | | |
| Methanol | 80 | | - | | 70-130 | - | | |
| Vinyl chloride | 80 | | - | | 70-130 | - | | |
| 1,3-Butadiene | 92 | | - | | 70-130 | - | | |
| Butane | 84 | | - | | 70-130 | - | | |
| Bromomethane | 80 | | - | | 70-130 | - | | |
| Chloroethane | 80 | | - | | 70-130 | - | | |
| Ethyl Alcohol | 72 | | - | | 70-130 | - | | |
| Dichlorofluoromethane | 78 | | - | | 70-130 | - | | |
| Vinyl bromide | 82 | | - | | 70-130 | - | | |
| Acrolein | 83 | | - | | 70-130 | - | | |
| Acetone | 98 | | - | | 40-160 | - | | |
| Acetonitrile | 90 | | - | | 70-130 | - | | |
| Trichlorofluoromethane | 93 | | - | | 70-130 | - | | |
| iso-Propyl Alcohol | 92 | | - | | 70-130 | - | | |
| Acrylonitrile | 88 | | - | | 70-130 | - | | |
| Pentane | 91 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1534153

**Report Date:** 01/06/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG854315-3 | | | | | | | | |
| Ethyl ether | 94 | | - | | 70-130 | - | | |
| 1,1-Dichloroethene | 91 | | - | | 70-130 | - | | |
| tert-Butyl Alcohol | 79 | | - | | 70-130 | - | | |
| Methylene chloride | 98 | | - | | 70-130 | - | | |
| 3-Chloropropene | 100 | | - | | 70-130 | - | | |
| Carbon disulfide | 83 | | - | | 70-130 | - | | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 86 | | - | | 70-130 | - | | |
| trans-1,2-Dichloroethene | 82 | | - | | 70-130 | - | | |
| 1,1-Dichloroethane | 90 | | - | | 70-130 | - | | |
| Methyl tert butyl ether | 86 | | - | | 70-130 | - | | |
| Vinyl acetate | 92 | | - | | 70-130 | - | | |
| 2-Butanone | 100 | | - | | 70-130 | - | | |
| cis-1,2-Dichloroethene | 100 | | - | | 70-130 | - | | |
| Ethyl Acetate | 88 | | - | | 70-130 | - | | |
| Chloroform | 84 | | - | | 70-130 | - | | |
| Tetrahydrofuran | 93 | | - | | 70-130 | - | | |
| 2,2-Dichloropropane | 77 | | - | | 70-130 | - | | |
| 1,2-Dichloroethane | 88 | | - | | 70-130 | - | | |
| n-Hexane | 100 | | - | | 70-130 | - | | |
| Isopropyl Ether | 94 | | - | | 70-130 | - | | |
| Ethyl-Tert-Butyl-Ether | 94 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1534153

**Report Date:** 01/06/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG854315-3 | | | | | | | | |
| 1,1,1-Trichloroethane | 120 | | - | | 70-130 | - | | |
| 1,1-Dichloropropene | 98 | | - | | 70-130 | - | | |
| Benzene | 93 | | - | | 70-130 | - | | |
| Carbon tetrachloride | 110 | | - | | 70-130 | - | | |
| Cyclohexane | 100 | | - | | 70-130 | - | | |
| Tertiary-Amyl Methyl Ether | 88 | | - | | 70-130 | - | | |
| Dibromomethane | 93 | | - | | 70-130 | - | | |
| 1,2-Dichloropropane | 100 | | - | | 70-130 | - | | |
| Bromodichloromethane | 110 | | - | | 70-130 | - | | |
| 1,4-Dioxane | 91 | | - | | 40-160 | - | | |
| Trichloroethene | 100 | | - | | 70-130 | - | | |
| 2,2,4-Trimethylpentane | 100 | | - | | 70-130 | - | | |
| Methyl Methacrylate | 100 | | - | | 70-130 | - | | |
| Heptane | 110 | | - | | 70-130 | - | | |
| cis-1,3-Dichloropropene | 110 | | - | | 70-130 | - | | |
| 4-Methyl-2-pentanone | 110 | | - | | 70-130 | - | | |
| trans-1,3-Dichloropropene | 92 | | - | | 70-130 | - | | |
| 1,1,2-Trichloroethane | 100 | | - | | 70-130 | - | | |
| Toluene | 88 | | - | | 70-130 | - | | |
| 1,3-Dichloropropane | 83 | | - | | 70-130 | - | | |
| 2-Hexanone | 110 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1534153

**Report Date:** 01/06/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG854315-3 | | | | | | | | |
| Dibromochloromethane | 100 | | - | | 70-130 | - | | |
| 1,2-Dibromoethane | 94 | | - | | 70-130 | - | | |
| Butyl Acetate | 86 | | - | | 70-130 | - | | |
| Octane | 82 | | - | | 70-130 | - | | |
| Tetrachloroethene | 88 | | - | | 70-130 | - | | |
| 1,1,1,2-Tetrachloroethane | 91 | | - | | 70-130 | - | | |
| Chlorobenzene | 91 | | - | | 70-130 | - | | |
| Ethylbenzene | 92 | | - | | 70-130 | - | | |
| p/m-Xylene | 90 | | - | | 70-130 | - | | |
| Bromoform | 99 | | - | | 70-130 | - | | |
| Styrene | 91 | | - | | 70-130 | - | | |
| 1,1,2,2-Tetrachloroethane | 94 | | - | | 70-130 | - | | |
| o-Xylene | 95 | | - | | 70-130 | - | | |
| 1,2,3-Trichloropropane | 85 | | - | | 70-130 | - | | |
| Nonane (C9) | 100 | | - | | 70-130 | - | | |
| Isopropylbenzene | 84 | | - | | 70-130 | - | | |
| Bromobenzene | 83 | | - | | 70-130 | - | | |
| o-Chlorotoluene | 81 | | - | | 70-130 | - | | |
| n-Propylbenzene | 84 | | - | | 70-130 | - | | |
| p-Chlorotoluene | 84 | | - | | 70-130 | - | | |
| 4-Ethyltoluene | 85 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1534153

**Report Date:** 01/06/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG854315-3 | | | | | | | | |
| 1,3,5-Trimethylbenzene | 90 | | - | | 70-130 | - | | |
| tert-Butylbenzene | 85 | | - | | 70-130 | - | | |
| 1,2,4-Trimethylbenzene | 94 | | - | | 70-130 | - | | |
| Decane (C10) | 90 | | - | | 70-130 | - | | |
| Benzyl chloride | 100 | | - | | 70-130 | - | | |
| 1,3-Dichlorobenzene | 89 | | - | | 70-130 | - | | |
| 1,4-Dichlorobenzene | 89 | | - | | 70-130 | - | | |
| sec-Butylbenzene | 85 | | - | | 70-130 | - | | |
| p-Isopropyltoluene | 79 | | - | | 70-130 | - | | |
| 1,2-Dichlorobenzene | 92 | | - | | 70-130 | - | | |
| n-Butylbenzene | 97 | | - | | 70-130 | - | | |
| 1,2-Dibromo-3-chloropropane | 100 | | - | | 70-130 | - | | |
| Undecane | 100 | | - | | 70-130 | - | | |
| Dodecane (C12) | 93 | | - | | 70-130 | - | | |
| 1,2,4-Trichlorobenzene | 92 | | - | | 40-160 | - | | |
| Naphthalene | 87 | | - | | 40-160 | - | | |
| 1,2,3-Trichlorobenzene | 80 | | - | | 70-130 | - | | |
| Hexachlorobutadiene | 87 | | - | | 40-160 | - | | |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1534153
**Report Date:** 01/06/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG854315-5 QC Sample: L1534153-01 Client ID: 4-SSDS-200 | | | | | | |
| Dichlorodifluoromethane | ND | ND | ppbV | NC | | 25 |
| Chloromethane | ND | ND | ppbV | NC | | 25 |
| Freon-114 | ND | ND | ppbV | NC | | 25 |
| Vinyl chloride | ND | ND | ppbV | NC | | 25 |
| 1,3-Butadiene | ND | ND | ppbV | NC | | 25 |
| Bromomethane | ND | ND | ppbV | NC | | 25 |
| Chloroethane | ND | ND | ppbV | NC | | 25 |
| Ethanol | ND | ND | ppbV | NC | | 25 |
| Vinyl bromide | ND | ND | ppbV | NC | | 25 |
| Acetone | 5.0 | 4.4 | ppbV | 13 | | 25 |
| Trichlorofluoromethane | ND | ND | ppbV | NC | | 25 |
| Isopropanol | 1.3 | 1.3 | ppbV | 0 | | 25 |
| 1,1-Dichloroethene | 1.8 | 1.8 | ppbV | 0 | | 25 |
| Tertiary butyl Alcohol | ND | ND | ppbV | NC | | 25 |
| Methylene chloride | ND | ND | ppbV | NC | | 25 |
| 3-Chloropropene | ND | ND | ppbV | NC | | 25 |
| Carbon disulfide | ND | ND | ppbV | NC | | 25 |
| Freon-113 | ND | ND | ppbV | NC | | 25 |
| trans-1,2-Dichloroethene | 2.5 | 2.5 | ppbV | 0 | | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1534153
**Report Date:** 01/06/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG854315-5 QC Sample: L1534153-01 Client ID: 4-SSDS-200 | | | | | |
| 1,1-Dichloroethane | ND | ND | ppbV | NC | 25 |
| Methyl tert butyl ether | ND | ND | ppbV | NC | 25 |
| 2-Butanone | ND | ND | ppbV | NC | 25 |
| cis-1,2-Dichloroethene | 13 | 13 | ppbV | 0 | 25 |
| Chloroform | ND | ND | ppbV | NC | 25 |
| Tetrahydrofuran | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloroethane | ND | ND | ppbV | NC | 25 |
| n-Hexane | ND | ND | ppbV | NC | 25 |
| 1,1,1-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Benzene | ND | ND | ppbV | NC | 25 |
| Carbon tetrachloride | ND | ND | ppbV | NC | 25 |
| Cyclohexane | ND | 0.46 | ppbV | NC | 25 |
| 1,2-Dichloropropane | ND | ND | ppbV | NC | 25 |
| Bromodichloromethane | ND | ND | ppbV | NC | 25 |
| 1,4-Dioxane | ND | ND | ppbV | NC | 25 |
| Trichloroethene | 190 | 190 | ppbV | 0 | 25 |
| 2,2,4-Trimethylpentane | ND | ND | ppbV | NC | 25 |
| Methyl Methacrylate | ND | ND | ppbV | NC | 25 |
| Heptane | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1534153
**Report Date:** 01/06/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG854315-5 QC Sample: L1534153-01 Client ID: 4-SSDS-200 | | | | | |
| cis-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 4-Methyl-2-pentanone | ND | ND | ppbV | NC | 25 |
| trans-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Toluene | ND | ND | ppbV | NC | 25 |
| Dibromochloromethane | ND | ND | ppbV | NC | 25 |
| 1,2-Dibromoethane | ND | ND | ppbV | NC | 25 |
| Tetrachloroethene | ND | ND | ppbV | NC | 25 |
| Chlorobenzene | ND | ND | ppbV | NC | 25 |
| Ethylbenzene | ND | ND | ppbV | NC | 25 |
| p/m-Xylene | ND | ND | ppbV | NC | 25 |
| Bromoform | ND | ND | ppbV | NC | 25 |
| Styrene | ND | ND | ppbV | NC | 25 |
| 1,1,2,2-Tetrachloroethane | ND | ND | ppbV | NC | 25 |
| o-Xylene | ND | ND | ppbV | NC | 25 |
| 2-Chlorotoluene | ND | ND | ppbV | NC | 25 |
| 4-Ethyltoluene | ND | ND | ppbV | NC | 25 |
| 1,3,5-Trimethybenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trimethylbenzene | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1534153
**Report Date:** 01/06/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG854315-5 QC Sample: L1534153-01 Client ID: 4-SSDS-200 | | | | | |
| 1,3-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,4-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trichlorobenzene | ND | ND | ppbV | NC | 25 |
| Hexachlorobutadiene | ND | ND | ppbV | NC | 25 |

**Project Name:** RARITAN ARSENAL

**Lab Number:** L1534153

**Project Number:** TR0479-02B

**Report Date:** 01/06/16

## Canister and Flow Controller Information

| Samplenum | Client ID | Media ID | Media Type | Date Prepared | Bottle Order | Cleaning Batch ID | Can Leak Check | Initial Pressure (in. Hg) | Pressure on Receipt (in. Hg) | Flow Controler Leak Chk | Flow Out mL/min | Flow In mL/min | % RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1534153-01 | 4-SSDS-200 | 813 | 1.0L Can | 12/22/15 | 214707 | L1533196-01 | Pass | -29.5 | 0.8 | - | - | - | - |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1533196
**Report Date:** 01/06/16

# Air Canister Certification Results

Lab ID: L1533196-01
Client ID: CAN 1946 SHELF 8
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 12/16/15 10:59
Analyst: AR

Date Collected: 12/15/15 16:00
Date Received: 12/16/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 5.00 | -- | ND | 9.42 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1533196
**Report Date:** 01/06/16

# Air Canister Certification Results

Lab ID: L1533196-01
Client ID: CAN 1946 SHELF 8
Sample Location:
Date Collected: 12/15/15 16:00
Date Received: 12/16/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1533196
**Report Date:** 01/06/16

# Air Canister Certification Results

Lab ID: L1533196-01
Client ID: CAN 1946 SHELF 8
Sample Location:
Date Collected: 12/15/15 16:00
Date Received: 12/16/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1533196

**Project Number:** CANISTER QC BAT **Report Date:** 01/06/16

# Air Canister Certification Results

Lab ID: L1533196-01 Date Collected: 12/15/15 16:00

Client ID: CAN 1946 SHELF 8 Date Received: 12/16/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | **Results** | **Qualifier** | **Units** | **RDL** | **Dilution Factor** |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| No Tentatively Identified Compounds | | | | | |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1533196
**Report Date:** 01/06/16

# Air Canister Certification Results

Lab ID: L1533196-01
Client ID: CAN 1946 SHELF 8
Sample Location:
Date Collected: 12/15/15 16:00
Date Received: 12/16/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 99 | | 60-140 |
| Bromochloromethane | 98 | | 60-140 |
| chlorobenzene-d5 | 99 | | 60-140 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1533196
**Report Date:** 01/06/16

# Air Canister Certification Results

Lab ID: L1533196-01
Client ID: CAN 1946 SHELF 8
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 12/16/15 10:59
Analyst: AR

Date Collected: 12/15/15 16:00
Date Received: 12/16/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.050 | -- | ND | 0.349 | -- | | 1 |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,3-Butadiene | ND | 0.020 | -- | ND | 0.044 | -- | | 1 |
| Bromomethane | ND | 0.020 | -- | ND | 0.078 | -- | | 1 |
| Chloroethane | ND | 0.020 | -- | ND | 0.053 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.050 | -- | ND | 0.281 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| Freon-113 | ND | 0.050 | -- | ND | 0.383 | -- | | 1 |
| Halothane | ND | 0.050 | -- | ND | 0.404 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Chloroform | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Benzene | ND | 0.100 | -- | ND | 0.319 | -- | | 1 |
| Carbon tetrachloride | ND | 0.020 | -- | ND | 0.126 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT

**Lab Number:** L1533196
**Report Date:** 01/06/16

# Air Canister Certification Results

Lab ID: L1533196-01
Client ID: CAN 1946 SHELF 8
Sample Location:

Date Collected: 12/15/15 16:00
Date Received: 12/16/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Bromodichloromethane | ND | 0.020 | -- | ND | 0.134 | -- | | 1 |
| 1,4-Dioxane | ND | 0.100 | -- | ND | 0.360 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Toluene | ND | 0.050 | -- | ND | 0.188 | -- | | 1 |
| Dibromochloromethane | ND | 0.020 | -- | ND | 0.170 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.020 | -- | ND | 0.154 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| Chlorobenzene | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |
| Ethylbenzene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| p/m-Xylene | ND | 0.040 | -- | ND | 0.174 | -- | | 1 |
| Bromoform | ND | 0.020 | -- | ND | 0.207 | -- | | 1 |
| Styrene | ND | 0.020 | -- | ND | 0.085 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| o-Xylene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT

**Lab Number:** L1533196
**Report Date:** 01/06/16

# Air Canister Certification Results

Lab ID: L1533196-01
Client ID: CAN 1946 SHELF 8
Sample Location:

Date Collected: 12/15/15 16:00
Date Received: 12/16/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Naphthalene | ND | 0.050 | -- | ND | 0.262 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.050 | -- | ND | 0.533 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 98 | | 60-140 |
| bromochloromethane | 113 | | 60-140 |
| chlorobenzene-d5 | 99 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1534153
**Report Date:** 01/06/16

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

**Cooler Information** **Custody Seal**

**Cooler**
N/A Absent

**Container Information**

| Container ID | Container Type | Cooler | pH | Temp deg C | Pres | Seal | Analysis(*) |
|---|---|---|---|---|---|---|---|
| L1534153-01A | Canister - 1 Liter | N/A | N/A | N/A | Y | Absent | NJ-TO15(30) |

*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1534153 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/06/16 |

## GLOSSARY

### *Acronyms*

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### *Footnotes*

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### *Terms*

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### *Data Qualifiers*

**A** - Spectra identified as "Aldol Condensation Product".

**B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

*Report Format:* Data Usability Report

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1534153 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/06/16 |

***Data Qualifiers***

**C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**ND** - Not detected at the reporting limit (RL) for the sample.

*Report Format:* Data Usability Report

## REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

**The following analytes are not included in our Primary NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.
**EPA 1010A:** NPW: Ignitability
**EPA 6010C:** NPW: Strontium; SCM: Strontium
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation
**EPA 9038:** NPW: Sulfate
**EPA 9050A:** NPW: Specific Conductance
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate
**EPA 9065:** NPW: Phenols
**EPA 9251:** NPW: Chloride
**SM3500:** NPW: Ferrous Iron
**SM4500**: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
**SM5310C:** DW: Dissolved Organic Carbon

**Mansfield Facility**
**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl
**EPA 2540D:** TSS
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

***Drinking Water***
**EPA 200.8**: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
**EPA 300.0**: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
**EPA 332**: Perchlorate.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

***Non-Potable Water***
**EPA 200.8**: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
**EPA 200.7**: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
**EPA 624**: Volatile Halocarbons & Aromatics,
**EPA 608**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625**: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Alpha Analytical
320 Forbes Blvd
Mansfield, MA 02048-1806
Tel: 508-822-9300
Fax: 508-822-3288

# AIR Chain-of-Custody - NJ

Date Rec'd in Lab 12/24/15 | ALPHA Job# L1534153

1 of 1 COCs

## Client Contact Information

Company: Geosyntec
Address: 130 Stone Rd West
City/State/Zip Guelph ON N1G3Z2
Phone: 519-515-0864
FAX: —
Email: PNicholson@geosyntec.com
Site Contact: Matthew Mcaw
Site Contact Phone: 609-462-1198

## Project Information

Project Name: Raritan Arsenal
Project No: TR0479-02B
Site/Location: Edison, NJ
Project Manager: Paul Nicholson

## Analysis Turn-Around Time

Standard (Specify) 2-week
Rush (Specify)

## NJ DEP Information

Bureau: Division: Contract No:

## Report Information - Data Deliverables:

☐ FAX:
☐ ADEx ☒ Criteria Checker: Enviro Data
☑ EMail (standard pdf report)

## Billing Information

☐ Same as Client Info PO #:

| ALPHA LAB ID (Lab Use Only) | Sample Identification | Sample Date(s) | Time Start (24 hr clock) | Time Stop (24 hr clock) | Canister Pressure in Field (Hg) (Start) | Canister Pressure in Field ~~(Hg)~~ H2O (Stop) | Interior Temp. (F) (Start) | Interior Temp. (F) (Stop) | Outgoing Canister Pressure (Hg) (Note1) | Incoming Canister Pressure (Hg) (Note 2) | Flow Reg. ID | Can ID | Can Size (L) | Flow Controller Readout (ml/min) (Note1) | Batch Cert ID (Note 1) | Analysis: TO-15 | Analysis: EPA 3C | Matrix: Indoor/Ambient Air | Matrix: Soil Gas |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -01 | 4-SSDS-200 | 12/23/15 | 0900 | 0900 | -29.5 | -3.7 | 58 | 58 | -29.5 | | — | 813 | 1 | — | L1532496-01 | X | | | X |
| | | | | | | | | | | | mm | 12/23/15 | | | | | | | |

| Custody Seals: | Temperature (Fahrenheit) | Ambient | Maximum | Minimum |
|---|---|---|---|---|
| Outgoing Seal No: (refer to crate seal) | Start | 58 | 58 | 58 |
| Incoming Seal No: (if applicable) | Stop | 58 | 58 | 58 |

Individual Preparing Canister/Containers and Laboratory Canister Certification
Name: Paul Walukevich
Signature: Paul O. Walukevich

| | Pressure (inches of Hg) | Ambient | Maximum | Minimum |
|---|---|---|---|---|
| | Start | 30.19 | 30.19 | 30.19 |
| | Stop | 30.19 | 30.19 | 30.19 |

Footnotes:
(1) Refer to equipment tags for these readings.
(2) Readings provided in data deliverable package.

Special Instructions/QC Requirements & Comments:

| Canisters Shipped by: | Date/Time: | Canisters Received by: | Date/Time: |
|---|---|---|---|
| Samples Relinquished by: Matt M | Date/Time: 12/23/15 1707 | Received by: AAL | Date/Time: 12/23/15 17:07 |
| Relinquished by: | Date/Time: 12/23/15 2245 | Received by: Al Williams | Date/Time: 12-23-15 2245 |
| Al Williams | 12-24-15 0415 | | 12/24/15 4:15 |

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until all ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.



Note: Combined External Chain of Custody and NJDEP Field Test Data Sheet

# ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L1600329 |
| Client: | Geosyntec Consultants, Inc.<br>130 Stone Road West<br>Guelph, ON N1G 3Z2 |
| ATTN: | Paul Nicholson |
| Phone: | (519) 575-0864 |
| Project Name: | RARITAN ARSENAL |
| Project Number: | TR0479-02B |
| Report Date: | 01/08/16 |

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320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L1600329-01 | 8-SSDS-200 | SOIL_VAPOR | EDISON, NJ | 01/06/16 08:55 | 01/06/16 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

**NJ DEP Data of Known Quality Protocols**
**Conformance/Non-Conformance**
**Summary Questionnaire**

| | | |
|---|---|---|
| 1 | For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards? | YES |
| 1a | Were the method specified handling, preservation, and holding time requirements met? | YES |
| 1b | EPH Method: Was the EPH Method conducted without significant modifications (see Section 11.3 of respective DKQ methods)? | N/A |
| 2 | Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)? | YES |
| 3 | Were all samples received at an appropriate temperature (4 ± 2° C)? | N/A |
| 4 | Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved? | YES |
| 5a | Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt? | YES |
| 5b | Were these reporting limits met? | YES |
| 6 | For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP? | YES |
| 7 | Are project-specific matrix spikes and/or laboratory duplicates included in this data set? | NO |

**Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1a or #1b is "No", the data package does not meet the requirements for "Data of Known Quality".**

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1600329
**Report Date:** 01/08/16

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1600329 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/08/16 |

**Case Narrative (continued)**

NJDEP Volatile Organics in Air

Canisters were released from the laboratory on January 5, 2016. The canister certification results are provided as an addendum.

Any Manual integrations that were performed on L1600329 as well as its associated quality control samples and are noted on the individual quantitation reports. A listing of all manual integrations performed and the integration code definitions are provided in manual integration documentation section of the data package.

Please note, dilution analysis due to exceedance of the calibration range is not required for Ethanol or Isopropyl Alcohol.

GC column and trap information utilized for the analysis of this sample delivery group is detailed below:
Column Type: Restek RTX-1
Column Length: 60 Meters
Internal diameter: 0.52 mm
Film thickness: 1.00 um
Trap 1: Entech Cold Trap - no packing material
Trap 2: Entech Tenax - 20 cm packing material

Gaseous calibration standards were utilized for system calibration and quality control standards associated with this sample delivery group. These standards were purchased from Linde (formerly Spectra Gases).

Laboratory standard procedure for QC (i.e. method blanks, LCS) and sample analysis is to withdraw a 250 mL aliquot from the canister as the "1X" analysis. For some calibration levels and samples, subsequent dilutions will be performed as needed by decreasing aliquot volumes via the instrumentation, or performing a dilution using a second canister. Make-up air is not routinely added to canisters prior to sample analysis.

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1600329
**Report Date:** 01/08/16

**Case Narrative (continued)**

Sample L1600329-01 results for Acetone should be considered estimated due to co-elution with a non-target peak.

Sample L1600329-01 The presence of 2,2,4-Trimethylpentane could not be determined in this sample due to a non-target compound interfering with the identification and quantification of this compound.

Sample L1600329-01: Prior to sample analysis, the canister was pressurized with UHP Nitrogen due to canister size. The pressurization resulted in a dilution of the sample. The reporting limits have been elevated accordingly.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 01/08/16

# AIR

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1600329
**Report Date:** 01/08/16

## SAMPLE RESULTS

Lab ID: L1600329-01 D
Client ID: 8-SSDS-200
Sample Location: EDISON, NJ
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 01/07/16 17:40
Analyst: MB

Date Collected: 01/06/16 08:55
Date Received: 01/06/16
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Chloromethane | ND | 0.41 | -- | ND | 0.8 | -- | | 2.07 |
| Freon-114 | ND | 0.41 | -- | ND | 3 | -- | | 2.07 |
| Vinyl chloride | ND | 0.41 | -- | ND | 1 | -- | | 2.07 |
| 1,3-Butadiene | ND | 0.41 | -- | ND | 0.9 | -- | | 2.07 |
| Bromomethane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Chloroethane | ND | 0.41 | -- | ND | 1 | -- | | 2.07 |
| Ethanol | ND | 10 | -- | ND | 20 | -- | | 2.07 |
| Vinyl bromide | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Acetone | 8.2 | 2.1 | -- | 19 | 5.0 | -- | | 2.07 |
| Trichlorofluoromethane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Isopropanol | 1.3 | 1.0 | -- | 3 | 2 | -- | | 2.07 |
| 1,1-Dichloroethene | 1.4 | 0.41 | -- | 6 | 2 | -- | | 2.07 |
| Tertiary butyl Alcohol | ND | 1.0 | -- | ND | 3 | -- | | 2.07 |
| Methylene chloride | ND | 1.0 | -- | ND | 3 | -- | | 2.07 |
| 3-Chloropropene | ND | 0.41 | -- | ND | 1 | -- | | 2.07 |
| Carbon disulfide | ND | 0.41 | -- | ND | 1 | -- | | 2.07 |
| Freon-113 | ND | 0.41 | -- | ND | 3 | -- | | 2.07 |
| trans-1,2-Dichloroethene | 1.9 | 0.41 | -- | 8 | 2 | -- | | 2.07 |
| 1,1-Dichloroethane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Methyl tert butyl ether | ND | 0.41 | -- | ND | 1 | -- | | 2.07 |
| 2-Butanone | 1.1 | 1.0 | -- | 3 | 3 | -- | | 2.07 |
| cis-1,2-Dichloroethene | 9.9 | 0.41 | -- | 39 | 1.6 | -- | | 2.07 |
| Chloroform | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1600329
***Report Date:*** 01/08/16

## *SAMPLE RESULTS*

Lab ID: L1600329-01 D
Client ID: 8-SSDS-200
Sample Location: EDISON, NJ
Date Collected: 01/06/16 08:55
Date Received: 01/06/16
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Tetrahydrofuran | ND | 1.0 | -- | ND | 3 | -- | | 2.07 |
| 1,2-Dichloroethane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| n-Hexane | ND | 0.41 | -- | ND | 1 | -- | | 2.07 |
| 1,1,1-Trichloroethane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Benzene | ND | 0.41 | -- | ND | 1 | -- | | 2.07 |
| Carbon tetrachloride | ND | 0.41 | -- | ND | 3 | -- | | 2.07 |
| Cyclohexane | 1.1 | 0.41 | -- | 4 | 1 | -- | | 2.07 |
| 1,2-Dichloropropane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Bromodichloromethane | ND | 0.41 | -- | ND | 3 | -- | | 2.07 |
| 1,4-Dioxane | ND | 0.41 | -- | ND | 1 | -- | | 2.07 |
| Trichloroethene | 170 | 0.41 | -- | 910 | 2.2 | -- | | 2.07 |
| 2,2,4-Trimethylpentane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Methyl Methacrylate | ND | 1.0 | -- | ND | 4 | -- | | 2.07 |
| Heptane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| cis-1,3-Dichloropropene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 4-Methyl-2-pentanone | ND | 1.0 | -- | ND | 4 | -- | | 2.07 |
| trans-1,3-Dichloropropene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 1,1,2-Trichloroethane | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Toluene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Dibromochloromethane | ND | 0.41 | -- | ND | 3 | -- | | 2.07 |
| 1,2-Dibromoethane | ND | 0.41 | -- | ND | 3 | -- | | 2.07 |
| Tetrachloroethene | ND | 0.41 | -- | ND | 3 | -- | | 2.07 |
| Chlorobenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| Ethylbenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| p/m-Xylene | ND | 0.83 | -- | ND | 4 | -- | | 2.07 |
| Bromoform | ND | 0.41 | -- | ND | 4 | -- | | 2.07 |
| Styrene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 1,1,2,2-Tetrachloroethane | ND | 0.41 | -- | ND | 3 | -- | | 2.07 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1600329
**Report Date:** 01/08/16

## SAMPLE RESULTS

Lab ID: L1600329-01 D
Client ID: 8-SSDS-200
Sample Location: EDISON, NJ
Date Collected: 01/06/16 08:55
Date Received: 01/06/16
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| o-Xylene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 2-Chlorotoluene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 4-Ethyltoluene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 1,3,5-Trimethybenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 1,2,4-Trimethylbenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 1,3-Dichlorobenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 1,4-Dichlorobenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 1,2-Dichlorobenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.07 |
| 1,2,4-Trichlorobenzene | ND | 0.41 | -- | ND | 3 | -- | | 2.07 |
| Hexachlorobutadiene | ND | 0.41 | -- | ND | 4 | -- | | 2.07 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| unknown alkane | 47 | J | ppbV | | 2.07 |
| Butane, 2,3-Dimethyl- | 130 | NJ | ppbV | | 2.07 |
| Pentane, 2-methyl- | 200 | NJ | ppbV | | 2.07 |
| Pentane, 3,3-dimethyl- | 88 | NJ | ppbV | | 2.07 |
| Hexane, 3-methyl- | 67 | NJ | ppbV | | 2.07 |
| Pentane, 2,4-dimethyl- | 120 | NJ | ppbV | | 2.07 |
| unknown alkane | 14 | J | ppbV | | 2.07 |
| unknown alkane | 150 | J | ppbV | | 2.07 |
| unknown cycloalkane | 23 | J | ppbV | | 2.07 |
| Pentane, 2,3-dimethyl- | 92 | NJ | ppbV | | 2.07 |
| unknown alkane | 36 | J | ppbV | | 2.07 |
| unknown alkane | 41 | J | ppbV | | 2.07 |
| Butane, 2,2-dimethyl- | 140 | NJ | ppbV | | 2.07 |
| unknown alkane | 15 | J | ppbV | | 2.07 |
| Pentane, 2,2-dimethyl- | 68 | NJ | ppbV | | 2.07 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1600329
**Report Date:** 01/08/16

## SAMPLE RESULTS

Lab ID: L1600329-01 D
Client ID: 8-SSDS-200
Sample Location: EDISON, NJ
Date Collected: 01/06/16 08:55
Date Received: 01/06/16
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 96 | | 60-140 |
| Bromochloromethane | 96 | | 60-140 |
| chlorobenzene-d5 | 102 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1600329
**Report Date:** 01/08/16

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 01/07/16 13:09

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG855541-4 | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chloromethane | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Freon-114 | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Vinyl chloride | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| 1,3-Butadiene | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Butane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Bromomethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroethane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Ethanol | ND | 5.0 | -- | ND | 9. | -- | | 1 |
| Vinyl bromide | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Acetone | ND | 1.0 | -- | ND | 2. | -- | | 1 |
| Trichlorofluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Isopropanol | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Methylene chloride | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| 3-Chloropropene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon disulfide | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Freon-113 | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 2-Butanone | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroform | ND | 0.20 | -- | ND | 1. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1600329
**Report Date:** 01/08/16

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 01/07/16 13:09

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG855541-4 | | | | | | | | |
| Tetrahydrofuran | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| n-Hexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Benzene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon tetrachloride | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Cyclohexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Bromodichloromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dioxane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| Trichloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Methyl Methacrylate | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Heptane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Toluene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Dibromochloromethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Tetrachloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chlorobenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Ethylbenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| p/m-Xylene | ND | 0.40 | -- | ND | 2. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1600329
**Report Date:** 01/08/16

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 01/07/16 13:09

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG855541-4 | | | | | | | | |
| Bromoform | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Styrene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| o-Xylene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 2-Chlorotoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 4-Ethyltoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Hexachlorobutadiene | ND | 0.20 | -- | ND | 2. | -- | | 1 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

No Tentatively Identified Compounds

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG855541-3 | | | | | | | | |
| Chlorodifluoromethane | 84 | | - | | 70-130 | - | | |
| Propylene | 95 | | - | | 70-130 | - | | |
| Dichlorodifluoromethane | 76 | | - | | 40-160 | - | | |
| Chloromethane | 96 | | - | | 70-130 | - | | |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 88 | | - | | 70-130 | - | | |
| Methanol | 88 | | - | | 70-130 | - | | |
| Vinyl chloride | 91 | | - | | 70-130 | - | | |
| 1,3-Butadiene | 97 | | - | | 70-130 | - | | |
| Butane | 86 | | - | | 70-130 | - | | |
| Bromomethane | 88 | | - | | 70-130 | - | | |
| Chloroethane | 90 | | - | | 70-130 | - | | |
| Ethyl Alcohol | 76 | | - | | 70-130 | - | | |
| Dichlorofluoromethane | 80 | | - | | 70-130 | - | | |
| Vinyl bromide | 88 | | - | | 70-130 | - | | |
| Acrolein | 91 | | - | | 70-130 | - | | |
| Acetone | 94 | | - | | 40-160 | - | | |
| Acetonitrile | 94 | | - | | 70-130 | - | | |
| Trichlorofluoromethane | 87 | | - | | 70-130 | - | | |
| iso-Propyl Alcohol | 96 | | - | | 70-130 | - | | |
| Acrylonitrile | 87 | | - | | 70-130 | - | | |
| Pentane | 86 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG855541-3 | | | | | | | | |
| Ethyl ether | 85 | | - | | 70-130 | - | | |
| 1,1-Dichloroethene | 82 | | - | | 70-130 | - | | |
| tert-Butyl Alcohol | 79 | | - | | 70-130 | - | | |
| Methylene chloride | 92 | | - | | 70-130 | - | | |
| 3-Chloropropene | 93 | | - | | 70-130 | - | | |
| Carbon disulfide | 85 | | - | | 70-130 | - | | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 83 | | - | | 70-130 | - | | |
| trans-1,2-Dichloroethene | 76 | | - | | 70-130 | - | | |
| 1,1-Dichloroethane | 85 | | - | | 70-130 | - | | |
| Methyl tert butyl ether | 78 | | - | | 70-130 | - | | |
| Vinyl acetate | 83 | | - | | 70-130 | - | | |
| 2-Butanone | 91 | | - | | 70-130 | - | | |
| cis-1,2-Dichloroethene | 96 | | - | | 70-130 | - | | |
| Ethyl Acetate | 88 | | - | | 70-130 | - | | |
| Chloroform | 85 | | - | | 70-130 | - | | |
| Tetrahydrofuran | 83 | | - | | 70-130 | - | | |
| 2,2-Dichloropropane | 73 | | - | | 70-130 | - | | |
| 1,2-Dichloroethane | 81 | | - | | 70-130 | - | | |
| n-Hexane | 96 | | - | | 70-130 | - | | |
| Isopropyl Ether | 85 | | - | | 70-130 | - | | |
| Ethyl-Tert-Butyl-Ether | 90 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG855541-3 | | | | | | | | |
| 1,1,1-Trichloroethane | 92 | | - | | 70-130 | - | | |
| 1,1-Dichloropropene | 91 | | - | | 70-130 | - | | |
| Benzene | 93 | | - | | 70-130 | - | | |
| Carbon tetrachloride | 95 | | - | | 70-130 | - | | |
| Cyclohexane | 96 | | - | | 70-130 | - | | |
| Tertiary-Amyl Methyl Ether | 84 | | - | | 70-130 | - | | |
| Dibromomethane | 89 | | - | | 70-130 | - | | |
| 1,2-Dichloropropane | 100 | | - | | 70-130 | - | | |
| Bromodichloromethane | 100 | | - | | 70-130 | - | | |
| 1,4-Dioxane | 95 | | - | | 40-160 | - | | |
| Trichloroethene | 97 | | - | | 70-130 | - | | |
| 2,2,4-Trimethylpentane | 100 | | - | | 70-130 | - | | |
| Methyl Methacrylate | 91 | | - | | 70-130 | - | | |
| Heptane | 100 | | - | | 70-130 | - | | |
| cis-1,3-Dichloropropene | 100 | | - | | 70-130 | - | | |
| 4-Methyl-2-pentanone | 100 | | - | | 70-130 | - | | |
| trans-1,3-Dichloropropene | 88 | | - | | 70-130 | - | | |
| 1,1,2-Trichloroethane | 100 | | - | | 70-130 | - | | |
| Toluene | 98 | | - | | 70-130 | - | | |
| 1,3-Dichloropropane | 96 | | - | | 70-130 | - | | |
| 2-Hexanone | 110 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1600329

**Report Date:** 01/08/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG855541-3 | | | | | | | | |
| Dibromochloromethane | 110 | | - | | 70-130 | - | | |
| 1,2-Dibromoethane | 100 | | - | | 70-130 | - | | |
| Butyl Acetate | 93 | | - | | 70-130 | - | | |
| Octane | 93 | | - | | 70-130 | - | | |
| Tetrachloroethene | 97 | | - | | 70-130 | - | | |
| 1,1,1,2-Tetrachloroethane | 96 | | - | | 70-130 | - | | |
| Chlorobenzene | 100 | | - | | 70-130 | - | | |
| Ethylbenzene | 100 | | - | | 70-130 | - | | |
| p/m-Xylene | 100 | | - | | 70-130 | - | | |
| Bromoform | 110 | | - | | 70-130 | - | | |
| Styrene | 99 | | - | | 70-130 | - | | |
| 1,1,2,2-Tetrachloroethane | 110 | | - | | 70-130 | - | | |
| o-Xylene | 100 | | - | | 70-130 | - | | |
| 1,2,3-Trichloropropane | 94 | | - | | 70-130 | - | | |
| Nonane (C9) | 100 | | - | | 70-130 | - | | |
| Isopropylbenzene | 97 | | - | | 70-130 | - | | |
| Bromobenzene | 95 | | - | | 70-130 | - | | |
| o-Chlorotoluene | 94 | | - | | 70-130 | - | | |
| n-Propylbenzene | 96 | | - | | 70-130 | - | | |
| p-Chlorotoluene | 95 | | - | | 70-130 | - | | |
| 4-Ethyltoluene | 99 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG855541-3 | | | | | | | | |
| 1,3,5-Trimethylbenzene | 100 | | - | | 70-130 | - | | |
| tert-Butylbenzene | 100 | | - | | 70-130 | - | | |
| 1,2,4-Trimethylbenzene | 110 | | - | | 70-130 | - | | |
| Decane (C10) | 100 | | - | | 70-130 | - | | |
| Benzyl chloride | 100 | | - | | 70-130 | - | | |
| 1,3-Dichlorobenzene | 110 | | - | | 70-130 | - | | |
| 1,4-Dichlorobenzene | 110 | | - | | 70-130 | - | | |
| sec-Butylbenzene | 100 | | - | | 70-130 | - | | |
| p-Isopropyltoluene | 92 | | - | | 70-130 | - | | |
| 1,2-Dichlorobenzene | 110 | | - | | 70-130 | - | | |
| n-Butylbenzene | 100 | | - | | 70-130 | - | | |
| 1,2-Dibromo-3-chloropropane | 96 | | - | | 70-130 | - | | |
| Undecane | 110 | | - | | 70-130 | - | | |
| Dodecane (C12) | 110 | | - | | 70-130 | - | | |
| 1,2,4-Trichlorobenzene | 120 | | - | | 40-160 | - | | |
| Naphthalene | 100 | | - | | 40-160 | - | | |
| 1,2,3-Trichlorobenzene | 99 | | - | | 70-130 | - | | |
| Hexachlorobutadiene | 100 | | - | | 40-160 | - | | |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG855541-5 QC Sample: L1600337-01 Client ID: DUP Sample | | | | | | |
| Dichlorodifluoromethane | ND | ND | ppbV | NC | | 25 |
| Chloromethane | ND | ND | ppbV | NC | | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | ND | ppbV | NC | | 25 |
| Vinyl chloride | ND | ND | ppbV | NC | | 25 |
| 1,3-Butadiene | ND | ND | ppbV | NC | | 25 |
| Bromomethane | ND | ND | ppbV | NC | | 25 |
| Chloroethane | ND | ND | ppbV | NC | | 25 |
| Ethyl Alcohol | ND | ND | ppbV | NC | | 25 |
| Vinyl bromide | ND | ND | ppbV | NC | | 25 |
| Acetone | 3.1 | 3.0 | ppbV | 3 | | 25 |
| Trichlorofluoromethane | ND | ND | ppbV | NC | | 25 |
| iso-Propyl Alcohol | ND | ND | ppbV | NC | | 25 |
| 1,1-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| tert-Butyl Alcohol | ND | ND | ppbV | NC | | 25 |
| Methylene chloride | ND | ND | ppbV | NC | | 25 |
| 3-Chloropropene | ND | ND | ppbV | NC | | 25 |
| Carbon disulfide | 8.6 | 8.6 | ppbV | 0 | | 25 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | ND | ppbV | NC | | 25 |
| trans-1,2-Dichloroethene | ND | ND | ppbV | NC | | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG855541-5 QC Sample: L1600337-01 Client ID: DUP Sample | | | | | |
| 1,1-Dichloroethane | ND | ND | ppbV | NC | 25 |
| Methyl tert butyl ether | ND | ND | ppbV | NC | 25 |
| 2-Butanone | ND | ND | ppbV | NC | 25 |
| cis-1,2-Dichloroethene | ND | ND | ppbV | NC | 25 |
| Chloroform | 4.6 | 4.5 | ppbV | 2 | 25 |
| Tetrahydrofuran | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloroethane | ND | ND | ppbV | NC | 25 |
| n-Hexane | ND | ND | ppbV | NC | 25 |
| 1,1,1-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Benzene | ND | ND | ppbV | NC | 25 |
| Carbon tetrachloride | ND | ND | ppbV | NC | 25 |
| Cyclohexane | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloropropane | ND | ND | ppbV | NC | 25 |
| Bromodichloromethane | ND | ND | ppbV | NC | 25 |
| 1,4-Dioxane | ND | ND | ppbV | NC | 25 |
| Trichloroethene | ND | ND | ppbV | NC | 25 |
| 2,2,4-Trimethylpentane | 2.2 | 2.2 | ppbV | 0 | 25 |
| Methyl Methacrylate | ND | ND | ppbV | NC | 25 |
| Heptane | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG855541-5 QC Sample: L1600337-01 Client ID: DUP Sample | | | | | |
| cis-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 4-Methyl-2-pentanone | ND | ND | ppbV | NC | 25 |
| trans-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Toluene | 1.7 | 1.8 | ppbV | 6 | 25 |
| Dibromochloromethane | ND | ND | ppbV | NC | 25 |
| 1,2-Dibromoethane | ND | ND | ppbV | NC | 25 |
| Tetrachloroethene | ND | ND | ppbV | NC | 25 |
| Chlorobenzene | ND | ND | ppbV | NC | 25 |
| Ethylbenzene | ND | ND | ppbV | NC | 25 |
| p/m-Xylene | ND | ND | ppbV | NC | 25 |
| Bromoform | ND | ND | ppbV | NC | 25 |
| Styrene | ND | ND | ppbV | NC | 25 |
| 1,1,2,2-Tetrachloroethane | ND | ND | ppbV | NC | 25 |
| o-Xylene | ND | ND | ppbV | NC | 25 |
| o-Chlorotoluene | ND | ND | ppbV | NC | 25 |
| 4-Ethyltoluene | ND | ND | ppbV | NC | 25 |
| 1,3,5-Trimethylbenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trimethylbenzene | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG855541-5 QC Sample: L1600337-01 Client ID: DUP Sample | | | | | |
| 1,3-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,4-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trichlorobenzene | ND | ND | ppbV | NC | 25 |
| Hexachlorobutadiene | ND | ND | ppbV | NC | 25 |

**Project Name:** RARITAN ARSENAL

**Lab Number:** L1600329

**Project Number:** TR0479-02B

**Report Date:** 01/08/16

## Canister and Flow Controller Information

| Samplenum | Client ID | Media ID | Media Type | Date Prepared | Bottle Order | Cleaning Batch ID | Can Leak Check | Initial Pressure (in. Hg) | Pressure on Receipt (in. Hg) | Flow Controler Leak Chk | Flow Out mL/min | Flow In mL/min | % RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1600329-01 | 8-SSDS-200 | 834 | 1.0L Can | 01/05/16 | 215093 | L1533832-02 | Pass | -29.7 | 0.6 | - | - | - | - |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1533832
**Report Date:** 01/08/16

# Air Canister Certification Results

Lab ID: L1533832-02
Client ID: CAN 873 SHELF 3
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 12/22/15 15:30
Analyst: MB

Date Collected: 12/21/15 16:00
Date Received: 12/22/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 5.00 | -- | ND | 9.42 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1533832

**Project Number:** CANISTER QC BAT **Report Date:** 01/08/16

# Air Canister Certification Results

Lab ID: L1533832-02 Date Collected: 12/21/15 16:00

Client ID: CAN 873 SHELF 3 Date Received: 12/22/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1533832

**Project Number:** CANISTER QC BAT **Report Date:** 01/08/16

# Air Canister Certification Results

Lab ID: L1533832-02 Date Collected: 12/21/15 16:00

Client ID: CAN 873 SHELF 3 Date Received: 12/22/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1533832

**Project Number:** CANISTER QC BAT **Report Date:** 01/08/16

# Air Canister Certification Results

Lab ID: L1533832-02 Date Collected: 12/21/15 16:00

Client ID: CAN 873 SHELF 3 Date Received: 12/22/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | **Results** | **Qualifier** | **Units** | **RDL** | **Dilution Factor** |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| No Tentatively Identified Compounds | | | | | |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1533832

**Project Number:** CANISTER QC BAT **Report Date:** 01/08/16

# Air Canister Certification Results

Lab ID: L1533832-02 Date Collected: 12/21/15 16:00

Client ID: CAN 873 SHELF 3 Date Received: 12/22/15

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 96 | | 60-140 |
| Bromochloromethane | 95 | | 60-140 |
| chlorobenzene-d5 | 92 | | 60-140 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1533832

**Project Number:** CANISTER QC BAT **Report Date:** 01/08/16

# Air Canister Certification Results

Lab ID: L1533832-02
Client ID: CAN 873 SHELF 3
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 12/22/15 15:30
Analyst: MB

Date Collected: 12/21/15 16:00
Date Received: 12/22/15
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.050 | -- | ND | 0.349 | -- | | 1 |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,3-Butadiene | ND | 0.020 | -- | ND | 0.044 | -- | | 1 |
| Bromomethane | ND | 0.020 | -- | ND | 0.078 | -- | | 1 |
| Chloroethane | ND | 0.020 | -- | ND | 0.053 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.050 | -- | ND | 0.281 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| Freon-113 | ND | 0.050 | -- | ND | 0.383 | -- | | 1 |
| Halothane | ND | 0.050 | -- | ND | 0.404 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Chloroform | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Benzene | ND | 0.100 | -- | ND | 0.319 | -- | | 1 |
| Carbon tetrachloride | ND | 0.020 | -- | ND | 0.126 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1533832
**Report Date:** 01/08/16

# Air Canister Certification Results

Lab ID: L1533832-02
Client ID: CAN 873 SHELF 3
Sample Location:
Date Collected: 12/21/15 16:00
Date Received: 12/22/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Bromodichloromethane | ND | 0.020 | -- | ND | 0.134 | -- | | 1 |
| 1,4-Dioxane | ND | 0.100 | -- | ND | 0.360 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Toluene | ND | 0.050 | -- | ND | 0.188 | -- | | 1 |
| Dibromochloromethane | ND | 0.020 | -- | ND | 0.170 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.020 | -- | ND | 0.154 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| Chlorobenzene | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |
| Ethylbenzene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| p/m-Xylene | ND | 0.040 | -- | ND | 0.174 | -- | | 1 |
| Bromoform | ND | 0.020 | -- | ND | 0.207 | -- | | 1 |
| Styrene | ND | 0.020 | -- | ND | 0.085 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| o-Xylene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1533832
**Report Date:** 01/08/16

# Air Canister Certification Results

Lab ID: L1533832-02
Client ID: CAN 873 SHELF 3
Sample Location:
Date Collected: 12/21/15 16:00
Date Received: 12/22/15
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Naphthalene | ND | 0.050 | -- | ND | 0.262 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.050 | -- | ND | 0.533 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 98 | | 60-140 |
| bromochloromethane | 100 | | 60-140 |
| chlorobenzene-d5 | 98 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1600329
**Report Date:** 01/08/16

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

| Cooler Information | Custody Seal |
|---|---|
| Cooler | |
| N/A | Absent |

**Container Information**

| Container ID | Container Type | Cooler | pH | Temp deg C | Pres | Seal | Analysis(*) |
|---|---|---|---|---|---|---|---|
| L1600329-01A | Canister - 1 Liter | N/A | N/A | N/A | Y | Absent | NJ-TO15(30) |

*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1600329 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/08/16 |

## GLOSSARY

### *Acronyms*

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### *Footnotes*

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### *Terms*

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### *Data Qualifiers*

**A** - Spectra identified as "Aldol Condensation Product".

**B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

*Report Format:* Data Usability Report

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1600329 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/08/16 |

***Data Qualifiers***

**C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**ND** - Not detected at the reporting limit (RL) for the sample.

*Report Format:* Data Usability Report

## REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

**The following analytes are not included in our Primary NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.
**EPA 1010A:** NPW: Ignitability
**EPA 6010C:** NPW: Strontium; SCM: Strontium
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation
**EPA 9038:** NPW: Sulfate
**EPA 9050A:** NPW: Specific Conductance
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate
**EPA 9065:** NPW: Phenols
**EPA 9251:** NPW: Chloride
**SM3500:** NPW: Ferrous Iron
**SM4500**: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
**SM5310C:** DW: Dissolved Organic Carbon

**Mansfield Facility**
**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl
**EPA 2540D:** TSS
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

***Drinking Water***
**EPA 200.8**: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
**EPA 300.0**: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
**EPA 332**: Perchlorate.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

***Non-Potable Water***
**EPA 200.8**: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
**EPA 200.7**: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
**EPA 624**: Volatile Halocarbons & Aromatics,
**EPA 608**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625**: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Alpha Analytical
320 Forbes Blvd
Mansfield, MA 02048-1806
Tel: 508-822-9300
Fax: 508-822-3288

# AIR Chain-of-Custody - NJ

Date Rec'd in Lab 1/7/16 | ALPHA Job# L1600329

1 of 1 COCs

## Client Contact Information

Company: Geosyntec
Address: 130 Stone Rd West
City/State/Zip Guelph ON N1G3Z2
Phone: 519-515-0864
FAX: —
Email: PNicholson@geosyntec.com
Site Contact: Matthew Mraw
Site Contact Phone: 609-462-1198

## Project Information

Project Name: Raritan Arsenal
Project No: TR0479-02B
Site/Location: Edison, NJ
Project Manager: Paul Nicholson

## Analysis Turn-Around Time

Standard (Specify) 2-week
Rush (Specify)

## NJ DEP Information

Bureau: Division: Contract No:

## Report Information - Data Deliverables:

☐ FAX:
☐ ADEx ☒ Criteria Checker: Enviro Data
☒ EMail (standard pdf report)

## Billing Information

☐ Same as Client Info PO #:

| ALPHA LAB ID (Lab Use Only) | Sample Identification | Sample Date(s) | Time Start (24 hr clock) | Time Stop (24 hr clock) | Canister Pressure in Field (Hg) (Start) | Canister Pressure in Field (Hg) (Stop) | Interior Temp. (F) (Start) | Interior Temp. (F) (Stop) | Outgoing Canister Pressure (Hg) (Note1) | Incoming Canister Pressure (Hg) (Note 2) | Flow Reg. ID | Can ID | Can Size (L) | Flow Controller Readout (ml/min) (Note1) | Batch Cert ID (Note 1) | Analysis: TO-15 | Analysis: EPA 3C | Matrix: Indoor/Ambient Air | Matrix: Soil Gas |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 00329-01 | 8-SSDS-200 | 1/6/16 | 0855 | 0855 | -29.7 | -11.9 | 20 | 20 | -29.7 | | — | 834 | 1 | — | L1533832-02 | X | | | X |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

mm/dd/yy

Custody Seals:
Outgoing Seal No: — (refer to crate seal)
Incoming Seal No: — (if applicable)

Temperature (Fahrenheit)

| | Ambient | Maximum | Minimum |
|---|---|---|---|
| Start | 25 | 38 | 20 |
| Stop | 25 | 38 | 20 |

Pressure (inches of Hg)

| | Ambient | Maximum | Minimum |
|---|---|---|---|
| Start | 30.06 | 30.06 | 30.06 |
| Stop | 30.06 | 30.06 | 30.06 |

Individual Preparing Canister/Containers and Laboratory Canister Certification
Name: Paul Walukevich
Signature: Paul D. Walukevich

Footnotes:
(1) Refer to equipment tags for these readings.
(2) Readings provided in data deliverable package.

Special Instructions/QC Requirements & Comments:

| Canisters Shipped by: | Date/Time: | Canisters Received by: | Date/Time: |
|---|---|---|---|
| Samples Relinquished by: Matthew Mraw | Date/Time: 1/6/16 1400 | Received by: [signature] (AK) | Date/Time: 1/6/16 1400 |
| Relinquished by: [signature] | Date/Time: 1/6/16 1840 | Received by: Tom Tobin | Date/Time: 1-6-16 1840 |
| Tom Tobin | 1-6-16 2140 | Ae Williams | 1-6-16 2140 |
| Ae Williams | 1-7-16 0110 | [signature] | 1/7/16 1:10 |

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until all ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.

Note: Combined External Chain of Custody and NJDEP Field Test Data Sheet

# ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L1601851 |
| Client: | Geosyntec Consultants, Inc.<br>130 Stone Road West<br>Guelph, ON N1G 3Z2 |
| ATTN: | Paul Nicholson |
| Phone: | (519) 575-0864 |
| Project Name: | RARITAN ARSENAL |
| Project Number: | TR0479-02B |
| Report Date: | 01/28/16 |

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: NY (11627), CT (PH-0141), NH (2206), NJ NELAP (MA015), RI (LAO00299), ME (MA00030), PA (68-02089), VA (460194), LA NELAP (03090), FL (E87814), TX (T104704419), WA (C954), USFWS (Permit #LE2069641), USDA (Permit #P330-11-00109), US Army Corps of Engineers.

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1601851
**Report Date:** 01/28/16

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L1601851-01 | 8-SSDS-200 | SOIL_VAPOR | EDISON, NJ | 01/20/16 09:50 | 01/21/16 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1601851
**Report Date:** 01/28/16

**NJ DEP Data of Known Quality Protocols**
**Conformance/Non-Conformance**
**Summary Questionnaire**

| | | |
|---|---|---|
| 1 | For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the NJDEP Data of Known Quality performance standards? | YES |
| 1a | Were the method specified handling, preservation, and holding time requirements met? | YES |
| 1b | EPH Method: Was the EPH Method conducted without significant modifications (see Section 11.3 of respective DKQ methods)? | N/A |
| 2 | Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)? | YES |
| 3 | Were all samples received at an appropriate temperature (4 ± 2° C)? | N/A |
| 4 | Were all QA/QC performance criteria specified in the NJDEP DKQP standards achieved? | YES |
| 5a | Were reporting limits specified or referenced on the chain-of-custody or communicated to the laboratory prior to sample receipt? | YES |
| 5b | Were these reporting limits met? | YES |
| 6 | For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the DKQP documents and/or site-specific QAPP? | YES |
| 7 | Are project-specific matrix spikes and/or laboratory duplicates included in this data set? | NO |

**Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1a or #1b is "No", the data package does not meet the requirements for "Data of Known Quality".**

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1601851
**Report Date:** 01/28/16

## Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. All specific QC information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY
For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1601851 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/28/16 |

**Case Narrative (continued)**

NJDEP Volatile Organics in Air
Canisters were released from the laboratory on January 19, 2016. The canister certification results are provided as an addendum.

Any Manual integrations that were performed on L1601851 as well as its associated quality control samples and are noted on the individual quantitation reports. A listing of all manual integrations performed and the integration code definitions are provided in manual integration documentation section of the data package.

Please note, dilution analysis due to exceedance of the calibration range is not required for Ethanol or Isopropyl Alcohol.

GC column and trap information utilized for the analysis of this sample delivery group is detailed below:
Column Type: Restek RTX-1
Column Length: 60 Meters
Internal diameter: 0.52 mm
Film thickness: 1.00 um
Trap 1: Entech Cold Trap - no packing material
Trap 2: Entech Tenax - 20 cm packing material

Gaseous calibration standards were utilized for system calibration and quality control standards associated with this sample delivery group. These standards were purchased from Linde (formerly Spectra Gases).

Laboratory standard procedure for QC (i.e. method blanks, LCS) and sample analysis is to withdraw a 250 mL aliquot from the canister as the "1X" analysis. For some calibration levels and samples, subsequent dilutions will be performed as needed by decreasing aliquot volumes via the instrumentation, or performing a dilution using a second canister. Make-up air is not routinely added to canisters prior to sample analysis.

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1601851 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/28/16 |

**Case Narrative (continued)**

Sample L1601851-01: Prior to sample analysis, the canister was pressurized with UHP Nitrogen due to canister size. The pressurization resulted in a dilution of the sample. The reporting limits have been elevated accordingly.

Sample L1601851-01 The presence of Acetone and 2,2,4-Trimethylpentane could not be determined in this sample due to a non-target compounds interfering with the identification and quantification of these compounds.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Christopher J. Anderson

Title: Technical Director/Representative Date: 01/28/16

# AIR

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1601851
**Report Date:** 01/28/16

## SAMPLE RESULTS

Lab ID: L1601851-01 D
Client ID: 8-SSDS-200
Sample Location: EDISON, NJ
Matrix: Soil_Vapor
Anaytical Method: 48,TO-15
Analytical Date: 01/26/16 22:40
Analyst: MB

Date Collected: 01/20/16 09:50
Date Received: 01/21/16
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Chloromethane | ND | 0.41 | -- | ND | 0.8 | -- | | 2.055 |
| Freon-114 | ND | 0.41 | -- | ND | 3 | -- | | 2.055 |
| Vinyl chloride | ND | 0.41 | -- | ND | 1 | -- | | 2.055 |
| 1,3-Butadiene | ND | 0.41 | -- | ND | 0.9 | -- | | 2.055 |
| Bromomethane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Chloroethane | ND | 0.41 | -- | ND | 1 | -- | | 2.055 |
| Ethanol | ND | 10 | -- | ND | 20 | -- | | 2.055 |
| Vinyl bromide | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Acetone | ND | 2.0 | -- | ND | 5 | -- | | 2.055 |
| Trichlorofluoromethane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Isopropanol | 3.7 | 1.0 | -- | 9 | 2 | -- | | 2.055 |
| 1,1-Dichloroethene | 1.3 | 0.41 | -- | 5 | 2 | -- | | 2.055 |
| Tertiary butyl Alcohol | ND | 1.0 | -- | ND | 3 | -- | | 2.055 |
| Methylene chloride | ND | 1.0 | -- | ND | 3 | -- | | 2.055 |
| 3-Chloropropene | ND | 0.41 | -- | ND | 1 | -- | | 2.055 |
| Carbon disulfide | ND | 0.41 | -- | ND | 1 | -- | | 2.055 |
| Freon-113 | ND | 0.41 | -- | ND | 3 | -- | | 2.055 |
| trans-1,2-Dichloroethene | 2.1 | 0.41 | -- | 8 | 2 | -- | | 2.055 |
| 1,1-Dichloroethane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Methyl tert butyl ether | ND | 0.41 | -- | ND | 1 | -- | | 2.055 |
| 2-Butanone | ND | 1.0 | -- | ND | 3 | -- | | 2.055 |
| cis-1,2-Dichloroethene | 9.8 | 0.41 | -- | 39 | 1.6 | -- | | 2.055 |
| Chloroform | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1601851
***Report Date:*** 01/28/16

## *SAMPLE RESULTS*

Lab ID: L1601851-01 D
Client ID: 8-SSDS-200
Sample Location: EDISON, NJ
Date Collected: 01/20/16 09:50
Date Received: 01/21/16
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Tetrahydrofuran | ND | 1.0 | -- | ND | 3 | -- | | 2.055 |
| 1,2-Dichloroethane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| n-Hexane | ND | 0.41 | -- | ND | 1 | -- | | 2.055 |
| 1,1,1-Trichloroethane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Benzene | ND | 0.41 | -- | ND | 1 | -- | | 2.055 |
| Carbon tetrachloride | ND | 0.41 | -- | ND | 3 | -- | | 2.055 |
| Cyclohexane | 0.47 | 0.41 | -- | 2 | 1 | -- | | 2.055 |
| 1,2-Dichloropropane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Bromodichloromethane | ND | 0.41 | -- | ND | 3 | -- | | 2.055 |
| 1,4-Dioxane | ND | 0.41 | -- | ND | 1 | -- | | 2.055 |
| Trichloroethene | 130 | 0.41 | -- | 700 | 2.2 | -- | | 2.055 |
| 2,2,4-Trimethylpentane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Methyl Methacrylate | ND | 1.0 | -- | ND | 4 | -- | | 2.055 |
| Heptane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| cis-1,3-Dichloropropene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 4-Methyl-2-pentanone | ND | 1.0 | -- | ND | 4 | -- | | 2.055 |
| trans-1,3-Dichloropropene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 1,1,2-Trichloroethane | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Toluene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Dibromochloromethane | ND | 0.41 | -- | ND | 3 | -- | | 2.055 |
| 1,2-Dibromoethane | ND | 0.41 | -- | ND | 3 | -- | | 2.055 |
| Tetrachloroethene | ND | 0.41 | -- | ND | 3 | -- | | 2.055 |
| Chlorobenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| Ethylbenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| p/m-Xylene | ND | 0.82 | -- | ND | 4 | -- | | 2.055 |
| Bromoform | ND | 0.41 | -- | ND | 4 | -- | | 2.055 |
| Styrene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 1,1,2,2-Tetrachloroethane | ND | 0.41 | -- | ND | 3 | -- | | 2.055 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1601851
**Report Date:** 01/28/16

## SAMPLE RESULTS

Lab ID: L1601851-01 D
Client ID: 8-SSDS-200
Sample Location: EDISON, NJ
Date Collected: 01/20/16 09:50
Date Received: 01/21/16
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| o-Xylene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 2-Chlorotoluene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 4-Ethyltoluene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 1,3,5-Trimethybenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 1,2,4-Trimethylbenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 1,3-Dichlorobenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 1,4-Dichlorobenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 1,2-Dichlorobenzene | ND | 0.41 | -- | ND | 2 | -- | | 2.055 |
| 1,2,4-Trichlorobenzene | ND | 0.41 | -- | ND | 3 | -- | | 2.055 |
| Hexachlorobutadiene | ND | 0.41 | -- | ND | 4 | -- | | 2.055 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |
| unknown alkane | 34 | J | ppbV | | 2.055 |
| Pentane, 2-methyl- | 35 | NJ | ppbV | | 2.055 |
| Cyclotrisiloxane, Hexamethyl- | 6.4 | NJ | ppbV | | 2.055 |
| unknown alkane | 10 | J | ppbV | | 2.055 |
| unknown alkane | 19 | J | ppbV | | 2.055 |
| unknown alkane | 8.7 | J | ppbV | | 2.055 |
| unknown alkane | 28 | J | ppbV | | 2.055 |
| Butane, 2-Methyl- | 32 | NJ | ppbV | | 2.055 |
| unknown alkane | 18 | J | ppbV | | 2.055 |
| unknown alkane | 26 | J | ppbV | | 2.055 |
| unknown alkane | 6.4 | J | ppbV | | 2.055 |
| unknown alkane | 90 | J | ppbV | | 2.055 |
| unknown alkane | 32 | J | ppbV | | 2.055 |
| unknown alkane | 42 | J | ppbV | | 2.055 |
| Butane, 2,2-dimethyl- | 160 | NJ | ppbV | | 2.055 |

***Project Name:*** RARITAN ARSENAL
***Project Number:*** TR0479-02B
***Lab Number:*** L1601851
***Report Date:*** 01/28/16

## *SAMPLE RESULTS*

Lab ID: L1601851-01 D
Client ID: 8-SSDS-200
Sample Location: EDISON, NJ
Date Collected: 01/20/16 09:50
Date Received: 01/21/16
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 97 | | 60-140 |
| Bromochloromethane | 94 | | 60-140 |
| chlorobenzene-d5 | 100 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1601851
**Report Date:** 01/28/16

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 01/26/16 14:02

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG860384-4 | | | | | | | | |
| Dichlorodifluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chloromethane | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Freon-114 | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Vinyl chloride | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| 1,3-Butadiene | ND | 0.20 | -- | ND | 0.4 | -- | | 1 |
| Butane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Bromomethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroethane | ND | 0.20 | -- | ND | 0.5 | -- | | 1 |
| Ethanol | ND | 5.0 | -- | ND | 9. | -- | | 1 |
| Vinyl bromide | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Acetone | ND | 1.0 | -- | ND | 2. | -- | | 1 |
| Trichlorofluoromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Isopropanol | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Methylene chloride | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| 3-Chloropropene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon disulfide | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Freon-113 | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 2-Butanone | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Chloroform | ND | 0.20 | -- | ND | 1. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1601851
**Report Date:** 01/28/16

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 01/26/16 14:02

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG860384-4 | | | | | | | | |
| Tetrahydrofuran | ND | 0.50 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| n-Hexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Benzene | ND | 0.20 | -- | ND | 0.6 | -- | | 1 |
| Carbon tetrachloride | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Cyclohexane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Bromodichloromethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dioxane | ND | 0.20 | -- | ND | 0.7 | -- | | 1 |
| Trichloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Methyl Methacrylate | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| Heptane | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.50 | -- | ND | 2. | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Toluene | ND | 0.20 | -- | ND | 0.8 | -- | | 1 |
| Dibromochloromethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Tetrachloroethene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Chlorobenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| Ethylbenzene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| p/m-Xylene | ND | 0.40 | -- | ND | 2. | -- | | 1 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B
**Lab Number:** L1601851
**Report Date:** 01/28/16

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 48,TO-15
Analytical Date: 01/26/16 14:02

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab for sample(s): 01 Batch: WG860384-4 | | | | | | | | |
| Bromoform | ND | 0.20 | -- | ND | 2. | -- | | 1 |
| Styrene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| o-Xylene | ND | 0.20 | -- | ND | 0.9 | -- | | 1 |
| 2-Chlorotoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 4-Ethyltoluene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.20 | -- | ND | 1. | -- | | 1 |
| Hexachlorobutadiene | ND | 0.20 | -- | ND | 2. | -- | | 1 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| Tentatively Identified Compounds | | | | | |

No Tentatively Identified Compounds

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1601851
**Report Date:** 01/28/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG860384-3 | | | | | | | | |
| Chlorodifluoromethane | 73 | | - | | 70-130 | - | | |
| Propylene | 71 | | - | | 70-130 | - | | |
| Dichlorodifluoromethane | 73 | | - | | 40-160 | - | | |
| Chloromethane | 79 | | - | | 70-130 | - | | |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | 85 | | - | | 70-130 | - | | |
| Methanol | 80 | | - | | 70-130 | - | | |
| Vinyl chloride | 76 | | - | | 70-130 | - | | |
| 1,3-Butadiene | 87 | | - | | 70-130 | - | | |
| Butane | 82 | | - | | 70-130 | - | | |
| Bromomethane | 74 | | - | | 70-130 | - | | |
| Chloroethane | 76 | | - | | 70-130 | - | | |
| Ethyl Alcohol | 74 | | - | | 70-130 | - | | |
| Dichlorofluoromethane | 76 | | - | | 70-130 | - | | |
| Vinyl bromide | 78 | | - | | 70-130 | - | | |
| Acrolein | 83 | | - | | 70-130 | - | | |
| Acetone | 100 | | - | | 40-160 | - | | |
| Acetonitrile | 90 | | - | | 70-130 | - | | |
| Trichlorofluoromethane | 91 | | - | | 70-130 | - | | |
| iso-Propyl Alcohol | 92 | | - | | 70-130 | - | | |
| Acrylonitrile | 91 | | - | | 70-130 | - | | |
| Pentane | 96 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1601851

**Report Date:** 01/28/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG860384-3 | | | | | | | | |
| Ethyl ether | 100 | | - | | 70-130 | - | | |
| 1,1-Dichloroethene | 91 | | - | | 70-130 | - | | |
| tert-Butyl Alcohol | 79 | | - | | 70-130 | - | | |
| Methylene chloride | 100 | | - | | 70-130 | - | | |
| 3-Chloropropene | 110 | | - | | 70-130 | - | | |
| Carbon disulfide | 85 | | - | | 70-130 | - | | |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | 86 | | - | | 70-130 | - | | |
| trans-1,2-Dichloroethene | 84 | | - | | 70-130 | - | | |
| 1,1-Dichloroethane | 92 | | - | | 70-130 | - | | |
| Methyl tert butyl ether | 86 | | - | | 70-130 | - | | |
| Vinyl acetate | 100 | | - | | 70-130 | - | | |
| 2-Butanone | 110 | | - | | 70-130 | - | | |
| cis-1,2-Dichloroethene | 100 | | - | | 70-130 | - | | |
| Ethyl Acetate | 82 | | - | | 70-130 | - | | |
| Chloroform | 82 | | - | | 70-130 | - | | |
| Tetrahydrofuran | 96 | | - | | 70-130 | - | | |
| 2,2-Dichloropropane | 78 | | - | | 70-130 | - | | |
| 1,2-Dichloroethane | 89 | | - | | 70-130 | - | | |
| n-Hexane | 96 | | - | | 70-130 | - | | |
| Isopropyl Ether | 86 | | - | | 70-130 | - | | |
| Ethyl-Tert-Butyl-Ether | 94 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1601851

**Report Date:** 01/28/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG860384-3 | | | | | | | | |
| 1,1,1-Trichloroethane | 100 | | - | | 70-130 | - | | |
| 1,1-Dichloropropene | 94 | | - | | 70-130 | - | | |
| Benzene | 91 | | - | | 70-130 | - | | |
| Carbon tetrachloride | 110 | | - | | 70-130 | - | | |
| Cyclohexane | 99 | | - | | 70-130 | - | | |
| Tertiary-Amyl Methyl Ether | 86 | | - | | 70-130 | - | | |
| Dibromomethane | 93 | | - | | 70-130 | - | | |
| 1,2-Dichloropropane | 100 | | - | | 70-130 | - | | |
| Bromodichloromethane | 100 | | - | | 70-130 | - | | |
| 1,4-Dioxane | 92 | | - | | 40-160 | - | | |
| Trichloroethene | 96 | | - | | 70-130 | - | | |
| 2,2,4-Trimethylpentane | 100 | | - | | 70-130 | - | | |
| Methyl Methacrylate | 110 | | - | | 70-130 | - | | |
| Heptane | 110 | | - | | 70-130 | - | | |
| cis-1,3-Dichloropropene | 100 | | - | | 70-130 | - | | |
| 4-Methyl-2-pentanone | 120 | | - | | 70-130 | - | | |
| trans-1,3-Dichloropropene | 92 | | - | | 70-130 | - | | |
| 1,1,2-Trichloroethane | 96 | | - | | 70-130 | - | | |
| Toluene | 83 | | - | | 70-130 | - | | |
| 1,3-Dichloropropane | 81 | | - | | 70-130 | - | | |
| 2-Hexanone | 110 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis

## Batch Quality Control

**Project Name:** RARITAN ARSENAL

**Project Number:** TR0479-02B

**Lab Number:** L1601851

**Report Date:** 01/28/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG860384-3 | | | | | | | | |
| Dibromochloromethane | 93 | | - | | 70-130 | - | | |
| 1,2-Dibromoethane | 88 | | - | | 70-130 | - | | |
| Butyl Acetate | 85 | | - | | 70-130 | - | | |
| Octane | 76 | | - | | 70-130 | - | | |
| Tetrachloroethene | 82 | | - | | 70-130 | - | | |
| 1,1,1,2-Tetrachloroethane | 87 | | - | | 70-130 | - | | |
| Chlorobenzene | 85 | | - | | 70-130 | - | | |
| Ethylbenzene | 86 | | - | | 70-130 | - | | |
| p/m-Xylene | 90 | | - | | 70-130 | - | | |
| Bromoform | 93 | | - | | 70-130 | - | | |
| Styrene | 85 | | - | | 70-130 | - | | |
| 1,1,2,2-Tetrachloroethane | 87 | | - | | 70-130 | - | | |
| o-Xylene | 89 | | - | | 70-130 | - | | |
| 1,2,3-Trichloropropane | 81 | | - | | 70-130 | - | | |
| Nonane (C9) | 96 | | - | | 70-130 | - | | |
| Isopropylbenzene | 78 | | - | | 70-130 | - | | |
| Bromobenzene | 78 | | - | | 70-130 | - | | |
| o-Chlorotoluene | 75 | | - | | 70-130 | - | | |
| n-Propylbenzene | 79 | | - | | 70-130 | - | | |
| p-Chlorotoluene | 79 | | - | | 70-130 | - | | |
| 4-Ethyltoluene | 78 | | - | | 70-130 | - | | |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1601851
**Report Date:** 01/28/16

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 Batch: WG860384-3 | | | | | | | | |
| 1,3,5-Trimethylbenzene | 84 | | - | | 70-130 | - | | |
| tert-Butylbenzene | 80 | | - | | 70-130 | - | | |
| 1,2,4-Trimethylbenzene | 90 | | - | | 70-130 | - | | |
| Decane (C10) | 85 | | - | | 70-130 | - | | |
| Benzyl chloride | 93 | | - | | 70-130 | - | | |
| 1,3-Dichlorobenzene | 82 | | - | | 70-130 | - | | |
| 1,4-Dichlorobenzene | 82 | | - | | 70-130 | - | | |
| sec-Butylbenzene | 78 | | - | | 70-130 | - | | |
| p-Isopropyltoluene | 74 | | - | | 70-130 | - | | |
| 1,2-Dichlorobenzene | 84 | | - | | 70-130 | - | | |
| n-Butylbenzene | 91 | | - | | 70-130 | - | | |
| 1,2-Dibromo-3-chloropropane | 96 | | - | | 70-130 | - | | |
| Undecane | 96 | | - | | 70-130 | - | | |
| Dodecane (C12) | 98 | | - | | 70-130 | - | | |
| 1,2,4-Trichlorobenzene | 93 | | - | | 40-160 | - | | |
| Naphthalene | 88 | | - | | 40-160 | - | | |
| 1,2,3-Trichlorobenzene | 83 | | - | | 70-130 | - | | |
| Hexachlorobutadiene | 85 | | - | | 40-160 | - | | |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1601851
**Report Date:** 01/28/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG860384-5 QC Sample: L1602080-02 Client ID: DUP Sample | | | | | | |
| Dichlorodifluoromethane | 0.43 | 0.46 | ppbV | 7 | | 25 |
| Chloromethane | 0.54 | 0.51 | ppbV | 6 | | 25 |
| 1,2-Dichloro-1,1,2,2-tetrafluoroethane | ND | ND | ppbV | NC | | 25 |
| Vinyl chloride | ND | ND | ppbV | NC | | 25 |
| 1,3-Butadiene | ND | ND | ppbV | NC | | 25 |
| Bromomethane | ND | ND | ppbV | NC | | 25 |
| Chloroethane | ND | ND | ppbV | NC | | 25 |
| Ethyl Alcohol | ND | ND | ppbV | NC | | 25 |
| Vinyl bromide | ND | ND | ppbV | NC | | 25 |
| Acetone | ND | ND | ppbV | NC | | 25 |
| Trichlorofluoromethane | ND | 0.21 | ppbV | NC | | 25 |
| iso-Propyl Alcohol | ND | ND | ppbV | NC | | 25 |
| 1,1-Dichloroethene | ND | ND | ppbV | NC | | 25 |
| tert-Butyl Alcohol | ND | ND | ppbV | NC | | 25 |
| Methylene chloride | ND | ND | ppbV | NC | | 25 |
| 3-Chloropropene | ND | ND | ppbV | NC | | 25 |
| Carbon disulfide | ND | ND | ppbV | NC | | 25 |
| 1,1,2-Trichloro-1,2,2-Trifluoroethane | ND | ND | ppbV | NC | | 25 |
| trans-1,2-Dichloroethene | ND | ND | ppbV | NC | | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1601851
**Report Date:** 01/28/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG860384-5 QC Sample: L1602080-02 Client ID: DUP Sample | | | | | |
| 1,1-Dichloroethane | ND | ND | ppbV | NC | 25 |
| Methyl tert butyl ether | ND | ND | ppbV | NC | 25 |
| 2-Butanone | ND | ND | ppbV | NC | 25 |
| cis-1,2-Dichloroethene | ND | ND | ppbV | NC | 25 |
| Chloroform | ND | ND | ppbV | NC | 25 |
| Tetrahydrofuran | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloroethane | ND | ND | ppbV | NC | 25 |
| n-Hexane | ND | ND | ppbV | NC | 25 |
| 1,1,1-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Benzene | ND | ND | ppbV | NC | 25 |
| Carbon tetrachloride | ND | ND | ppbV | NC | 25 |
| Cyclohexane | ND | ND | ppbV | NC | 25 |
| 1,2-Dichloropropane | ND | ND | ppbV | NC | 25 |
| Bromodichloromethane | ND | ND | ppbV | NC | 25 |
| 1,4-Dioxane | ND | ND | ppbV | NC | 25 |
| Trichloroethene | ND | ND | ppbV | NC | 25 |
| 2,2,4-Trimethylpentane | ND | ND | ppbV | NC | 25 |
| Methyl Methacrylate | ND | ND | ppbV | NC | 25 |
| Heptane | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1601851
**Report Date:** 01/28/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG860384-5 QC Sample: L1602080-02 Client ID: DUP Sample | | | | | |
| cis-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 4-Methyl-2-pentanone | ND | ND | ppbV | NC | 25 |
| trans-1,3-Dichloropropene | ND | ND | ppbV | NC | 25 |
| 1,1,2-Trichloroethane | ND | ND | ppbV | NC | 25 |
| Toluene | ND | ND | ppbV | NC | 25 |
| Dibromochloromethane | ND | ND | ppbV | NC | 25 |
| 1,2-Dibromoethane | ND | ND | ppbV | NC | 25 |
| Tetrachloroethene | ND | ND | ppbV | NC | 25 |
| Chlorobenzene | ND | ND | ppbV | NC | 25 |
| Ethylbenzene | ND | ND | ppbV | NC | 25 |
| p/m-Xylene | ND | ND | ppbV | NC | 25 |
| Bromoform | ND | ND | ppbV | NC | 25 |
| Styrene | ND | ND | ppbV | NC | 25 |
| 1,1,2,2-Tetrachloroethane | ND | ND | ppbV | NC | 25 |
| o-Xylene | ND | ND | ppbV | NC | 25 |
| o-Chlorotoluene | ND | ND | ppbV | NC | 25 |
| 4-Ethyltoluene | ND | ND | ppbV | NC | 25 |
| 1,3,5-Trimethylbenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trimethylbenzene | ND | ND | ppbV | NC | 25 |

# Lab Duplicate Analysis
## Batch Quality Control

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1601851
**Report Date:** 01/28/16

| Parameter | Native Sample | Duplicate Sample | Units | RPD | RPD Limits |
|---|---|---|---|---|---|
| NJ Volatile Organics in Air - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG860384-5 QC Sample: L1602080-02 Client ID: DUP Sample | | | | | |
| 1,3-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,4-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2-Dichlorobenzene | ND | ND | ppbV | NC | 25 |
| 1,2,4-Trichlorobenzene | ND | ND | ppbV | NC | 25 |
| Hexachlorobutadiene | ND | ND | ppbV | NC | 25 |

**Project Name:** RARITAN ARSENAL

**Lab Number:** L1601851

**Project Number:** TR0479-02B

**Report Date:** 01/28/16

## Canister and Flow Controller Information

| Samplenum | Client ID | Media ID | Media Type | Date Prepared | Bottle Order | Cleaning Batch ID | Can Leak Check | Initial Pressure (in. Hg) | Pressure on Receipt (in. Hg) | Flow Controler Leak Chk | Flow Out mL/min | Flow In mL/min | % RPD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L1601851-01 | 8-SSDS-200 | 1959 | 1.0L Can | 01/19/16 | 215930 | L1600953-02 | Pass | -29.3 | 0.9 | - | - | - | - |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1600953
**Report Date:** 01/28/16

# Air Canister Certification Results

Lab ID: L1600953-02
Client ID: CAN 1920 SHELF 8
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15
Analytical Date: 01/13/16 16:57
Analyst: RY

Date Collected: 01/12/16 15:00
Date Received: 01/13/16
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Chlorodifluoromethane | ND | 0.200 | -- | ND | 0.707 | -- | | 1 |
| Propylene | ND | 0.500 | -- | ND | 0.861 | -- | | 1 |
| Propane | ND | 0.500 | -- | ND | 0.902 | -- | | 1 |
| Dichlorodifluoromethane | ND | 0.200 | -- | ND | 0.989 | -- | | 1 |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.200 | -- | ND | 1.40 | -- | | 1 |
| Methanol | ND | 5.00 | -- | ND | 6.55 | -- | | 1 |
| Vinyl chloride | ND | 0.200 | -- | ND | 0.511 | -- | | 1 |
| 1,3-Butadiene | ND | 0.200 | -- | ND | 0.442 | -- | | 1 |
| Butane | ND | 0.200 | -- | ND | 0.475 | -- | | 1 |
| Bromomethane | ND | 0.200 | -- | ND | 0.777 | -- | | 1 |
| Chloroethane | ND | 0.200 | -- | ND | 0.528 | -- | | 1 |
| Ethanol | ND | 5.00 | -- | ND | 9.42 | -- | | 1 |
| Dichlorofluoromethane | ND | 0.200 | -- | ND | 0.842 | -- | | 1 |
| Vinyl bromide | ND | 0.200 | -- | ND | 0.874 | -- | | 1 |
| Acrolein | ND | 0.500 | -- | ND | 1.15 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Acetonitrile | ND | 0.200 | -- | ND | 0.336 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.200 | -- | ND | 1.12 | -- | | 1 |
| Isopropanol | ND | 0.500 | -- | ND | 1.23 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| Pentane | ND | 0.200 | -- | ND | 0.590 | -- | | 1 |
| Ethyl ether | ND | 0.200 | -- | ND | 0.606 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Tertiary butyl Alcohol | ND | 0.500 | -- | ND | 1.52 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1600953
**Report Date:** 01/28/16

# Air Canister Certification Results

Lab ID: L1600953-02
Client ID: CAN 1920 SHELF 8
Sample Location:
Date Collected: 01/12/16 15:00
Date Received: 01/13/16
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| 3-Chloropropene | ND | 0.200 | -- | ND | 0.626 | -- | | 1 |
| Carbon disulfide | ND | 0.200 | -- | ND | 0.623 | -- | | 1 |
| Freon-113 | ND | 0.200 | -- | ND | 1.53 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| Vinyl acetate | ND | 1.00 | -- | ND | 3.52 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |
| Ethyl Acetate | ND | 0.500 | -- | ND | 1.80 | -- | | 1 |
| Chloroform | ND | 0.200 | -- | ND | 0.977 | -- | | 1 |
| Tetrahydrofuran | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| 2,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.200 | -- | ND | 0.809 | -- | | 1 |
| n-Hexane | ND | 0.200 | -- | ND | 0.705 | -- | | 1 |
| Diisopropyl ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| tert-Butyl Ethyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| Benzene | ND | 0.200 | -- | ND | 0.639 | -- | | 1 |
| Carbon tetrachloride | ND | 0.200 | -- | ND | 1.26 | -- | | 1 |
| Cyclohexane | ND | 0.200 | -- | ND | 0.688 | -- | | 1 |
| tert-Amyl Methyl Ether | ND | 0.200 | -- | ND | 0.836 | -- | | 1 |
| Dibromomethane | ND | 0.200 | -- | ND | 1.42 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| Bromodichloromethane | ND | 0.200 | -- | ND | 1.34 | -- | | 1 |
| 1,4-Dioxane | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1600953

**Project Number:** CANISTER QC BAT **Report Date:** 01/28/16

# Air Canister Certification Results

Lab ID: L1600953-02 Date Collected: 01/12/16 15:00

Client ID: CAN 1920 SHELF 8 Date Received: 01/13/16

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |
| Trichloroethene | ND | 0.200 | -- | ND | 1.07 | -- | | 1 |
| 2,2,4-Trimethylpentane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Methyl Methacrylate | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| Heptane | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.200 | -- | ND | 0.908 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.200 | -- | ND | 1.09 | -- | | 1 |
| Toluene | ND | 0.200 | -- | ND | 0.754 | -- | | 1 |
| 1,3-Dichloropropane | ND | 0.200 | -- | ND | 0.924 | -- | | 1 |
| 2-Hexanone | ND | 0.200 | -- | ND | 0.820 | -- | | 1 |
| Dibromochloromethane | ND | 0.200 | -- | ND | 1.70 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.200 | -- | ND | 1.54 | -- | | 1 |
| Butyl acetate | ND | 0.500 | -- | ND | 2.38 | -- | | 1 |
| Octane | ND | 0.200 | -- | ND | 0.934 | -- | | 1 |
| Tetrachloroethene | ND | 0.200 | -- | ND | 1.36 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| Chlorobenzene | ND | 0.200 | -- | ND | 0.921 | -- | | 1 |
| Ethylbenzene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| p/m-Xylene | ND | 0.400 | -- | ND | 1.74 | -- | | 1 |
| Bromoform | ND | 0.200 | -- | ND | 2.07 | -- | | 1 |
| Styrene | ND | 0.200 | -- | ND | 0.852 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.200 | -- | ND | 1.37 | -- | | 1 |
| o-Xylene | ND | 0.200 | -- | ND | 0.869 | -- | | 1 |
| 1,2,3-Trichloropropane | ND | 0.200 | -- | ND | 1.21 | -- | | 1 |
| Nonane | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Bromobenzene | ND | 0.200 | -- | ND | 0.793 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1600953
**Report Date:** 01/28/16

# Air Canister Certification Results

Lab ID: L1600953-02
Client ID: CAN 1920 SHELF 8
Sample Location:
Date Collected: 01/12/16 15:00
Date Received: 01/13/16
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| **Volatile Organics in Air - Mansfield Lab** | | | | | | | | |
| 2-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| n-Propylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Chlorotoluene | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 1,3,5-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| tert-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| Decane | ND | 0.200 | -- | ND | 1.16 | -- | | 1 |
| Benzyl chloride | ND | 0.200 | -- | ND | 1.04 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.200 | -- | ND | 1.20 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dibromo-3-chloropropane | ND | 0.200 | -- | ND | 1.93 | -- | | 1 |
| Undecane | ND | 0.200 | -- | ND | 1.28 | -- | | 1 |
| Dodecane | ND | 0.200 | -- | ND | 1.39 | -- | | 1 |
| 1,2,4-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Naphthalene | ND | 0.200 | -- | ND | 1.05 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.200 | -- | ND | 1.48 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.200 | -- | ND | 2.13 | -- | | 1 |

| | Results | Qualifier | Units | RDL | Dilution Factor |
|---|---|---|---|---|---|
| **Tentatively Identified Compounds** | | | | | |
| No Tentatively Identified Compounds | | | | | |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1600953

**Project Number:** CANISTER QC BAT **Report Date:** 01/28/16

# Air Canister Certification Results

Lab ID: L1600953-02 Date Collected: 01/12/16 15:00

Client ID: CAN 1920 SHELF 8 Date Received: 01/13/16

Sample Location: Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air - Mansfield Lab | | | | | | | | |

| Internal Standard | % Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| 1,4-Difluorobenzene | 97 | | 60-140 |
| Bromochloromethane | 89 | | 60-140 |
| chlorobenzene-d5 | 91 | | 60-140 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1600953
**Report Date:** 01/28/16

# Air Canister Certification Results

Lab ID: L1600953-02
Client ID: CAN 1920 SHELF 8
Sample Location:
Matrix: Air
Anaytical Method: 48,TO-15-SIM
Analytical Date: 01/13/16 16:57
Analyst: RY

Date Collected: 01/12/16 15:00
Date Received: 01/13/16
Field Prep: Not Specified

| Parameter | ppbV Results | ppbV RL | ppbV MDL | ug/m3 Results | ug/m3 RL | ug/m3 MDL | Qualifier | Dilution Factor |
|---|---|---|---|---|---|---|---|---|
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| Chloromethane | ND | 0.200 | -- | ND | 0.413 | -- | | 1 |
| Freon-114 | ND | 0.050 | -- | ND | 0.349 | -- | | 1 |
| Vinyl chloride | ND | 0.020 | -- | ND | 0.051 | -- | | 1 |
| 1,3-Butadiene | ND | 0.020 | -- | ND | 0.044 | -- | | 1 |
| Bromomethane | ND | 0.020 | -- | ND | 0.078 | -- | | 1 |
| Chloroethane | ND | 0.020 | -- | ND | 0.053 | -- | | 1 |
| Acetone | ND | 1.00 | -- | ND | 2.38 | -- | | 1 |
| Trichlorofluoromethane | ND | 0.050 | -- | ND | 0.281 | -- | | 1 |
| Acrylonitrile | ND | 0.500 | -- | ND | 1.09 | -- | | 1 |
| 1,1-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Methylene chloride | ND | 0.500 | -- | ND | 1.74 | -- | | 1 |
| Freon-113 | ND | 0.050 | -- | ND | 0.383 | -- | | 1 |
| Halothane | ND | 0.050 | -- | ND | 0.404 | -- | | 1 |
| trans-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| 1,1-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| Methyl tert butyl ether | ND | 0.200 | -- | ND | 0.721 | -- | | 1 |
| 2-Butanone | ND | 0.500 | -- | ND | 1.47 | -- | | 1 |
| cis-1,2-Dichloroethene | ND | 0.020 | -- | ND | 0.079 | -- | | 1 |
| Chloroform | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2-Dichloroethane | ND | 0.020 | -- | ND | 0.081 | -- | | 1 |
| 1,1,1-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Benzene | ND | 0.100 | -- | ND | 0.319 | -- | | 1 |
| Carbon tetrachloride | ND | 0.020 | -- | ND | 0.126 | -- | | 1 |
| 1,2-Dichloropropane | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |
| Bromodichloromethane | ND | 0.020 | -- | ND | 0.134 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION
**Project Number:** CANISTER QC BAT
**Lab Number:** L1600953
**Report Date:** 01/28/16

# Air Canister Certification Results

Lab ID: L1600953-02
Client ID: CAN 1920 SHELF 8
Sample Location:
Date Collected: 01/12/16 15:00
Date Received: 01/13/16
Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| 1,4-Dioxane | ND | 0.100 | -- | ND | 0.360 | -- | | 1 |
| Trichloroethene | ND | 0.020 | -- | ND | 0.107 | -- | | 1 |
| cis-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 4-Methyl-2-pentanone | ND | 0.500 | -- | ND | 2.05 | -- | | 1 |
| trans-1,3-Dichloropropene | ND | 0.020 | -- | ND | 0.091 | -- | | 1 |
| 1,1,2-Trichloroethane | ND | 0.020 | -- | ND | 0.109 | -- | | 1 |
| Toluene | ND | 0.050 | -- | ND | 0.188 | -- | | 1 |
| Dibromochloromethane | ND | 0.020 | -- | ND | 0.170 | -- | | 1 |
| 1,2-Dibromoethane | ND | 0.020 | -- | ND | 0.154 | -- | | 1 |
| Tetrachloroethene | ND | 0.020 | -- | ND | 0.136 | -- | | 1 |
| 1,1,1,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| Chlorobenzene | ND | 0.020 | -- | ND | 0.092 | -- | | 1 |
| Ethylbenzene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| p/m-Xylene | ND | 0.040 | -- | ND | 0.174 | -- | | 1 |
| Bromoform | ND | 0.020 | -- | ND | 0.207 | -- | | 1 |
| Styrene | ND | 0.020 | -- | ND | 0.085 | -- | | 1 |
| 1,1,2,2-Tetrachloroethane | ND | 0.020 | -- | ND | 0.137 | -- | | 1 |
| o-Xylene | ND | 0.020 | -- | ND | 0.087 | -- | | 1 |
| Isopropylbenzene | ND | 0.200 | -- | ND | 0.983 | -- | | 1 |
| 4-Ethyltoluene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3,5-Trimethybenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,2,4-Trimethylbenzene | ND | 0.020 | -- | ND | 0.098 | -- | | 1 |
| 1,3-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| 1,4-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| sec-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| p-Isopropyltoluene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |
| 1,2-Dichlorobenzene | ND | 0.020 | -- | ND | 0.120 | -- | | 1 |
| n-Butylbenzene | ND | 0.200 | -- | ND | 1.10 | -- | | 1 |

**Project Name:** BATCH CANISTER CERTIFICATION **Lab Number:** L1600953

**Project Number:** CANISTER QC BAT **Report Date:** 01/28/16

# Air Canister Certification Results

Lab ID: L1600953-02 Date Collected: 01/12/16 15:00

Client ID: CAN 1920 SHELF 8 Date Received: 01/13/16

Sample Location: Field Prep: Not Specified

| | ppbV | | | ug/m3 | | | | |
|---|---|---|---|---|---|---|---|---|
| **Parameter** | **Results** | **RL** | **MDL** | **Results** | **RL** | **MDL** | **Qualifier** | **Dilution Factor** |
| Volatile Organics in Air by SIM - Mansfield Lab | | | | | | | | |
| 1,2,4-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Naphthalene | ND | 0.050 | -- | ND | 0.262 | -- | | 1 |
| 1,2,3-Trichlorobenzene | ND | 0.050 | -- | ND | 0.371 | -- | | 1 |
| Hexachlorobutadiene | ND | 0.050 | -- | ND | 0.533 | -- | | 1 |

| **Internal Standard** | **% Recovery** | **Qualifier** | **Acceptance Criteria** |
|---|---|---|---|
| 1,4-difluorobenzene | 96 | | 60-140 |
| bromochloromethane | 91 | | 60-140 |
| chlorobenzene-d5 | 97 | | 60-140 |

**Project Name:** RARITAN ARSENAL
**Project Number:** TR0479-02B

**Lab Number:** L1601851
**Report Date:** 01/28/16

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

| Cooler Information | Custody Seal |
|---|---|
| Cooler | |
| N/A | Absent |

**Container Information**

| Container ID | Container Type | Cooler | pH | Temp deg C | Pres | Seal | Analysis(*) |
|---|---|---|---|---|---|---|---|
| L1601851-01A | Canister - 1 Liter | N/A | N/A | N/A | Y | Absent | NJ-TO15(30) |

*Values in parentheses indicate holding time in days

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1601851 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/28/16 |

## GLOSSARY

### *Acronyms*

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

### *Footnotes*

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### *Terms*

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### *Data Qualifiers*

**A** - Spectra identified as "Aldol Condensation Product".

**B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

*Report Format:* Data Usability Report

| | | | |
|---|---|---|---|
| **Project Name:** | RARITAN ARSENAL | **Lab Number:** | L1601851 |
| **Project Number:** | TR0479-02B | **Report Date:** | 01/28/16 |

***Data Qualifiers***

**C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

**D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

**E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

**G** - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

**H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

**I** - The lower value for the two columns has been reported due to obvious interference.

**M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

**NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

**P** - The RPD between the results for the two columns exceeds the method-specified criteria.

**Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

**R** - Analytical results are from sample re-analysis.

**RE** - Analytical results are from sample re-extraction.

**S** - Analytical results are from modified screening analysis.

**J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

**ND** - Not detected at the reporting limit (RL) for the sample.

*Report Format:* Data Usability Report

## REFERENCES

48 Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Second Edition. EPA/625/R-96/010b, January 1999.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

# Certification Information

**The following analytes are not included in our Primary NELAP Scope of Accreditation:**

**Westborough Facility**
**EPA 524.2:** 1,2-Dibromo-3-chloropropane, 1,2-Dibromoethane, m/p-xylene, o-xylene
**EPA 624:** 2-Butanone (MEK), 1,4-Dioxane, tert-Amylmethyl Ether, tert-Butyl Alcohol, m/p-xylene, o-xylene
**EPA 625:** Aniline, Benzoic Acid, Benzyl Alcohol, 4-Chloroaniline, 3-Methylphenol, 4-Methylphenol.
**EPA 1010A:** NPW: Ignitability
**EPA 6010C:** NPW: Strontium; SCM: Strontium
**EPA 8151A:** NPW: 2,4-DB, Dicamba, Dichloroprop, MCPA, MCPP; SCM: 2,4-DB, Dichloroprop, MCPA, MCPP
**EPA 8260C:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene, Isopropanol; SCM: Iodomethane (methyl iodide), Methyl methacrylate (soil); 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
**EPA 8270D:** NPW: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Pentachloronitrobenzene, 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.
**EPA 9010:** NPW: Amenable Cyanide Distillation, Total Cyanide Distillation
**EPA 9038:** NPW: Sulfate
**EPA 9050A:** NPW: Specific Conductance
**EPA 9056:** NPW: Chloride, Nitrate, Sulfate
**EPA 9065:** NPW: Phenols
**EPA 9251:** NPW: Chloride
**SM3500:** NPW: Ferrous Iron
**SM4500**: NPW: Amenable Cyanide, Dissolved Oxygen; SCM: Total Phosphorus, TKN, NO2, NO3.
**SM5310C:** DW: Dissolved Organic Carbon

**Mansfield Facility**
**EPA 8270D:** NPW: Biphenyl; SCM: Biphenyl
**EPA 2540D:** TSS
**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

***Drinking Water***
**EPA 200.8**: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;
**EPA 300.0**: Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B**
**EPA 332**: Perchlorate.
**Microbiology**: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

***Non-Potable Water***
**EPA 200.8**: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;
**EPA 200.7**: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;
**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH**, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**
**EPA 624**: Volatile Halocarbons & Aromatics,
**EPA 608**: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
**EPA 625**: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF**.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Alpha Analytical
320 Forbes Blvd
Mansfield, MA 02048-1806
Tel: 508-822-9300
Fax: 508-822-3288

# AIR Chain-of-Custody - NJ

Date Rec'd in Lab 1/22/16 | ALPHA Job# L1601851

1 of 1 COCs

## Client Contact Information

Company: Geosyntec
Address: 130 Stone Road West
City/State/Zip: Guelph ON N1G3Z2
Phone: 519-515-0864
FAX: —
Email: PNicholson@geosyntec.com
Site Contact: Matthew Mraw
Site Contact Phone: 609-462-1198

## Project Information

Project Name: Raritan Arsenal
Project No: ~~TR0479~~ TR0479-02B
Site/Location: Edison, NJ
Project Manager: Paul Nicholson

## Analysis Turn-Around Time

Standard (Specify) 5 day
Rush (Specify)

## NJ DEP Information

Bureau: Division: Contract No:

## Report Information - Data Deliverables:

☐ FAX:
☒ ADEx ☐ Criteria Checker: _____
☒ EMail (standard pdf report)

## Billing Information

☐ Same as Client Info PO #:

| ALPHA LAB ID (Lab Use Only) | Sample Identification | Sample Date(s) | Time Start (24 hr clock) | Time Stop (24 hr clock) | Canister Pressure in Field (Hg) (Start) | Canister Pressure in Field ~~(Hg)~~ (Stop) | Interior Temp. (F) (Start) | Interior Temp. (F) (Stop) | Outgoing Canister Pressure (Hg) (Note1) | Incoming Canister Pressure (Hg) (Note 2) | Flow Reg. ID | Can ID | Can Size (L) | Flow Controller Readout (ml/min) (Note1) | Batch Cert ID (Note 1) | Analysis: TO-15 | Analysis: EPA 3C | Matrix: Indoor /Ambient Air | Matrix: Soil Gas |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1601851-01 | 8-SSDS-200 | 1/22/16 | 0950 | 0950 | NM | -8.0 | 20 | 20 | NA | | NA | NA | 1 | NA | NA | X | | | X |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

mm 1/20/16

Custody Seals:
Outgoing Seal No: _____ (refer to crate seal)
Incoming Seal No: _____ (if applicable)

Temperature (Fahrenheit)

| | Ambient | Maximum | Minimum | |
|---|---|---|---|---|
| Start | 20 | 20 | 20 | |
| Stop | 20 | 20 | 20 | |

Pressure (inches of Hg)

| | Ambient | Maximum | Minimum | |
|---|---|---|---|---|
| Start | 30.16 | 30.16 | 30.16 | |
| Stop | 30.16 | 30.16 | 30.16 | |

Individual Preparing Canister/Containers and Laboratory Canister Certification
Name: Lisa Barrett
Signature: Lisa B

Footnotes:
(1) Refer to equipment tags for these readings.
(2) Readings provided in data deliverable package.

Special Instructions/QC Requirements & Comments:

| Canisters Shipped by: | Date/Time: | Canisters Received by: | Date/Time: |
|---|---|---|---|
| Samples Relinquished by: Matt Mraw | Date/Time: 1/20/16 11:23 | Received by: Lisa Barrett-AAL | Date/Time: 1/21/16 11:23 |
| Relinquished by: Lisa Barrett-AAL | Date/Time: 1/21/16 1850 | Received by: Tom Tobin | Date/Time: 1-21-16 1850 |
| Tom Tobin | 1-21-16 2315 | GE Williams | 1-21-16 2315 |
| GE Williams | 1-22-16 02:15 | Pete Boehm | 1/22/16 02:15 |

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until all ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.

Note: Combined External Chain of Custody and NJDEP Field Test Data Sheet

# Site #3: Sun Devil Manor

# Hill Air Force Base

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6/22/2016

Mr. Paul Nicholson
GeoSyntec Consultants
130 Stone Road West

Guelph, Ontario  N1G3Z2

Project Name: SDM Optimization
Project #: TR0479
Workorder #: 1606235

Dear Mr. Paul Nicholson

The following report includes the data for the above referenced project for sample(s) received on 6/10/2016 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs.  Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality.  Please feel free the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott

Project Manager

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# WORK ORDER #: 1606235

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Stone Road West<br>Guelph, Ontario N1G3Z2 | **BILL TO:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Stone Road West<br>Guelph, Ontario N1G3Z2 |
| **PHONE:** | 519-822-2230 | **P.O. #** | |
| **FAX:** | 519-822-3151 | **PROJECT #** | TR0479 SDM Optimization |
| **DATE RECEIVED:** | 06/10/2016 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 06/22/2016 | | |

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. | FINAL PRESSURE |
|---|---|---|---|---|
| 01A | ST-LDO-120-53 | Modified TO-15 | 9 "Hg | 5 psi |
| 01B | ST-LDO-120-53 | Modified TO-15 | 9 "Hg | 5 psi |
| 02A | Lab Blank | Modified TO-15 | NA | NA |
| 02B | Lab Blank | Modified TO-15 | NA | NA |
| 03A | CCV | Modified TO-15 | NA | NA |
| 03B | CCV | Modified TO-15 | NA | NA |
| 04A | LCS | Modified TO-15 | NA | NA |
| 04AA | LCSD | Modified TO-15 | NA | NA |
| 04B | LCS | Modified TO-15 | NA | NA |
| 04BB | LCSD | Modified TO-15 | NA | NA |

CERTIFIED BY:  DATE: 06/22/16

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-15-9, UT NELAP CA0093332015-6, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2015, Expiration date: 10/17/2016.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

**LABORATORY NARRATIVE**
**Modified TO-15 Full Scan/SIM**
**GeoSyntec Consultants**
**Workorder# 1606235**

One 6 Liter Summa Canister (SIM Certified) samples were received on June 10, 2016. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the Full Scan and SIM acquisition modes. The method involves concentrating up to 1.0 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

| ***Requirement*** | ***TO-15*** | ***ATL Modifications*** |
|---|---|---|
| ICAL %RSD acceptance criteria | </=30% RSD with 2 compounds allowed out to < 40% RSD | For Full Scan:<br>30% RSD with 4 compounds allowed out to < 40% RSD<br><br>For SIM:<br>Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD |
| Daily Calibration | +- 30% Difference | For Full Scan:<br></= 30% Difference with four allowed out up to </=40%.; flag and narrate outliers<br><br>For SIM:<br>Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers |
| Blank and standards | Zero air | Nitrogen |
| Method Detection Limit | Follow 40CFR Pt.136 App. B | The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases |

## Receiving Notes

There were no receiving discrepancies.

## Analytical Notes

The results for each sample in this report were acquired from two separate data files originating from the same analytical run. The two data files have the same base file name and are differentiated with a "sim" extension on the SIM data file.

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is

defined at the bottom of this Case Narrative and on each Sample Result Summary page. Target compound non-detects in the samples that are associated with high bias in QC analyses have not been flagged.

**Definition of Data Qualifying Flags**

Nine qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

CN - See case narrative explanation

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN

**Client Sample ID: ST-LDO-120-53**

**Lab ID#: 1606235-01A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 11 | 0.19 | 0.42 | 1.1 | 2.3 |
| Ethanol | 0.96 | 28 | 1.8 | 52 |
| Freon 113 | 0.19 | 0.49 | 1.5 | 3.8 |
| Acetone | 0.96 | 16 | 2.3 | 38 |
| 2-Propanol | 0.96 | 1.8 | 2.3 | 4.5 |
| Methylene Chloride | 0.38 | 0.54 | 1.3 | 1.9 |
| Hexane | 0.19 | 0.33 | 0.67 | 1.2 |
| 2-Butanone (Methyl Ethyl Ketone) | 0.96 | 1.1 | 2.8 | 3.2 |
| Cyclohexane | 0.19 | 0.32 | 0.66 | 1.1 |
| Heptane | 0.19 | 0.27 | 0.78 | 1.1 |
| Styrene | 0.19 | 0.22 | 0.81 | 0.95 |

**Client Sample ID: ST-LDO-120-53**

**Lab ID#: 1606235-01B**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.038 | 0.52 | 0.19 | 2.6 |
| Chloromethane | 0.096 | 0.51 | 0.20 | 1.0 |
| 1,1-Dichloroethene | 0.019 | 3.8 | 0.076 | 15 |
| 1,1-Dichloroethane | 0.038 | 1.1 | 0.15 | 4.3 |
| cis-1,2-Dichloroethene | 0.038 | 0.90 | 0.15 | 3.6 |
| Chloroform | 0.038 | 3.7 | 0.19 | 18 |
| 1,1,1-Trichloroethane | 0.038 | 1.9 | 0.21 | 10 |
| Carbon Tetrachloride | 0.038 | 0.071 | 0.24 | 0.45 |
| Benzene | 0.096 | 0.18 | 0.30 | 0.58 |
| 1,2-Dichloroethane | 0.038 | 0.21 | 0.15 | 0.85 |
| Trichloroethene | 0.038 | 7.9 | 0.20 | 42 |
| Toluene | 0.038 | 1.4 | 0.14 | 5.2 |
| Tetrachloroethene | 0.038 | 2.0 | 0.26 | 13 |
| Ethyl Benzene | 0.038 | 0.12 | 0.16 | 0.54 |
| m,p-Xylene | 0.076 | 0.36 | 0.33 | 1.5 |
| o-Xylene | 0.038 | 0.15 | 0.16 | 0.64 |

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**Client Sample ID: ST-LDO-120-53**

**Lab ID#: 1606235-01A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061609** | **Date of Collection:** | **6/7/16 6:55:00 PM** |
| **Dil. Factor:** | **1.91** | **Date of Analysis:** | **6/16/16 05:05 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| 1,3-Butadiene | 0.19 | Not Detected | 0.42 | Not Detected |
| Bromomethane | 0.96 | Not Detected | 3.7 | Not Detected |
| Freon 11 | 0.19 | 0.42 | 1.1 | 2.3 |
| Ethanol | 0.96 | 28 | 1.8 | 52 |
| Freon 113 | 0.19 | 0.49 | 1.5 | 3.8 |
| Acetone | 0.96 | 16 | 2.3 | 38 |
| 2-Propanol | 0.96 | 1.8 | 2.3 | 4.5 |
| Carbon Disulfide | 0.96 | Not Detected | 3.0 | Not Detected |
| 3-Chloropropene | 0.96 | Not Detected | 3.0 | Not Detected |
| Methylene Chloride | 0.38 | 0.54 | 1.3 | 1.9 |
| Hexane | 0.19 | 0.33 | 0.67 | 1.2 |
| 2-Butanone (Methyl Ethyl Ketone) | 0.96 | 1.1 | 2.8 | 3.2 |
| Tetrahydrofuran | 0.96 | Not Detected | 2.8 | Not Detected |
| Cyclohexane | 0.19 | 0.32 | 0.66 | 1.1 |
| 2,2,4-Trimethylpentane | 0.96 | Not Detected | 4.5 | Not Detected |
| Heptane | 0.19 | 0.27 | 0.78 | 1.1 |
| 1,2-Dichloropropane | 0.19 | Not Detected | 0.88 | Not Detected |
| 1,4-Dioxane | 0.19 | Not Detected | 0.69 | Not Detected |
| Bromodichloromethane | 0.19 | Not Detected | 1.3 | Not Detected |
| cis-1,3-Dichloropropene | 0.19 | Not Detected | 0.87 | Not Detected |
| 4-Methyl-2-pentanone | 0.19 | Not Detected | 0.78 | Not Detected |
| trans-1,3-Dichloropropene | 0.19 | Not Detected | 0.87 | Not Detected |
| 2-Hexanone | 0.96 | Not Detected | 3.9 | Not Detected |
| Dibromochloromethane | 0.19 | Not Detected | 1.6 | Not Detected |
| Chlorobenzene | 0.19 | Not Detected | 0.88 | Not Detected |
| Styrene | 0.19 | 0.22 | 0.81 | 0.95 |
| Bromoform | 0.19 | Not Detected | 2.0 | Not Detected |
| Cumene | 0.19 | Not Detected | 0.94 | Not Detected |
| Propylbenzene | 0.19 | Not Detected | 0.94 | Not Detected |
| 4-Ethyltoluene | 0.19 | Not Detected | 0.94 | Not Detected |
| 1,3,5-Trimethylbenzene | 0.19 | Not Detected | 0.94 | Not Detected |
| 1,2,4-Trimethylbenzene | 0.19 | Not Detected | 0.94 | Not Detected |
| 1,3-Dichlorobenzene | 0.19 | Not Detected | 1.1 | Not Detected |
| alpha-Chlorotoluene | 0.19 | Not Detected | 0.99 | Not Detected |
| 1,2-Dichlorobenzene | 0.19 | Not Detected | 1.1 | Not Detected |
| 1,2,4-Trichlorobenzene | 0.96 | Not Detected | 7.1 | Not Detected |
| Hexachlorobutadiene | 0.96 | Not Detected | 10 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 114 | 70-130 |

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**Client Sample ID: ST-LDO-120-53**

**Lab ID#: 1606235-01A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061609** | **Date of Collection: 6/7/16 6:55:00 PM** | |
| **Dil. Factor:** | **1.91** | **Date of Analysis: 6/16/16 05:05 PM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 96 | 70-130 |

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**Client Sample ID: ST-LDO-120-53**

**Lab ID#: 1606235-01B**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061609sim** | **Date of Collection:** | **6/7/16 6:55:00 PM** |
| **Dil. Factor:** | **1.91** | **Date of Analysis:** | **6/16/16 05:05 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.038 | 0.52 | 0.19 | 2.6 |
| Freon 114 | 0.038 | Not Detected | 0.27 | Not Detected |
| Chloromethane | 0.096 | 0.51 | 0.20 | 1.0 |
| Vinyl Chloride | 0.019 | Not Detected | 0.049 | Not Detected |
| Chloroethane | 0.096 | Not Detected | 0.25 | Not Detected |
| 1,1-Dichloroethene | 0.019 | 3.8 | 0.076 | 15 |
| trans-1,2-Dichloroethene | 0.19 | Not Detected | 0.76 | Not Detected |
| Methyl tert-butyl ether | 0.19 | Not Detected | 0.69 | Not Detected |
| 1,1-Dichloroethane | 0.038 | 1.1 | 0.15 | 4.3 |
| cis-1,2-Dichloroethene | 0.038 | 0.90 | 0.15 | 3.6 |
| Chloroform | 0.038 | 3.7 | 0.19 | 18 |
| 1,1,1-Trichloroethane | 0.038 | 1.9 | 0.21 | 10 |
| Carbon Tetrachloride | 0.038 | 0.071 | 0.24 | 0.45 |
| Benzene | 0.096 | 0.18 | 0.30 | 0.58 |
| 1,2-Dichloroethane | 0.038 | 0.21 | 0.15 | 0.85 |
| Trichloroethene | 0.038 | 7.9 | 0.20 | 42 |
| Toluene | 0.038 | 1.4 | 0.14 | 5.2 |
| 1,1,2-Trichloroethane | 0.038 | Not Detected | 0.21 | Not Detected |
| Tetrachloroethene | 0.038 | 2.0 | 0.26 | 13 |
| 1,2-Dibromoethane (EDB) | 0.038 | Not Detected | 0.29 | Not Detected |
| Ethyl Benzene | 0.038 | 0.12 | 0.16 | 0.54 |
| m,p-Xylene | 0.076 | 0.36 | 0.33 | 1.5 |
| o-Xylene | 0.038 | 0.15 | 0.16 | 0.64 |
| 1,1,2,2-Tetrachloroethane | 0.038 | Not Detected | 0.26 | Not Detected |
| 1,4-Dichlorobenzene | 0.038 | Not Detected | 0.23 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 114 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 98 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1606235-02A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061606** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 02:07 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| 1,3-Butadiene | 0.10 | Not Detected | 0.22 | Not Detected |
| Bromomethane | 0.50 | Not Detected | 1.9 | Not Detected |
| Freon 11 | 0.10 | Not Detected | 0.56 | Not Detected |
| Ethanol | 0.50 | Not Detected | 0.94 | Not Detected |
| Freon 113 | 0.10 | Not Detected | 0.77 | Not Detected |
| Acetone | 0.50 | Not Detected | 1.2 | Not Detected |
| 2-Propanol | 0.50 | Not Detected | 1.2 | Not Detected |
| Carbon Disulfide | 0.50 | Not Detected | 1.6 | Not Detected |
| 3-Chloropropene | 0.50 | Not Detected | 1.6 | Not Detected |
| Methylene Chloride | 0.20 | Not Detected | 0.69 | Not Detected |
| Hexane | 0.10 | Not Detected | 0.35 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.50 | Not Detected | 1.5 | Not Detected |
| Tetrahydrofuran | 0.50 | Not Detected | 1.5 | Not Detected |
| Cyclohexane | 0.10 | Not Detected | 0.34 | Not Detected |
| 2,2,4-Trimethylpentane | 0.50 | Not Detected | 2.3 | Not Detected |
| Heptane | 0.10 | Not Detected | 0.41 | Not Detected |
| 1,2-Dichloropropane | 0.10 | Not Detected | 0.46 | Not Detected |
| 1,4-Dioxane | 0.10 | Not Detected | 0.36 | Not Detected |
| Bromodichloromethane | 0.10 | Not Detected | 0.67 | Not Detected |
| cis-1,3-Dichloropropene | 0.10 | Not Detected | 0.45 | Not Detected |
| 4-Methyl-2-pentanone | 0.10 | Not Detected | 0.41 | Not Detected |
| trans-1,3-Dichloropropene | 0.10 | Not Detected | 0.45 | Not Detected |
| 2-Hexanone | 0.50 | Not Detected | 2.0 | Not Detected |
| Dibromochloromethane | 0.10 | Not Detected | 0.85 | Not Detected |
| Chlorobenzene | 0.10 | Not Detected | 0.46 | Not Detected |
| Styrene | 0.10 | Not Detected | 0.42 | Not Detected |
| Bromoform | 0.10 | Not Detected | 1.0 | Not Detected |
| Cumene | 0.10 | Not Detected | 0.49 | Not Detected |
| Propylbenzene | 0.10 | Not Detected | 0.49 | Not Detected |
| 4-Ethyltoluene | 0.10 | Not Detected | 0.49 | Not Detected |
| 1,3,5-Trimethylbenzene | 0.10 | Not Detected | 0.49 | Not Detected |
| 1,2,4-Trimethylbenzene | 0.10 | Not Detected | 0.49 | Not Detected |
| 1,3-Dichlorobenzene | 0.10 | Not Detected | 0.60 | Not Detected |
| alpha-Chlorotoluene | 0.10 | Not Detected | 0.52 | Not Detected |
| 1,2-Dichlorobenzene | 0.10 | Not Detected | 0.60 | Not Detected |
| 1,2,4-Trichlorobenzene | 0.50 | Not Detected | 3.7 | Not Detected |
| Hexachlorobutadiene | 0.50 | Not Detected | 5.3 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 111 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1606235-02A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061606** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 02:07 PM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 92 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1606235-02B**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061606sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 02:07 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.020 | Not Detected | 0.099 | Not Detected |
| Freon 114 | 0.020 | Not Detected | 0.14 | Not Detected |
| Chloromethane | 0.050 | Not Detected | 0.10 | Not Detected |
| Vinyl Chloride | 0.010 | Not Detected | 0.026 | Not Detected |
| Chloroethane | 0.050 | Not Detected | 0.13 | Not Detected |
| 1,1-Dichloroethene | 0.010 | Not Detected | 0.040 | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | Not Detected | 0.40 | Not Detected |
| Methyl tert-butyl ether | 0.10 | Not Detected | 0.36 | Not Detected |
| 1,1-Dichloroethane | 0.020 | Not Detected | 0.081 | Not Detected |
| cis-1,2-Dichloroethene | 0.020 | Not Detected | 0.079 | Not Detected |
| Chloroform | 0.020 | Not Detected | 0.098 | Not Detected |
| 1,1,1-Trichloroethane | 0.020 | Not Detected | 0.11 | Not Detected |
| Carbon Tetrachloride | 0.020 | Not Detected | 0.12 | Not Detected |
| Benzene | 0.050 | Not Detected | 0.16 | Not Detected |
| 1,2-Dichloroethane | 0.020 | Not Detected | 0.081 | Not Detected |
| Trichloroethene | 0.020 | Not Detected | 0.11 | Not Detected |
| Toluene | 0.020 | Not Detected | 0.075 | Not Detected |
| 1,1,2-Trichloroethane | 0.020 | Not Detected | 0.11 | Not Detected |
| Tetrachloroethene | 0.020 | Not Detected | 0.14 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.020 | Not Detected | 0.15 | Not Detected |
| Ethyl Benzene | 0.020 | Not Detected | 0.087 | Not Detected |
| m,p-Xylene | 0.040 | Not Detected | 0.17 | Not Detected |
| o-Xylene | 0.020 | Not Detected | 0.087 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.020 | Not Detected | 0.14 | Not Detected |
| 1,4-Dichlorobenzene | 0.020 | Not Detected | 0.12 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 115 | 70-130 |
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 95 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1606235-03A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061602** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 11:18 AM** | |

| Compound | %Recovery |
|---|---|
| 1,3-Butadiene | 106 |
| Bromomethane | 120 |
| Freon 11 | 108 |
| Ethanol | 112 |
| Freon 113 | 99 |
| Acetone | 101 |
| 2-Propanol | 103 |
| Carbon Disulfide | 108 |
| 3-Chloropropene | 101 |
| Methylene Chloride | 98 |
| Hexane | 108 |
| 2-Butanone (Methyl Ethyl Ketone) | 107 |
| Tetrahydrofuran | 111 |
| Cyclohexane | 103 |
| 2,2,4-Trimethylpentane | 108 |
| Heptane | 108 |
| 1,2-Dichloropropane | 109 |
| 1,4-Dioxane | 106 |
| Bromodichloromethane | 108 |
| cis-1,3-Dichloropropene | 109 |
| 4-Methyl-2-pentanone | 112 |
| trans-1,3-Dichloropropene | 113 |
| 2-Hexanone | 104 |
| Dibromochloromethane | 107 |
| Chlorobenzene | 108 |
| Styrene | 97 |
| Bromoform | 109 |
| Cumene | 104 |
| Propylbenzene | 97 |
| 4-Ethyltoluene | 92 |
| 1,3,5-Trimethylbenzene | 100 |
| 1,2,4-Trimethylbenzene | 104 |
| 1,3-Dichlorobenzene | 97 |
| alpha-Chlorotoluene | 109 |
| 1,2-Dichlorobenzene | 95 |
| 1,2,4-Trichlorobenzene | 102 |
| Hexachlorobutadiene | 90 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1606235-03A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061602** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 11:18 AM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1606235-03B**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061602sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 11:18 AM** | |

| Compound | %Recovery |
|---|---|
| Freon 12 | 110 |
| Freon 114 | 104 |
| Chloromethane | 98 |
| Vinyl Chloride | 97 |
| Chloroethane | 113 |
| 1,1-Dichloroethene | 97 |
| trans-1,2-Dichloroethene | 100 |
| Methyl tert-butyl ether | 102 |
| 1,1-Dichloroethane | 108 |
| cis-1,2-Dichloroethene | 101 |
| Chloroform | 109 |
| 1,1,1-Trichloroethane | 106 |
| Carbon Tetrachloride | 137 |
| Benzene | 103 |
| 1,2-Dichloroethane | 109 |
| Trichloroethene | 101 |
| Toluene | 106 |
| 1,1,2-Trichloroethane | 110 |
| Tetrachloroethene | 101 |
| 1,2-Dibromoethane (EDB) | 108 |
| Ethyl Benzene | 105 |
| m,p-Xylene | 102 |
| o-Xylene | 102 |
| 1,1,2,2-Tetrachloroethane | 112 |
| 1,4-Dichlorobenzene | 85 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 104 | 70-130 |
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 102 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1606235-04A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061603** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 12:05 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| 1,3-Butadiene | 108 | 70-130 |
| Bromomethane | 133 Q | 70-130 |
| Freon 11 | 117 | 70-130 |
| Ethanol | 120 | 70-130 |
| Freon 113 | 102 | 70-130 |
| Acetone | 106 | 70-130 |
| 2-Propanol | 112 | 70-130 |
| Carbon Disulfide | 99 | 70-130 |
| 3-Chloropropene | 99 | 70-130 |
| Methylene Chloride | 100 | 70-130 |
| Hexane | 109 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 109 | 70-130 |
| Tetrahydrofuran | 115 | 70-130 |
| Cyclohexane | 106 | 70-130 |
| 2,2,4-Trimethylpentane | 112 | 70-130 |
| Heptane | 112 | 70-130 |
| 1,2-Dichloropropane | 109 | 70-130 |
| 1,4-Dioxane | 103 | 70-130 |
| Bromodichloromethane | 113 | 70-130 |
| cis-1,3-Dichloropropene | 102 | 70-130 |
| 4-Methyl-2-pentanone | 114 | 70-130 |
| trans-1,3-Dichloropropene | 112 | 70-130 |
| 2-Hexanone | 108 | 70-130 |
| Dibromochloromethane | 110 | 70-130 |
| Chlorobenzene | 107 | 70-130 |
| Styrene | 98 | 70-130 |
| Bromoform | 113 | 70-130 |
| Cumene | 103 | 70-130 |
| Propylbenzene | 97 | 70-130 |
| 4-Ethyltoluene | 90 | 70-130 |
| 1,3,5-Trimethylbenzene | 99 | 70-130 |
| 1,2,4-Trimethylbenzene | 102 | 70-130 |
| 1,3-Dichlorobenzene | 98 | 70-130 |
| alpha-Chlorotoluene | 109 | 70-130 |
| 1,2-Dichlorobenzene | 96 | 70-130 |
| 1,2,4-Trichlorobenzene | 102 | 70-130 |
| Hexachlorobutadiene | 90 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1606235-04A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061603** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 12:05 PM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 102 | 70-130 |
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 97 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1606235-04AA**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061604** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 12:51 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| 1,3-Butadiene | 107 | 70-130 |
| Bromomethane | 132 Q | 70-130 |
| Freon 11 | 115 | 70-130 |
| Ethanol | 120 | 70-130 |
| Freon 113 | 101 | 70-130 |
| Acetone | 104 | 70-130 |
| 2-Propanol | 110 | 70-130 |
| Carbon Disulfide | 98 | 70-130 |
| 3-Chloropropene | 98 | 70-130 |
| Methylene Chloride | 98 | 70-130 |
| Hexane | 108 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 105 | 70-130 |
| Tetrahydrofuran | 113 | 70-130 |
| Cyclohexane | 105 | 70-130 |
| 2,2,4-Trimethylpentane | 111 | 70-130 |
| Heptane | 107 | 70-130 |
| 1,2-Dichloropropane | 109 | 70-130 |
| 1,4-Dioxane | 105 | 70-130 |
| Bromodichloromethane | 114 | 70-130 |
| cis-1,3-Dichloropropene | 102 | 70-130 |
| 4-Methyl-2-pentanone | 114 | 70-130 |
| trans-1,3-Dichloropropene | 112 | 70-130 |
| 2-Hexanone | 108 | 70-130 |
| Dibromochloromethane | 110 | 70-130 |
| Chlorobenzene | 106 | 70-130 |
| Styrene | 97 | 70-130 |
| Bromoform | 113 | 70-130 |
| Cumene | 104 | 70-130 |
| Propylbenzene | 96 | 70-130 |
| 4-Ethyltoluene | 88 | 70-130 |
| 1,3,5-Trimethylbenzene | 97 | 70-130 |
| 1,2,4-Trimethylbenzene | 99 | 70-130 |
| 1,3-Dichlorobenzene | 97 | 70-130 |
| alpha-Chlorotoluene | 110 | 70-130 |
| 1,2-Dichlorobenzene | 95 | 70-130 |
| 1,2,4-Trichlorobenzene | 101 | 70-130 |
| Hexachlorobutadiene | 89 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1606235-04AA**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061604** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 12:51 PM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 100 | 70-130 |
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 98 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1606235-04B**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061603sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 12:05 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 114 | 70-130 |
| Freon 114 | 111 | 70-130 |
| Chloromethane | 100 | 70-130 |
| Vinyl Chloride | 101 | 70-130 |
| Chloroethane | 121 | 70-130 |
| 1,1-Dichloroethene | 100 | 70-130 |
| trans-1,2-Dichloroethene | 105 | 70-130 |
| Methyl tert-butyl ether | 102 | 70-130 |
| 1,1-Dichloroethane | 110 | 70-130 |
| cis-1,2-Dichloroethene | 101 | 70-130 |
| Chloroform | 110 | 70-130 |
| 1,1,1-Trichloroethane | 107 | 70-130 |
| Carbon Tetrachloride | 137 | 60-140 |
| Benzene | 103 | 70-130 |
| 1,2-Dichloroethane | 110 | 70-130 |
| Trichloroethene | 101 | 70-130 |
| Toluene | 106 | 70-130 |
| 1,1,2-Trichloroethane | 110 | 70-130 |
| Tetrachloroethene | 102 | 70-130 |
| 1,2-Dibromoethane (EDB) | 110 | 70-130 |
| Ethyl Benzene | 106 | 70-130 |
| m,p-Xylene | 102 | 70-130 |
| o-Xylene | 105 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 114 | 70-130 |
| 1,4-Dichlorobenzene | 85 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 104 | 70-130 |
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1606235-04BB**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **20061604sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/16/16 12:51 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 114 | 70-130 |
| Freon 114 | 110 | 70-130 |
| Chloromethane | 99 | 70-130 |
| Vinyl Chloride | 100 | 70-130 |
| Chloroethane | 121 | 70-130 |
| 1,1-Dichloroethene | 99 | 70-130 |
| trans-1,2-Dichloroethene | 104 | 70-130 |
| Methyl tert-butyl ether | 102 | 70-130 |
| 1,1-Dichloroethane | 109 | 70-130 |
| cis-1,2-Dichloroethene | 100 | 70-130 |
| Chloroform | 109 | 70-130 |
| 1,1,1-Trichloroethane | 107 | 70-130 |
| Carbon Tetrachloride | 137 | 60-140 |
| Benzene | 102 | 70-130 |
| 1,2-Dichloroethane | 109 | 70-130 |
| Trichloroethene | 100 | 70-130 |
| Toluene | 105 | 70-130 |
| 1,1,2-Trichloroethane | 109 | 70-130 |
| Tetrachloroethene | 100 | 70-130 |
| 1,2-Dibromoethane (EDB) | 109 | 70-130 |
| Ethyl Benzene | 105 | 70-130 |
| m,p-Xylene | 101 | 70-130 |
| o-Xylene | 103 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 114 | 70-130 |
| 1,4-Dichlorobenzene | 83 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 104 | 70-130 |
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
**T:** +1 805 526 7161
**F:** +1 805 526 7270
www.alsglobal.com

# LABORATORY REPORT

June 27, 2016

Darius Mali
GeoSyntec Consultants
130 Research Lane, Suite 2
Guelph, ON N1G 5G3

Dear Darius:

Enclosed are the results of the samples submitted to our laboratory on June 14, 2016. For your reference, these analyses have been assigned our service request number P1602971.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

**ALS | Environmental**

*By Kelly Horiuchi at 4:56 pm, Jun 27, 2016*

Kelly Horiuchi
Laboratory Director

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
**T:** +1 805 526 7161
**F:** +1 805 526 7270
www.alsglobal.com

Client: GeoSyntec Consultants Service Request No: P1602971

## CASE NARRATIVE

The samples were received intact under chain of custody on June 14, 2016 and were stored in accordance with the analytical method requirements. The samples were received past the recommended holding time. The analysis was performed as soon as possible after receipt by the laboratory. The data is flagged to indicate the holding time exceedance. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Fixed Gases Analysis

The samples were analyzed for fixed gases (hydrogen, oxygen, nitrogen, carbon monoxide, methane and carbon dioxide) according to modified EPA Method 3C (single injection) using a gas chromatograph equipped with a thermal conductivity detector (TCD). This procedure is described in laboratory SOP VOA-EPA3C. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP or AIHA-LAP accreditation.

*The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.*

*Use of ALS Environmental (ALS)'s Name. Client shall not use ALS's name or trademark in any marketing or reporting materials, press releases or in any other manner ("Materials") whatsoever and shall not attribute to ALS any test result, tolerance or specification derived from ALS's data ("Attribution") without ALS's prior written consent, which may be withheld by ALS for any reason in its sole discretion. To request ALS's consent, Client shall provide copies of the proposed Materials or Attribution and describe in writing Client's proposed use of such Materials or Attribution. If ALS has not provided written approval of the Materials or Attribution within ten (10) days of receipt from Client, Client's request to use ALS's name or trademark in any Materials or Attribution shall be deemed denied. ALS may, in its discretion, reasonably charge Client for its time in reviewing Materials or Attribution requests. Client acknowledges and agrees that the unauthorized use of ALS's name or trademark may cause ALS to incur irreparable harm for which the recovery of money damages will be inadequate. Accordingly, Client acknowledges and agrees that a violation shall justify preliminary injunctive relief. For questions contact the laboratory.*

2655 Park Center Dr., Suite A
Simi Valley, CA 93065
**T:** +1 805 526 7161
**F:** +1 805 526 7270
www.alsglobal.com

ALS Environmental – Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

| Agency | Web Site | Number |
|---|---|---|
| AIHA-LAP, LLC | http://www.aihaaccreditedlabs.org | 101661 |
| Arizona DHS | http://www.azdhs.gov/lab/license/env.htm | AZ0694 |
| PJLA (DoD ELAP) | http://www.pjlabs.com/search-accredited-labs | 65818 (Testing) |
| Florida DOH (NELAP) | http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm | E871020 |
| Maine DHHS | http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm | 2014025 |
| Minnesota DOH (NELAP) | http://www.health.state.mn.us/accreditation | 977273 |
| New Jersey DEP (NELAP) | http://www.nj.gov/dep/oqa/ | CA009 |
| New York DOH (NELAP) | http://www.wadsworth.org/labcert/elap/elap.html | 11221 |
| Oregon PHD (NELAP) | http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx | 4068-003 |
| Pennsylvania DEP | http://www.depweb.state.pa.us/labs | 68-03307 (Registration) |
| Texas CEQ (NELAP) | http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html | T104704413-15-6 |
| Utah DOH (NELAP) | http://www.health.utah.gov/lab/labimp/certification/index.html | CA016272015-5 |
| Washington DOE | http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html | C946 |

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

**ALS ENVIRONMENTAL**

DETAIL SUMMARY REPORT

Client: GeoSyntec Consultants Service Request: P1602971

Date Received: 6/14/2016
Time Received: 10:00

| Client Sample ID | Lab Code | Matrix | Date Collected | Time Collected | 3C Modified - Fxd Gases Bag |
|---|---|---|---|---|---|
| ST-LDC-80 | P1602971-001 | Air | 6/6/2016 | 11:30 | X |
| ST-LDC-40 | P1602971-002 | Air | 6/6/2016 | 11:25 | X |
| ST-LDC-20 | P1602971-003 | Air | 6/6/2016 | 18:56 | X |
| ST-LDC-10 | P1602971-004 | Air | 6/7/2016 | 07:30 | X |
| ST-LDO-80 | P1602971-005 | Air | 6/9/2016 | 07:30 | X |
| ST-LDO-20 | P1602971-006 | Air | 6/7/2016 | 16:20 | X |
| ST-LDO-60 | P1602971-007 | Air | 6/7/2016 | 17:40 | X |

Columbia Analytical Services

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

# Air - Chain of Custody Record & Analytical Service Request



**Requested Turnaround Time in Business Days (Surcharges) please circle**
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard

CAS Project No. P1602971

| | |
|---|---|
| Company Name & Address (Reporting Information) | Geosyntec<br>Hester Groenevelt |
| Project Manager | |
| Phone | 519-515-0853 |
| Fax | |
| Email Address for Result Reporting | HGroenevelt@Geosyntec.com |
| Project Name | |
| Project Number | |
| P.O. # / Billing Information | |
| Sampler (Print & Sign) | Darius Mali |
| CAS Contact: | |

**Analysis Method/Analytes**

| Client Sample ID | Laboratory ID Number | Date Collected | Time Collected | Sample Type (Air/Tube/ Solid ) | Canister ID (Bar code # - AC, SC, etc.) | Flow Controller (Bar code - FC #) | Sample Volume | Comments e.g. Actual Preservative or specific instructions |
|---|---|---|---|---|---|---|---|---|
| ST-LDC-80 | 1 | 6/6/16 | 11:30 | Air | | | | |
| ST-LDC-40 | 2 | 6/6/16 | 13:25 | ↓ | | | | |
| ST-LDC-20 | 3 | 6/6/16 | 18:56 | | | | | |
| ST-LDC-10 | 4 | 6/7/16 | 7:30 | | | | | |
| ST-LDO-80 | 5 | 6/7/16 | 7:30 | | | | | |
| ST-LDO-20 | 6 | 6/7/16 | 16:20 | | | | | |
| ST-LDO-60 | 7 | 6/7/16 | 17:40 | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| All in Tedlar bags | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

5 of 15

**Report Tier Levels - please select**

Tier I - (Results/Default if not specified) _____
Tier II (Results + QC) _____
Tier III (Data Validation Package) 10% Surcharge _____
Tier V (client specified) _____

EDD required Yes / No
Type: _____ EDD Units: _____

Project Requirements (MRLs, QAPP)

| | Date: | Time: | | Date: | Time: |
|---|---|---|---|---|---|
| Reliquished by: (Signature) | | | Received by: (Signature) Doug Hammond Douglas E. Hammond | 6/14/16 | 1030 |
| Reliquished by: (Signature) Doug Hammond Doug Hammond | 6/13/16 | 1520 | Received by: (Signature) | 6/14/16 | 1000 |
| Reliquished by: (Signature) | Date: | Time: | Received by: (Signature) | Date: | Time: |

Cooler / Blank Temperature _____ °C

# ALS Environmental
## Sample Acceptance Check Form

Client: GeoSyntec Consultants  Work order: P1602971

Project:

Sample(s) received on: 6/14/16  Date opened: 6/14/16  by: ADAVID

***Note:*** This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

| | | Yes | No | N/A |
|---|---|---|---|---|
| 1 | Were **sample containers** properly marked with client sample ID? | ☒ | ☐ | ☐ |
| 2 | Did **sample containers** arrive in good condition? | ☒ | ☐ | ☐ |
| 3 | Were **chain-of-custody** papers used and filled out? | ☒ | ☐ | ☐ |
| 4 | Did **sample container labels** and/or tags agree with custody papers? | ☒ | ☐ | ☐ |
| 5 | Was **sample volume** received adequate for analysis? | ☒ | ☐ | ☐ |
| 6 | Are samples within specified holding times? | ☐ | ☒ | ☐ |
| 7 | Was proper **temperature** (thermal preservation) of cooler at receipt adhered to? | ☐ | ☐ | ☒ |
| 8 | Were **custody seals** on outside of cooler/Box/Container? | ☐ | ☒ | ☐ |
| | Location of seal(s)? _____ Sealing Lid? | ☐ | ☐ | ☒ |
| | Were signature and date included? | ☐ | ☐ | ☒ |
| | Were seals intact? | ☐ | ☐ | ☒ |
| 9 | Do containers have appropriate **preservation**, according to method/SOP or Client specified information? | ☐ | ☐ | ☒ |
| | Is there a client indication that the submitted samples are **pH** preserved? | ☐ | ☐ | ☒ |
| | Were **VOA vials** checked for presence/absence of air bubbles? | ☐ | ☐ | ☒ |
| | Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it? | ☐ | ☐ | ☒ |
| 10 | **Tubes:** Are the tubes capped and intact? | ☐ | ☐ | ☒ |
| 11 | **Badges:** Are the badges properly capped and intact? | ☐ | ☐ | ☒ |
| | Are dual bed badges separated and individually capped and intact? | ☐ | ☐ | ☒ |

| Lab Sample ID | Container Description | Required pH * | Received pH | Adjusted pH | VOA Headspace (Presence/Absence) | Receipt / Preservation Comments |
|---|---|---|---|---|---|---|
| P1602971-001.01 | 1.0 L Tedlar Bag | | | | | |
| P1602971-002.01 | 1.0 L Tedlar Bag | | | | | |
| P1602971-003.01 | 1.0 L Tedlar Bag | | | | | |
| P1602971-004.01 | 1.0 L Tedlar Bag | | | | | |
| P1602971-005.01 | 1.0 L Tedlar Bag | | | | | |
| P1602971-006.01 | 1.0 L Tedlar Bag | | | | | |
| P1602971-007.01 | 1.0 L Tedlar Bag | | | | | |
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Explain any discrepancies: (include lab sample ID numbers):

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **GeoSyntec Consultants**
**Client Sample ID:** **ST-LDC-80**

ALS Project ID: P1602971
ALS Sample ID: P1602971-001

| | | | |
|---|---|---|---|
| Test Code: | EPA Method 3C Modified | Date Collected: | 6/6/16 |
| Instrument ID: | HP5890 II/GC1/TCD | Date Received: | 6/14/16 |
| Analyst: | Wade Henton | Date Analyzed: | 6/14/16 |
| Sample Type: | 1.0 L Tedlar Bag | Volume(s) Analyzed: | 0.10 ml(s) |
| Test Notes: | **H3** | | |

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | Hydrogen | ND | 0.10 | |
| 7782-44-7 | **Oxygen*** | **22.0** | 0.10 | |
| 7727-37-9 | **Nitrogen** | **78.0** | 0.10 | |
| 630-08-0 | Carbon Monoxide | ND | 0.10 | |
| 74-82-8 | Methane | ND | 0.10 | |
| 124-38-9 | Carbon Dioxide | ND | 0.10 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

## ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **GeoSyntec Consultants**
**Client Sample ID:** **ST-LDC-40**

ALS Project ID: P1602971
ALS Sample ID: P1602971-002

| | | | |
|---|---|---|---|
| Test Code: | EPA Method 3C Modified | Date Collected: | 6/6/16 |
| Instrument ID: | HP5890 II/GC1/TCD | Date Received: | 6/14/16 |
| Analyst: | Wade Henton | Date Analyzed: | 6/14/16 |
| Sample Type: | 1.0 L Tedlar Bag | Volume(s) Analyzed: | 0.10 ml(s) |
| Test Notes: | **H3** | | |

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | Hydrogen | ND | 0.10 | |
| 7782-44-7 | **Oxygen*** | **22.0** | 0.10 | |
| 7727-37-9 | **Nitrogen** | **77.9** | 0.10 | |
| 630-08-0 | Carbon Monoxide | ND | 0.10 | |
| 74-82-8 | Methane | ND | 0.10 | |
| 124-38-9 | Carbon Dioxide | ND | 0.10 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

## ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **GeoSyntec Consultants**
**Client Sample ID:** **ST-LDC-20**

ALS Project ID: P1602971
ALS Sample ID: P1602971-003

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 1.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 6/6/16
Date Received: 6/14/16
Date Analyzed: 6/14/16
Volume(s) Analyzed: 0.10 ml(s)

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | Hydrogen | ND | 0.10 | |
| 7782-44-7 | **Oxygen*** | **21.9** | 0.10 | |
| 7727-37-9 | **Nitrogen** | **78.0** | 0.10 | |
| 630-08-0 | Carbon Monoxide | ND | 0.10 | |
| 74-82-8 | Methane | ND | 0.10 | |
| 124-38-9 | Carbon Dioxide | ND | 0.10 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

## ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **GeoSyntec Consultants**
**Client Sample ID:** **ST-LDC-10**

ALS Project ID: P1602971
ALS Sample ID: P1602971-004

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 1.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 6/7/16
Date Received: 6/14/16
Date Analyzed: 6/14/16
Volume(s) Analyzed: 0.10 ml(s)

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | Hydrogen | ND | 0.10 | |
| 7782-44-7 | **Oxygen*** | **22.0** | 0.10 | |
| 7727-37-9 | **Nitrogen** | **77.9** | 0.10 | |
| 630-08-0 | Carbon Monoxide | ND | 0.10 | |
| 74-82-8 | Methane | ND | 0.10 | |
| 124-38-9 | Carbon Dioxide | ND | 0.10 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **GeoSyntec Consultants**
**Client Sample ID:** **ST-LDO-80**

ALS Project ID: P1602971
ALS Sample ID: P1602971-005

| | | | |
|---|---|---|---|
| Test Code: | EPA Method 3C Modified | Date Collected: | 6/9/16 |
| Instrument ID: | HP5890 II/GC1/TCD | Date Received: | 6/14/16 |
| Analyst: | Wade Henton | Date Analyzed: | 6/14/16 |
| Sample Type: | 1.0 L Tedlar Bag | Volume(s) Analyzed: | 0.10 ml(s) |
| Test Notes: | **H3** | | |

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | Hydrogen | ND | 0.10 | |
| 7782-44-7 | **Oxygen*** | **22.0** | 0.10 | |
| 7727-37-9 | **Nitrogen** | **77.9** | 0.10 | |
| 630-08-0 | Carbon Monoxide | ND | 0.10 | |
| 74-82-8 | Methane | ND | 0.10 | |
| 124-38-9 | Carbon Dioxide | ND | 0.10 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

# ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **GeoSyntec Consultants**
**Client Sample ID:** **ST-LDO-20**

ALS Project ID: P1602971
ALS Sample ID: P1602971-006

| | | | |
|---|---|---|---|
| Test Code: | EPA Method 3C Modified | Date Collected: | 6/7/16 |
| Instrument ID: | HP5890 II/GC1/TCD | Date Received: | 6/14/16 |
| Analyst: | Wade Henton | Date Analyzed: | 6/14/16 |
| Sample Type: | 1.0 L Tedlar Bag | Volume(s) Analyzed: | 0.10 ml(s) |
| Test Notes: | **H3** | | |

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | Hydrogen | ND | 0.10 | |
| 7782-44-7 | **Oxygen*** | **22.0** | 0.10 | |
| 7727-37-9 | **Nitrogen** | **77.9** | 0.10 | |
| 630-08-0 | Carbon Monoxide | ND | 0.10 | |
| 74-82-8 | Methane | ND | 0.10 | |
| 124-38-9 | Carbon Dioxide | ND | 0.10 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

## ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **GeoSyntec Consultants**
**Client Sample ID:** **ST-LDO-60**

ALS Project ID: P1602971
ALS Sample ID: P1602971-007

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 1.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 6/7/16
Date Received: 6/14/16
Date Analyzed: 6/14/16
Volume(s) Analyzed: 0.10 ml(s)

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | Hydrogen | ND | 0.10 | |
| 7782-44-7 | **Oxygen*** | **21.9** | 0.10 | |
| 7727-37-9 | **Nitrogen** | **77.9** | 0.10 | |
| 630-08-0 | Carbon Monoxide | ND | 0.10 | |
| 74-82-8 | Methane | ND | 0.10 | |
| 124-38-9 | **Carbon Dioxide** | **0.114** | 0.10 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

## ALS ENVIRONMENTAL

RESULTS OF ANALYSIS



**Client:** **GeoSyntec Consultants**
**Client Sample ID:** **Method Blank**

ALS Project ID: P1602971
ALS Sample ID: P160614-MB

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 1.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 6/14/16
Volume(s) Analyzed: 0.10 ml(s)

| CAS # | Compound | Result %, v/v | MRL %, v/v | Data Qualifier |
|---|---|---|---|---|
| 1333-74-0 | Hydrogen | ND | 0.10 | |
| 7782-44-7 | Oxygen* | ND | 0.10 | |
| 7727-37-9 | Nitrogen | ND | 0.10 | |
| 630-08-0 | Carbon Monoxide | ND | 0.10 | |
| 74-82-8 | Methane | ND | 0.10 | |
| 124-38-9 | Carbon Dioxide | ND | 0.10 | |

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

## ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY



**Client:** **GeoSyntec Consultants**
**Client Sample ID:** **Lab Control Sample**

ALS Project ID: P1602971
ALS Sample ID: P160614-LCS

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 1.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 6/14/16
Volume(s) Analyzed: NA ml(s)

| CAS # | Compound | Spike Amount ppmV | Result ppmV | % Recovery | ALS Acceptance Limits | Data Qualifier |
|---|---|---|---|---|---|---|
| 1333-74-0 | Hydrogen | 40,000 | **39,400** | **99** | 83-114 | |
| 7782-44-7 | Oxygen* | 25,000 | **25,300** | **101** | 84-121 | |
| 7727-37-9 | Nitrogen | 50,000 | **50,000** | **100** | 88-122 | |
| 630-08-0 | Carbon Monoxide | 50,000 | **50,900** | **102** | 87-118 | |
| 74-82-8 | Methane | 40,000 | **41,500** | **104** | 85-116 | |
| 124-38-9 | Carbon Dioxide | 50,000 | **49,600** | **99** | 84-117 | |

* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

## Radon Analysis (EPA Method GS: Grab Sample/Scintillation Cell counting)

**For Geosyntec**

Client Project Number: TR0479

Samples Collected by: Darius Mali

Sample Dates: 06/06/16 to 06/09/16

Sample containers: Tedlar bags

Site: ESTCP: Layton, Utah

Assumed Site Pressure **0.85** atm

Analysts: Doug Hammond

based on an elevation of 4350 ft

Phone: 310-490-7896

Time Zone adjustment: add to decay time

email: dhammond@usc.edu

**1** hours

Collect (MDT)

Run (PDT)

## Gas Sample Summary

| | | Collection | | Analysis | | | | | Lab Duplicates | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ID | Date | time (MDT) | Date | time (PDT) | Vol run (cc) | Conc. pCi/L | ±1 sig pCi/L | mean pCi/L | ±1ssd pCi/L | Notes |
| Received 6/10/16 | | | | | | | | | | | |
| 1 | ST-LDC-80 | 6/6/16 | 11:30 | 6/10/16 | 13:43 | 40 | 4.7 | 0.4 | 4.6 | 0.2 | |
| | Lab dupe | 6/6/16 | 11:30 | 6/13/16 | 9:21 | 120 | 4.4 | 0.2 | | | |
| 2 | ST-LDC-40 | 6/6/16 | 13:25 | 6/10/16 | 13:39 | 40 | 4.4 | 0.3 | | | |
| 3 | ST-LDC-20 | 6/6/16 | 18:56 | 6/10/16 | 13:35 | 40 | 3.5 | 0.4 | | | |
| 4 | ST-LDC-10 | 6/7/16 | 7:30 | 6/10/16 | 13:31 | 40 | 2.6 | 0.7 | | | Less reliable, High background cell |
| | Lab dupe | 6/7/16 | 7:30 | 6/13/16 | 9:16 | 60 | 4.0 | 0.3 | | | More reliable, Low background cell |
| 5 | ST-LDO-80 | 6/9/16 | 7:30 | 6/13/16 | 9:25 | 120 | 11.2 | 0.6 | | | |
| 6 | ST-LDO-20 | 6/7/16 | 16:20 | 6/13/16 | 9:31 | 60 | 4.8 | 0.3 | | | |
| 7 | ST-LDO-60 | 6/7/16 | 17:40 | 6/10/16 | 13:55 | 40 | 13.9 | 0.7 | | | |

Uncertainty given in pCi/liter is based on counting statistics for low activity samples. For high activity samples uncertainty is ±5%.

The Lower Limit of Detection for Rn (95% confidence level as recommended by EPA 402-R-95-012, Oct. 97) is 0.14 pCi/liter.

Results are reported based on standardization with NIST-traceable radon sources.

These results are for application of naturally-occurring radon as a tracer of soil vapor intrusion, but are not intended for evaluation of radon hazards.

Results corrected to in situ pressure as noted above

Note Details: First run on Sample 4 was in high background cell, and result is less reliable than 2nd analysis.

## Raw Data, Calculation factors, and Analytical Details

| | | Collection | | Analysis | | | | | | | | | | | | | count |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Sample ID** | Date | Time (MDT) | Date | Time (PDT) | Count in cell/ch | He eff | Air/He eff | Vol run (cc) | Press factor | obs dpm | sig dpm | Decay T (hours) | Decay factor | Concentration dpm/liter | pCi/liter | stats pCi/liter ±1 sig | Notes |
| Received 6/10/16 | | | | | | | | | | | | | | | | | | |
| 1 | ST-LDC-80 | 6/6/16 | 11:30 | 6/10/16 | 13:43 | 58/31 | 0.885 | 0.99 | 40 | 0.85 | 0.20 | 0.02 | 99.2 | 2.116 | 10.5 | 4.7 | 0.4 | |
| | Lab dupe | 6/6/16 | 11:30 | 6/13/16 | 9:21 | 81/31 | 0.788 | 0.96 | 120 | 0.85 | 0.30 | 0.02 | 166.9 | 3.527 | 9.8 | 4.4 | 0.2 | |
| 2 | ST-LDC-40 | 6/6/16 | 13:25 | 6/10/16 | 13:39 | 77/32 | 0.915 | 0.99 | 40 | 0.85 | 0.20 | 0.02 | 97.2 | 2.084 | 9.7 | 4.4 | 0.3 | |
| 3 | ST-LDC-20 | 6/6/16 | 18:56 | 6/10/16 | 13:35 | Z17/11 | 0.710 | 0.99 | 40 | 0.85 | 0.13 | 0.02 | 91.7 | 1.998 | 7.9 | 3.5 | 0.4 | |
| 4 | ST-LDC-10 | 6/7/16 | 7:30 | 6/10/16 | 13:31 | Z13/22 | 0.811 | 0.99 | 40 | 0.85 | 0.12 | 0.03 | 79.0 | 1.816 | 5.7 | 2.6 | 0.7 | |
| | Lab dupe | 6/7/16 | 7:30 | 6/13/16 | 9:16 | 77/32 | 0.915 | 0.98 | 60 | 0.85 | 0.19 | 0.01 | 146.8 | 3.030 | 8.9 | 4.0 | 0.3 | |
| 5 | ST-LDO-80 | 6/9/16 | 7:30 | 6/13/16 | 9:25 | 83/33 | 0.806 | 0.96 | 120 | 0.85 | 1.29 | 0.06 | 98.9 | 2.111 | 24.9 | 11.2 | 0.5 | |
| 6 | ST-LDO-20 | 6/7/16 | 16:20 | 6/13/16 | 9:31 | 72/34 | 0.928 | 0.98 | 60 | 0.85 | 0.24 | 0.01 | 138.2 | 2.840 | 10.6 | 4.8 | 0.3 | |
| 7 | ST-LDO-60 | 6/7/16 | 17:40 | 6/10/16 | 13:55 | 61/33 | 0.822 | 0.99 | 40 | 0.85 | 0.70 | 0.03 | 69.3 | 1.687 | 30.9 | 13.9 | 0.5 | |

Decay correctiions based on Rn decay constant of 0.1813 per day

Conversion from dpm based on 0.4504 pCi/dpm

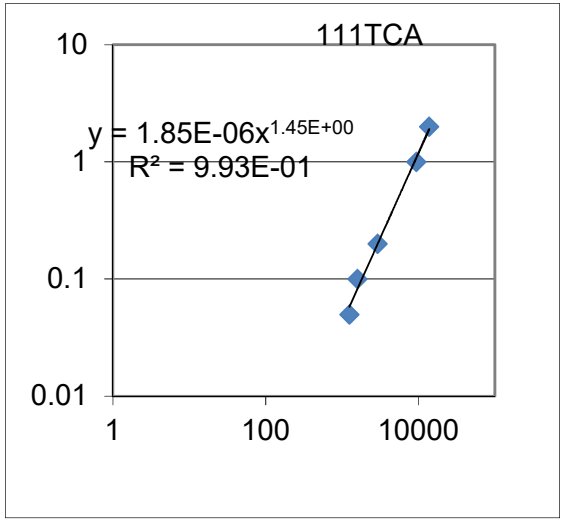
Blanks are negligible.

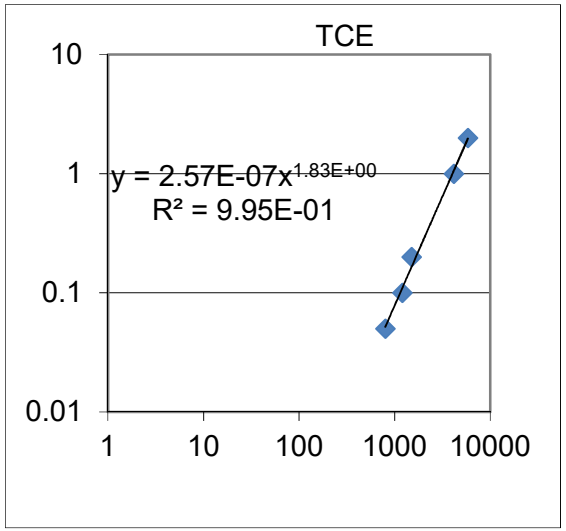
Radon Conc = [(0.4504)(1000)(obs dpm)(decay factor)(Press factor)]/[(cc used)(He eff)(Air/He)] (in pCi/liter)

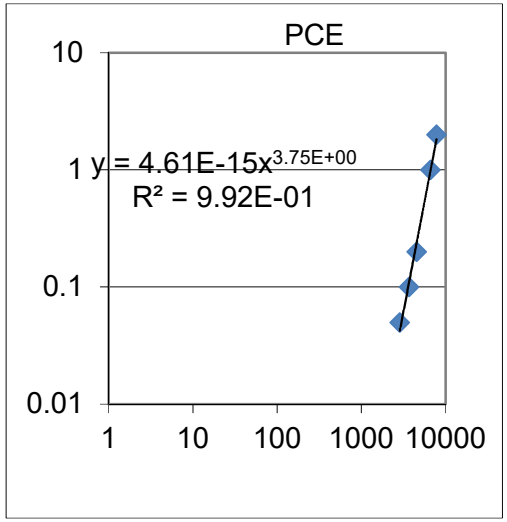
**Definitions:**

| | | | |
|---|---|---|---|
| Cell/ch: | Counting cell and channel used | sig dpm | uncertainty (± 1 sig) in dpm based on counting statistics |
| He eff: | Cell and counter efficiency using helium matrix | Decay T: | time elapsed from sampling to analysis |
| Air/He: | Correction for matrix counting gas density | Decay factor: | Correction factor for decay from collection to analysis |
| Sample vol: | Volume analyzed (cc) | dpm/liter: | Radon concentration in disintigrations per minute per liter of sample |
| Press factor: | Correction to in situ pressure based on collection altitude | piC/liter: | Radon concentration in picoCuries per liter |
| obs dpm: | observed radon activity (disintigrations per minute) when analyzed | count stats: | uncertainty in observed radon based on counting statistics |

| 6/5/2016 | | RT | | | | Area | | | |
|---|---|---|---|---|---|---|---|---|---|
| File ID | Conc. | 11DCE | 111TCA | TCE | PCE | 11DCE | 111TCA | TCE | PCE |
| TO-14-ECD-Cal-8 | 0.1 | | 17.9 | 19.383 | 22.433 | | 1596.28 | 1206.59 | 3686.966 |
| TO-14-ECD-Cal-9 | 0.2 | | 17.916 | 19.4 | 22.45 | | 2941.16 | 1500.76 | 4534.938 |
| TO-14-ECD-Cal-10 | 1 | | 17.916 | 19.383 | 22.433 | | 9368.688 | 4161.327 | 6595.066 |
| TO-14-ECD-Cal-11 | 2 | | 17.916 | 19.4 | 22.45 | | 13802.86 | 5820.081 | 7789.808 |
| TO-14-ECD-Cal-13 | 0.05 | | 17.833 | 19.333 | 22.4 | | 1249.666 | 796.758 | 2854.238 |




35 315

5.25

| Date | Analysis ID | Sample ID | Retention time | | | Area Count | | | Conc. [ppbv] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 111TCA | TCE | PCE | 111TCA | TCE | PCE | 111TCA | TCE | PCE |
| 6/6/2016 | TO-14-ECD-01 | ST-LDC-80-9m | | 19.333 | 22.416 | | 977.577 | 1419.896 | | 0.076192 | 0.003053 |
| | TO-14-ECD-02 | ST-LDC-80-45m | | 19.35 | 22.416 | | 991.1505 | 2264.05 | | 0.078139 | 0.01756 |
| | TO-14-ECD-03 | ST-LDC-40-18m | | 19.366 | 22.433 | | 1023.733 | 1819.726 | | 0.082904 | 0.00774 |
| | TO-14-ECD-04 | ST-LDC-40-60m | 17.883 | 19.366 | 22.433 | 288.44 | 898.927 | 2139.931 | | 0.06535 | 0.014213 |
| | TO-14-ECD-05 | ST-LDC-40-90m | 17.883 | 19.35 | 22.416 | 348.286 | 1087.118 | 2282.169 | | 0.092538 | 0.018093 |
| | TO-14-ECD-06 | ST-LDC-20-16m | 17.9 | 19.366 | 22.45 | 352.85 | 1047.82 | 2216.348 | | 0.086508 | 0.016212 |
| | TO-14-ECD-07 | ST-LDC-20-36m | 17.816 | 19.316 | 22.4 | 716.9365 | 1057.963 | 2110.173 | | 0.088047 | 0.013486 |
| | TO-14-ECD-08 | ST-LDC-20-85m | 17.833 | 19.333 | | 378.1465 | 1059.363 | | | 0.08826 | |
| | TO-14-ECD-09 | ST-LDC-20-140m | 17.866 | 19.35 | 22.433 | 279.8495 | 1097.825 | 1887.357 | | 0.094213 | 0.008875 |
| | TO-14-ECD-10 | ST-LDC-20-245m | 17.883 | 19.333 | 22.416 | 693.9075 | 1264.183 | 2157.163 | | 0.121968 | 0.014647 |

# Site #4: Building 11193

# Vandenberg Air Force Base

eurofins | Air Toxics

6/30/2017
Mr. William Wertz
GeoSyntec Consultants
26 Century Hill Drive
Suite 205
Latham NY 12110

Project Name: UDB 11193
Project #: TR0626
Workorder #: 1706400A

Dear Mr. William Wertz

The following report includes the data for the above referenced project for sample(s) received on 6/19/2017 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott

Project Manager

eurofins | Air Toxics

# WORK ORDER #: 1706400A

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. William Wertz<br>GeoSyntec Consultants<br>26 Century Hill Drive<br>Suite 205<br>Latham, NY 12110 | **BILL TO:** | Accounts Payable (NJ)<br>GeoSyntec Consultants<br>7 Graphics Drive<br>Suite 106<br>Ewing, NJ 08628 |
| **PHONE:** | 518-779-3582 | **P.O. #** | |
| **FAX:** | | **PROJECT #** | TR0626 UDB 11193 |
| **DATE RECEIVED:** | 06/19/2017 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 06/30/2017 | | |

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. | FINAL PRESSURE |
|---|---|---|---|---|
| 01A | B11193-061017-SVP-4-SS | TO-15 | 2.2 "Hg | 14.6 psi |
| 02A | B11193-061017-SVP-4-5 | TO-15 | 3.5 "Hg | 14.9 psi |
| 03A | B11193-061017-SVP-4-10 | TO-15 | 1.6 "Hg | 14.6 psi |
| 08A | B11193-060917-SVP-1SS | TO-15 | 1.8 "Hg | 14.8 psi |
| 09A | B11193-060917-SVP-1-5 | TO-15 | 3.1 "Hg | 15 psi |
| 10A | B11193-060917-SVP-1-10 | TO-15 | 2 "Hg | 14.7 psi |
| 11A | B11193-060917-SVP-2-SS | TO-15 | 2 "Hg | 14.5 psi |
| 12A | B11193-060917-SVP-2-5 | TO-15 | 3.3 "Hg | 15.1 psi |
| 13A | B11193-060917-SVP-2-10 | TO-15 | 3.1 "Hg | 15 psi |
| 14A | B11193-060917-SVP-3-SS | TO-15 | 4.1 "Hg | 15.1 psi |
| 15A | B11193-060917-SVP-3-5 | TO-15 | 2 "Hg | 15.2 psi |
| 16A | B11193-060917-SVP-3-10 | TO-15 | 0 psi | 15.1 psi |
| 17A | Lab Blank | TO-15 | NA | NA |
| 17B | Lab Blank | TO-15 | NA | NA |
| 17C | Lab Blank | TO-15 | NA | NA |
| 18A | CCV | TO-15 | NA | NA |
| 18B | CCV | TO-15 | NA | NA |
| 18C | CCV | TO-15 | NA | NA |
| 19A | LCS | TO-15 | NA | NA |
| 19AA | LCSD | TO-15 | NA | NA |
| 19B | LCS | TO-15 | NA | NA |
| 19BB | LCSD | TO-15 | NA | NA |
| 19C | LCS | TO-15 | NA | NA |

Continued on next page

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# WORK ORDER #: 1706400A

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. William Wertz<br>GeoSyntec Consultants<br>26 Century Hill Drive<br>Suite 205<br>Latham, NY 12110 | **BILL TO:** | Accounts Payable (NJ)<br>GeoSyntec Consultants<br>7 Graphics Drive<br>Suite 106<br>Ewing, NJ 08628 |
| **PHONE:** | 518-779-3582 | **P.O. #** | |
| **FAX:** | | **PROJECT #** | TR0626 UDB 11193 |
| **DATE RECEIVED:** | 06/19/2017 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 06/30/2017 | | |

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. | FINAL PRESSURE |
|---|---|---|---|---|
| 19CC | LCSD | TO-15 | NA | NA |

CERTIFIED BY: Heidi Hayes DATE: 06/30/17

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

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**LABORATORY NARRATIVE**
**EPA Method TO-15**
**GeoSyntec Consultants**
**Workorder# 1706400A**

Twelve 1 Liter Summa Canister samples were received on June 19, 2017. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

## Receiving Notes

Despite the use of flow controllers for sample collection, the final canister vacuum for sample B11193-060917-SVP-3-10 was measured at ambient pressure at the laboratory.

## Analytical Notes

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page (analytical batch from 06/23-24/17 instrument MSD-14).

Dilution was performed on samples B11193-061017-SVP-4-SS, B11193-061017-SVP-4-5, B11193-061017-SVP-4-10, B11193-060917-SVP-1SS, B11193-060917-SVP-1-5, B11193-060917-SVP-1-10, B11193-060917-SVP-2-SS, B11193-060917-SVP-2-5, B11193-060917-SVP-2-10, B11193-060917-SVP-3-SS, B11193-060917-SVP-3-5 and B11193-060917-SVP-3-10 due to the presence of high level target species.

## Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS

**Client Sample ID: B11193-061017-SVP-4-SS**

**Lab ID#: 1706400A-01A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 270 | 4900 | 1100 | 20000 |
| Trichloroethene | 270 | 3700 | 1400 | 20000 |
| Tetrachloroethene | 270 | 170000 | 1800 | 1200000 |

**Client Sample ID: B11193-061017-SVP-4-5**

**Lab ID#: 1706400A-02A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| 1,1-Dichloroethene | 570 | 1000 | 2300 | 4200 |
| trans-1,2-Dichloroethene | 570 | 8600 | 2200 | 34000 |
| cis-1,2-Dichloroethene | 570 | 150000 | 2200 | 600000 |
| Trichloroethene | 570 | 74000 | 3100 | 400000 |
| Tetrachloroethene | 570 | 410000 | 3900 | 2800000 |

**Client Sample ID: B11193-061017-SVP-4-10**

**Lab ID#: 1706400A-03A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| 1,1-Dichloroethene | 530 | 950 | 2100 | 3800 |
| trans-1,2-Dichloroethene | 530 | 7900 | 2100 | 31000 |
| cis-1,2-Dichloroethene | 530 | 150000 | 2100 | 600000 |
| Trichloroethene | 530 | 75000 | 2800 | 400000 |
| Tetrachloroethene | 530 | 430000 | 3600 | 2900000 |

**Client Sample ID: B11193-060917-SVP-1SS**

**Lab ID#: 1706400A-08A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Ethanol | 21 | 120 | 40 | 220 |
| Hexane | 5.4 | 300 | 19 | 1100 |
| Cyclohexane | 5.4 | 160 | 18 | 570 |
| Trichloroethene | 5.4 | 74 | 29 | 400 |

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS FULL SCAN

**Client Sample ID: B11193-060917-SVP-1SS**

**Lab ID#: 1706400A-08A**

| | | | | |
|---|---|---|---|---|
| Tetrachloroethene | 5.4 | 1700 | 36 | 12000 |

**Client Sample ID: B11193-060917-SVP-1-5**

**Lab ID#: 1706400A-09A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| 1,1-Dichloroethene | 22 | 50 | 89 | 200 |
| trans-1,2-Dichloroethene | 22 | 620 | 89 | 2500 |
| cis-1,2-Dichloroethene | 22 | 1100 | 89 | 4500 |
| Chloroform | 22 | 42 | 110 | 200 |
| Trichloroethene | 22 | 3000 | 120 | 16000 |
| Toluene | 22 | 48 | 85 | 180 |
| Tetrachloroethene | 22 | 20000 | 150 | 130000 |

**Client Sample ID: B11193-060917-SVP-1-10**

**Lab ID#: 1706400A-10A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| 1,1-Dichloroethene | 22 | 48 | 85 | 190 |
| trans-1,2-Dichloroethene | 22 | 640 | 85 | 2600 |
| cis-1,2-Dichloroethene | 22 | 1600 | 85 | 6100 |
| Chloroform | 22 | 36 | 100 | 180 |
| Trichloroethene | 22 | 3300 | 120 | 18000 |
| Tetrachloroethene | 22 | 20000 | 140 | 140000 |

**Client Sample ID: B11193-060917-SVP-2-SS**

**Lab ID#: 1706400A-11A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Trichloroethene | 11 | 24 | 57 | 130 |
| Tetrachloroethene | 11 | 7600 | 72 | 51000 |

**Client Sample ID: B11193-060917-SVP-2-5**

**Lab ID#: 1706400A-12A**

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS

**Client Sample ID: B11193-060917-SVP-2-5**

**Lab ID#: 1706400A-12A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 23 | 36 | 90 | 140 |
| Trichloroethene | 23 | 310 | 120 | 1700 |
| Tetrachloroethene | 23 | 16000 | 150 | 110000 |

**Client Sample ID: B11193-060917-SVP-2-10**

**Lab ID#: 1706400A-13A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 22 | 30 | 89 | 120 |
| Trichloroethene | 22 | 300 | 120 | 1600 |
| Tetrachloroethene | 22 | 15000 | 150 | 100000 |

**Client Sample ID: B11193-060917-SVP-3-SS**

**Lab ID#: 1706400A-14A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 24 | 33 | 93 | 130 |
| cis-1,2-Dichloroethene | 24 | 30 | 93 | 120 |
| Trichloroethene | 24 | 890 | 130 | 4800 |
| Tetrachloroethene | 24 | 18000 | 160 | 120000 |

**Client Sample ID: B11193-060917-SVP-3-5**

**Lab ID#: 1706400A-15A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 140 | 150 | 540 | 600 |
| cis-1,2-Dichloroethene | 140 | 390 | 540 | 1600 |
| Trichloroethene | 140 | 2800 | 730 | 15000 |
| Tetrachloroethene | 140 | 55000 | 920 | 370000 |

**Client Sample ID: B11193-060917-SVP-3-10**

**Lab ID#: 1706400A-16A**

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS

**Client Sample ID: B11193-060917-SVP-3-10**

**Lab ID#: 1706400A-16A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 130 | 180 | 500 | 730 |
| cis-1,2-Dichloroethene | 130 | 360 | 500 | 1400 |
| Trichloroethene | 130 | 2800 | 680 | 15000 |
| Tetrachloroethene | 130 | 57000 | 860 | 380000 |

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**Client Sample ID: B11193-061017-SVP-4-SS**

**Lab ID#: 1706400A-01A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062329** | **Date of Collection:** | **6/10/17** |
| **Dil. Factor:** | **53.8** | **Date of Analysis:** | **6/23/17 10:20 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 270 | Not Detected | 1300 | Not Detected |
| Freon 114 | 270 | Not Detected | 1900 | Not Detected |
| Chloromethane | 1100 | Not Detected | 2200 | Not Detected |
| Vinyl Chloride | 270 | Not Detected | 690 | Not Detected |
| 1,3-Butadiene | 270 | Not Detected | 600 | Not Detected |
| Bromomethane | 1100 | Not Detected | 4200 | Not Detected |
| Chloroethane | 1100 | Not Detected | 2800 | Not Detected |
| Freon 11 | 270 | Not Detected | 1500 | Not Detected |
| Ethanol | 1100 | Not Detected | 2000 | Not Detected |
| Freon 113 | 270 | Not Detected | 2100 | Not Detected |
| 1,1-Dichloroethene | 270 | Not Detected | 1100 | Not Detected |
| Acetone | 1100 | Not Detected | 2600 | Not Detected |
| 2-Propanol | 1100 | Not Detected | 2600 | Not Detected |
| Carbon Disulfide | 1100 | Not Detected | 3400 | Not Detected |
| 3-Chloropropene | 1100 | Not Detected | 3400 | Not Detected |
| Methylene Chloride | 1100 | Not Detected | 3700 | Not Detected |
| Methyl tert-butyl ether | 270 | Not Detected | 970 | Not Detected |
| trans-1,2-Dichloroethene | 270 | Not Detected | 1100 | Not Detected |
| Hexane | 270 | Not Detected | 950 | Not Detected |
| 1,1-Dichloroethane | 270 | Not Detected | 1100 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 1100 | Not Detected | 3200 | Not Detected |
| cis-1,2-Dichloroethene | 270 | 4900 | 1100 | 20000 |
| Tetrahydrofuran | 270 | Not Detected | 790 | Not Detected |
| Chloroform | 270 | Not Detected | 1300 | Not Detected |
| 1,1,1-Trichloroethane | 270 | Not Detected | 1500 | Not Detected |
| Cyclohexane | 270 | Not Detected | 920 | Not Detected |
| Carbon Tetrachloride | 270 | Not Detected | 1700 | Not Detected |
| 2,2,4-Trimethylpentane | 270 | Not Detected | 1200 | Not Detected |
| Benzene | 270 | Not Detected | 860 | Not Detected |
| 1,2-Dichloroethane | 270 | Not Detected | 1100 | Not Detected |
| Heptane | 270 | Not Detected | 1100 | Not Detected |
| Trichloroethene | 270 | 3700 | 1400 | 20000 |
| 1,2-Dichloropropane | 270 | Not Detected | 1200 | Not Detected |
| 1,4-Dioxane | 1100 | Not Detected | 3900 | Not Detected |
| Bromodichloromethane | 270 | Not Detected | 1800 | Not Detected |
| cis-1,3-Dichloropropene | 270 | Not Detected | 1200 | Not Detected |
| 4-Methyl-2-pentanone | 270 | Not Detected | 1100 | Not Detected |
| Toluene | 270 | Not Detected | 1000 | Not Detected |
| trans-1,3-Dichloropropene | 270 | Not Detected | 1200 | Not Detected |
| 1,1,2-Trichloroethane | 270 | Not Detected | 1500 | Not Detected |
| Tetrachloroethene | 270 | 170000 | 1800 | 1200000 |
| 2-Hexanone | 1100 | Not Detected | 4400 | Not Detected |

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**Client Sample ID: B11193-061017-SVP-4-SS**

**Lab ID#: 1706400A-01A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062329** | **Date of Collection:** | **6/10/17** |
| **Dil. Factor:** | **53.8** | **Date of Analysis:** | **6/23/17 10:20 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 270 | Not Detected | 2300 | Not Detected |
| 1,2-Dibromoethane (EDB) | 270 | Not Detected | 2100 | Not Detected |
| Chlorobenzene | 270 | Not Detected | 1200 | Not Detected |
| Ethyl Benzene | 270 | Not Detected | 1200 | Not Detected |
| m,p-Xylene | 270 | Not Detected | 1200 | Not Detected |
| o-Xylene | 270 | Not Detected | 1200 | Not Detected |
| Styrene | 270 | Not Detected | 1100 | Not Detected |
| Bromoform | 270 | Not Detected | 2800 | Not Detected |
| Cumene | 270 | Not Detected | 1300 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 270 | Not Detected | 1800 | Not Detected |
| Propylbenzene | 270 | Not Detected | 1300 | Not Detected |
| 4-Ethyltoluene | 270 | Not Detected | 1300 | Not Detected |
| 1,3,5-Trimethylbenzene | 270 | Not Detected | 1300 | Not Detected |
| 1,2,4-Trimethylbenzene | 270 | Not Detected | 1300 | Not Detected |
| 1,3-Dichlorobenzene | 270 | Not Detected | 1600 | Not Detected |
| 1,4-Dichlorobenzene | 270 | Not Detected | 1600 | Not Detected |
| alpha-Chlorotoluene | 270 | Not Detected | 1400 | Not Detected |
| 1,2-Dichlorobenzene | 270 | Not Detected | 1600 | Not Detected |
| 1,2,4-Trichlorobenzene | 1100 | Not Detected | 8000 | Not Detected |
| Hexachlorobutadiene | 1100 | Not Detected | 11000 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 116 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 95 | 70-130 |

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**Client Sample ID: B11193-061017-SVP-4-5**

**Lab ID#: 1706400A-02A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062330** | **Date of Collection:** | **6/10/17 2:53:00 PM** |
| **Dil. Factor:** | **114** | **Date of Analysis:** | **6/23/17 10:46 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 570 | Not Detected | 2800 | Not Detected |
| Freon 114 | 570 | Not Detected | 4000 | Not Detected |
| Chloromethane | 2300 | Not Detected | 4700 | Not Detected |
| Vinyl Chloride | 570 | Not Detected | 1400 | Not Detected |
| 1,3-Butadiene | 570 | Not Detected | 1300 | Not Detected |
| Bromomethane | 2300 | Not Detected | 8800 | Not Detected |
| Chloroethane | 2300 | Not Detected | 6000 | Not Detected |
| Freon 11 | 570 | Not Detected | 3200 | Not Detected |
| Ethanol | 2300 | Not Detected | 4300 | Not Detected |
| Freon 113 | 570 | Not Detected | 4400 | Not Detected |
| 1,1-Dichloroethene | 570 | 1000 | 2300 | 4200 |
| Acetone | 2300 | Not Detected | 5400 | Not Detected |
| 2-Propanol | 2300 | Not Detected | 5600 | Not Detected |
| Carbon Disulfide | 2300 | Not Detected | 7100 | Not Detected |
| 3-Chloropropene | 2300 | Not Detected | 7100 | Not Detected |
| Methylene Chloride | 2300 | Not Detected | 7900 | Not Detected |
| Methyl tert-butyl ether | 570 | Not Detected | 2000 | Not Detected |
| trans-1,2-Dichloroethene | 570 | 8600 | 2200 | 34000 |
| Hexane | 570 | Not Detected | 2000 | Not Detected |
| 1,1-Dichloroethane | 570 | Not Detected | 2300 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 2300 | Not Detected | 6700 | Not Detected |
| cis-1,2-Dichloroethene | 570 | 150000 | 2200 | 600000 |
| Tetrahydrofuran | 570 | Not Detected | 1700 | Not Detected |
| Chloroform | 570 | Not Detected | 2800 | Not Detected |
| 1,1,1-Trichloroethane | 570 | Not Detected | 3100 | Not Detected |
| Cyclohexane | 570 | Not Detected | 2000 | Not Detected |
| Carbon Tetrachloride | 570 | Not Detected | 3600 | Not Detected |
| 2,2,4-Trimethylpentane | 570 | Not Detected | 2700 | Not Detected |
| Benzene | 570 | Not Detected | 1800 | Not Detected |
| 1,2-Dichloroethane | 570 | Not Detected | 2300 | Not Detected |
| Heptane | 570 | Not Detected | 2300 | Not Detected |
| Trichloroethene | 570 | 74000 | 3100 | 400000 |
| 1,2-Dichloropropane | 570 | Not Detected | 2600 | Not Detected |
| 1,4-Dioxane | 2300 | Not Detected | 8200 | Not Detected |
| Bromodichloromethane | 570 | Not Detected | 3800 | Not Detected |
| cis-1,3-Dichloropropene | 570 | Not Detected | 2600 | Not Detected |
| 4-Methyl-2-pentanone | 570 | Not Detected | 2300 | Not Detected |
| Toluene | 570 | Not Detected | 2100 | Not Detected |
| trans-1,3-Dichloropropene | 570 | Not Detected | 2600 | Not Detected |
| 1,1,2-Trichloroethane | 570 | Not Detected | 3100 | Not Detected |
| Tetrachloroethene | 570 | 410000 | 3900 | 2800000 |
| 2-Hexanone | 2300 | Not Detected | 9300 | Not Detected |

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**Client Sample ID: B11193-061017-SVP-4-5**

**Lab ID#: 1706400A-02A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062330** | **Date of Collection: 6/10/17 2:53:00 PM** | |
| **Dil. Factor:** | **114** | **Date of Analysis: 6/23/17 10:46 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 570 | Not Detected | 4800 | Not Detected |
| 1,2-Dibromoethane (EDB) | 570 | Not Detected | 4400 | Not Detected |
| Chlorobenzene | 570 | Not Detected | 2600 | Not Detected |
| Ethyl Benzene | 570 | Not Detected | 2500 | Not Detected |
| m,p-Xylene | 570 | Not Detected | 2500 | Not Detected |
| o-Xylene | 570 | Not Detected | 2500 | Not Detected |
| Styrene | 570 | Not Detected | 2400 | Not Detected |
| Bromoform | 570 | Not Detected | 5900 | Not Detected |
| Cumene | 570 | Not Detected | 2800 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 570 | Not Detected | 3900 | Not Detected |
| Propylbenzene | 570 | Not Detected | 2800 | Not Detected |
| 4-Ethyltoluene | 570 | Not Detected | 2800 | Not Detected |
| 1,3,5-Trimethylbenzene | 570 | Not Detected | 2800 | Not Detected |
| 1,2,4-Trimethylbenzene | 570 | Not Detected | 2800 | Not Detected |
| 1,3-Dichlorobenzene | 570 | Not Detected | 3400 | Not Detected |
| 1,4-Dichlorobenzene | 570 | Not Detected | 3400 | Not Detected |
| alpha-Chlorotoluene | 570 | Not Detected | 3000 | Not Detected |
| 1,2-Dichlorobenzene | 570 | Not Detected | 3400 | Not Detected |
| 1,2,4-Trichlorobenzene | 2300 | Not Detected | 17000 | Not Detected |
| Hexachlorobutadiene | 2300 | Not Detected | 24000 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 110 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

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**Client Sample ID: B11193-061017-SVP-4-10**

**Lab ID#: 1706400A-03A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062422** | **Date of Collection:** | **6/10/17 4:42:00 PM** |
| **Dil. Factor:** | **106** | **Date of Analysis:** | **6/24/17 08:39 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 530 | Not Detected | 2600 | Not Detected |
| Freon 114 | 530 | Not Detected | 3700 | Not Detected |
| Chloromethane | 2100 | Not Detected | 4400 | Not Detected |
| Vinyl Chloride | 530 | Not Detected | 1400 | Not Detected |
| 1,3-Butadiene | 530 | Not Detected | 1200 | Not Detected |
| Bromomethane | 2100 | Not Detected | 8200 | Not Detected |
| Chloroethane | 2100 | Not Detected | 5600 | Not Detected |
| Freon 11 | 530 | Not Detected | 3000 | Not Detected |
| Ethanol | 2100 | Not Detected | 4000 | Not Detected |
| Freon 113 | 530 | Not Detected | 4100 | Not Detected |
| 1,1-Dichloroethene | 530 | 950 | 2100 | 3800 |
| Acetone | 2100 | Not Detected | 5000 | Not Detected |
| 2-Propanol | 2100 | Not Detected | 5200 | Not Detected |
| Carbon Disulfide | 2100 | Not Detected | 6600 | Not Detected |
| 3-Chloropropene | 2100 | Not Detected | 6600 | Not Detected |
| Methylene Chloride | 2100 | Not Detected | 7400 | Not Detected |
| Methyl tert-butyl ether | 530 | Not Detected | 1900 | Not Detected |
| trans-1,2-Dichloroethene | 530 | 7900 | 2100 | 31000 |
| Hexane | 530 | Not Detected | 1900 | Not Detected |
| 1,1-Dichloroethane | 530 | Not Detected | 2100 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 2100 | Not Detected | 6200 | Not Detected |
| cis-1,2-Dichloroethene | 530 | 150000 | 2100 | 600000 |
| Tetrahydrofuran | 530 | Not Detected | 1600 | Not Detected |
| Chloroform | 530 | Not Detected | 2600 | Not Detected |
| 1,1,1-Trichloroethane | 530 | Not Detected | 2900 | Not Detected |
| Cyclohexane | 530 | Not Detected | 1800 | Not Detected |
| Carbon Tetrachloride | 530 | Not Detected | 3300 | Not Detected |
| 2,2,4-Trimethylpentane | 530 | Not Detected | 2500 | Not Detected |
| Benzene | 530 | Not Detected | 1700 | Not Detected |
| 1,2-Dichloroethane | 530 | Not Detected | 2100 | Not Detected |
| Heptane | 530 | Not Detected | 2200 | Not Detected |
| Trichloroethene | 530 | 75000 | 2800 | 400000 |
| 1,2-Dichloropropane | 530 | Not Detected | 2400 | Not Detected |
| 1,4-Dioxane | 2100 | Not Detected | 7600 | Not Detected |
| Bromodichloromethane | 530 | Not Detected | 3600 | Not Detected |
| cis-1,3-Dichloropropene | 530 | Not Detected | 2400 | Not Detected |
| 4-Methyl-2-pentanone | 530 | Not Detected | 2200 | Not Detected |
| Toluene | 530 | Not Detected | 2000 | Not Detected |
| trans-1,3-Dichloropropene | 530 | Not Detected | 2400 | Not Detected |
| 1,1,2-Trichloroethane | 530 | Not Detected | 2900 | Not Detected |
| Tetrachloroethene | 530 | 430000 | 3600 | 2900000 |
| 2-Hexanone | 2100 | Not Detected | 8700 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-061017-SVP-4-10**

**Lab ID#: 1706400A-03A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062422** | **Date of Collection:** | **6/10/17 4:42:00 PM** |
| **Dil. Factor:** | **106** | **Date of Analysis:** | **6/24/17 08:39 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 530 | Not Detected | 4500 | Not Detected |
| 1,2-Dibromoethane (EDB) | 530 | Not Detected | 4100 | Not Detected |
| Chlorobenzene | 530 | Not Detected | 2400 | Not Detected |
| Ethyl Benzene | 530 | Not Detected | 2300 | Not Detected |
| m,p-Xylene | 530 | Not Detected | 2300 | Not Detected |
| o-Xylene | 530 | Not Detected | 2300 | Not Detected |
| Styrene | 530 | Not Detected | 2200 | Not Detected |
| Bromoform | 530 | Not Detected | 5500 | Not Detected |
| Cumene | 530 | Not Detected | 2600 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 530 | Not Detected | 3600 | Not Detected |
| Propylbenzene | 530 | Not Detected | 2600 | Not Detected |
| 4-Ethyltoluene | 530 | Not Detected | 2600 | Not Detected |
| 1,3,5-Trimethylbenzene | 530 | Not Detected | 2600 | Not Detected |
| 1,2,4-Trimethylbenzene | 530 | Not Detected | 2600 | Not Detected |
| 1,3-Dichlorobenzene | 530 | Not Detected | 3200 | Not Detected |
| 1,4-Dichlorobenzene | 530 | Not Detected | 3200 | Not Detected |
| alpha-Chlorotoluene | 530 | Not Detected | 2700 | Not Detected |
| 1,2-Dichlorobenzene | 530 | Not Detected | 3200 | Not Detected |
| 1,2,4-Trichlorobenzene | 2100 | Not Detected | 16000 | Not Detected |
| Hexachlorobutadiene | 2100 | Not Detected | 23000 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 98 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-1SS**

**Lab ID#: 1706400A-08A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062317** | **Date of Collection:** | **6/9/17 10:15:00 AM** |
| **Dil. Factor:** | **10.7** | **Date of Analysis:** | **6/23/17 11:55 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 5.4 | Not Detected | 26 | Not Detected |
| Freon 114 | 5.4 | Not Detected | 37 | Not Detected |
| Chloromethane | 54 | Not Detected | 110 | Not Detected |
| Vinyl Chloride | 5.4 | Not Detected | 14 | Not Detected |
| 1,3-Butadiene | 5.4 | Not Detected | 12 | Not Detected |
| Bromomethane | 54 | Not Detected | 210 | Not Detected |
| Chloroethane | 21 | Not Detected | 56 | Not Detected |
| Freon 11 | 5.4 | Not Detected | 30 | Not Detected |
| Ethanol | 21 | 120 | 40 | 220 |
| Freon 113 | 5.4 | Not Detected | 41 | Not Detected |
| 1,1-Dichloroethene | 5.4 | Not Detected | 21 | Not Detected |
| Acetone | 54 | Not Detected | 130 | Not Detected |
| 2-Propanol | 21 | Not Detected | 52 | Not Detected |
| Carbon Disulfide | 21 | Not Detected | 67 | Not Detected |
| 3-Chloropropene | 21 | Not Detected | 67 | Not Detected |
| Methylene Chloride | 54 | Not Detected | 180 | Not Detected |
| Methyl tert-butyl ether | 21 | Not Detected | 77 | Not Detected |
| trans-1,2-Dichloroethene | 5.4 | Not Detected | 21 | Not Detected |
| Hexane | 5.4 | 300 | 19 | 1100 |
| 1,1-Dichloroethane | 5.4 | Not Detected | 22 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 21 | Not Detected | 63 | Not Detected |
| cis-1,2-Dichloroethene | 5.4 | Not Detected | 21 | Not Detected |
| Tetrahydrofuran | 5.4 | Not Detected | 16 | Not Detected |
| Chloroform | 5.4 | Not Detected | 26 | Not Detected |
| 1,1,1-Trichloroethane | 5.4 | Not Detected | 29 | Not Detected |
| Cyclohexane | 5.4 | 160 | 18 | 570 |
| Carbon Tetrachloride | 5.4 | Not Detected | 34 | Not Detected |
| 2,2,4-Trimethylpentane | 5.4 | Not Detected | 25 | Not Detected |
| Benzene | 5.4 | Not Detected | 17 | Not Detected |
| 1,2-Dichloroethane | 5.4 | Not Detected | 22 | Not Detected |
| Heptane | 5.4 | Not Detected | 22 | Not Detected |
| Trichloroethene | 5.4 | 74 | 29 | 400 |
| 1,2-Dichloropropane | 5.4 | Not Detected | 25 | Not Detected |
| 1,4-Dioxane | 21 | Not Detected | 77 | Not Detected |
| Bromodichloromethane | 5.4 | Not Detected | 36 | Not Detected |
| cis-1,3-Dichloropropene | 5.4 | Not Detected | 24 | Not Detected |
| 4-Methyl-2-pentanone | 5.4 | Not Detected | 22 | Not Detected |
| Toluene | 5.4 | Not Detected | 20 | Not Detected |
| trans-1,3-Dichloropropene | 5.4 | Not Detected | 24 | Not Detected |
| 1,1,2-Trichloroethane | 5.4 | Not Detected | 29 | Not Detected |
| Tetrachloroethene | 5.4 | 1700 | 36 | 12000 |
| 2-Hexanone | 21 | Not Detected | 88 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-1SS**

**Lab ID#: 1706400A-08A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062317** | **Date of Collection: 6/9/17 10:15:00 AM** | |
| **Dil. Factor:** | **10.7** | **Date of Analysis: 6/23/17 11:55 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 5.4 | Not Detected | 46 | Not Detected |
| 1,2-Dibromoethane (EDB) | 5.4 | Not Detected | 41 | Not Detected |
| Chlorobenzene | 5.4 | Not Detected | 25 | Not Detected |
| Ethyl Benzene | 5.4 | Not Detected | 23 | Not Detected |
| m,p-Xylene | 5.4 | Not Detected | 23 | Not Detected |
| o-Xylene | 5.4 | Not Detected | 23 | Not Detected |
| Styrene | 5.4 | Not Detected | 23 | Not Detected |
| Bromoform | 5.4 | Not Detected | 55 | Not Detected |
| Cumene | 5.4 | Not Detected | 26 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 5.4 | Not Detected | 37 | Not Detected |
| Propylbenzene | 5.4 | Not Detected | 26 | Not Detected |
| 4-Ethyltoluene | 5.4 | Not Detected | 26 | Not Detected |
| 1,3,5-Trimethylbenzene | 5.4 | Not Detected | 26 | Not Detected |
| 1,2,4-Trimethylbenzene | 5.4 | Not Detected | 26 | Not Detected |
| 1,3-Dichlorobenzene | 5.4 | Not Detected | 32 | Not Detected |
| 1,4-Dichlorobenzene | 5.4 | Not Detected | 32 | Not Detected |
| alpha-Chlorotoluene | 5.4 | Not Detected | 28 | Not Detected |
| 1,2-Dichlorobenzene | 5.4 | Not Detected | 32 | Not Detected |
| 1,2,4-Trichlorobenzene | 21 | Not Detected | 160 | Not Detected |
| Hexachlorobutadiene | 21 | Not Detected | 230 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 1,2-Dichloroethane-d4 | 84 | 70-130 |
| 4-Bromofluorobenzene | 108 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-1-5**

**Lab ID#: 1706400A-09A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062420** | **Date of Collection:** | **6/9/17 11:19:00 AM** |
| **Dil. Factor:** | **4.50** | **Date of Analysis:** | **6/24/17 07:49 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 22 | Not Detected | 110 | Not Detected |
| Freon 114 | 22 | Not Detected | 160 | Not Detected |
| Chloromethane | 90 | Not Detected | 180 | Not Detected |
| Vinyl Chloride | 22 | Not Detected | 58 | Not Detected |
| 1,3-Butadiene | 22 | Not Detected | 50 | Not Detected |
| Bromomethane | 90 | Not Detected | 350 | Not Detected |
| Chloroethane | 90 | Not Detected | 240 | Not Detected |
| Freon 11 | 22 | Not Detected | 130 | Not Detected |
| Ethanol | 90 | Not Detected | 170 | Not Detected |
| Freon 113 | 22 | Not Detected | 170 | Not Detected |
| 1,1-Dichloroethene | 22 | 50 | 89 | 200 |
| Acetone | 90 | Not Detected | 210 | Not Detected |
| 2-Propanol | 90 | Not Detected | 220 | Not Detected |
| Carbon Disulfide | 90 | Not Detected | 280 | Not Detected |
| 3-Chloropropene | 90 | Not Detected | 280 | Not Detected |
| Methylene Chloride | 90 | Not Detected | 310 | Not Detected |
| Methyl tert-butyl ether | 22 | Not Detected | 81 | Not Detected |
| trans-1,2-Dichloroethene | 22 | 620 | 89 | 2500 |
| Hexane | 22 | Not Detected | 79 | Not Detected |
| 1,1-Dichloroethane | 22 | Not Detected | 91 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 90 | Not Detected | 260 | Not Detected |
| cis-1,2-Dichloroethene | 22 | 1100 | 89 | 4500 |
| Tetrahydrofuran | 22 | Not Detected | 66 | Not Detected |
| Chloroform | 22 | 42 | 110 | 200 |
| 1,1,1-Trichloroethane | 22 | Not Detected | 120 | Not Detected |
| Cyclohexane | 22 | Not Detected | 77 | Not Detected |
| Carbon Tetrachloride | 22 | Not Detected | 140 | Not Detected |
| 2,2,4-Trimethylpentane | 22 | Not Detected | 100 | Not Detected |
| Benzene | 22 | Not Detected | 72 | Not Detected |
| 1,2-Dichloroethane | 22 | Not Detected | 91 | Not Detected |
| Heptane | 22 | Not Detected | 92 | Not Detected |
| Trichloroethene | 22 | 3000 | 120 | 16000 |
| 1,2-Dichloropropane | 22 | Not Detected | 100 | Not Detected |
| 1,4-Dioxane | 90 | Not Detected | 320 | Not Detected |
| Bromodichloromethane | 22 | Not Detected | 150 | Not Detected |
| cis-1,3-Dichloropropene | 22 | Not Detected | 100 | Not Detected |
| 4-Methyl-2-pentanone | 22 | Not Detected | 92 | Not Detected |
| Toluene | 22 | 48 | 85 | 180 |
| trans-1,3-Dichloropropene | 22 | Not Detected | 100 | Not Detected |
| 1,1,2-Trichloroethane | 22 | Not Detected | 120 | Not Detected |
| Tetrachloroethene | 22 | 20000 | 150 | 130000 |
| 2-Hexanone | 90 | Not Detected | 370 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-1-5**

**Lab ID#: 1706400A-09A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062420** | **Date of Collection:** | **6/9/17 11:19:00 AM** |
| **Dil. Factor:** | **4.50** | **Date of Analysis:** | **6/24/17 07:49 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 22 | Not Detected | 190 | Not Detected |
| 1,2-Dibromoethane (EDB) | 22 | Not Detected | 170 | Not Detected |
| Chlorobenzene | 22 | Not Detected | 100 | Not Detected |
| Ethyl Benzene | 22 | Not Detected | 98 | Not Detected |
| m,p-Xylene | 22 | Not Detected | 98 | Not Detected |
| o-Xylene | 22 | Not Detected | 98 | Not Detected |
| Styrene | 22 | Not Detected | 96 | Not Detected |
| Bromoform | 22 | Not Detected | 230 | Not Detected |
| Cumene | 22 | Not Detected | 110 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 22 | Not Detected | 150 | Not Detected |
| Propylbenzene | 22 | Not Detected | 110 | Not Detected |
| 4-Ethyltoluene | 22 | Not Detected | 110 | Not Detected |
| 1,3,5-Trimethylbenzene | 22 | Not Detected | 110 | Not Detected |
| 1,2,4-Trimethylbenzene | 22 | Not Detected | 110 | Not Detected |
| 1,3-Dichlorobenzene | 22 | Not Detected | 140 | Not Detected |
| 1,4-Dichlorobenzene | 22 | Not Detected | 140 | Not Detected |
| alpha-Chlorotoluene | 22 | Not Detected | 120 | Not Detected |
| 1,2-Dichlorobenzene | 22 | Not Detected | 140 | Not Detected |
| 1,2,4-Trichlorobenzene | 90 | Not Detected | 670 | Not Detected |
| Hexachlorobutadiene | 90 | Not Detected | 960 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 112 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-1-10**

**Lab ID#: 1706400A-10A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062421** | **Date of Collection:** | **6/9/17 10:55:00 AM** |
| **Dil. Factor:** | **4.30** | **Date of Analysis:** | **6/24/17 08:14 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 22 | Not Detected | 110 | Not Detected |
| Freon 114 | 22 | Not Detected | 150 | Not Detected |
| Chloromethane | 86 | Not Detected | 180 | Not Detected |
| Vinyl Chloride | 22 | Not Detected | 55 | Not Detected |
| 1,3-Butadiene | 22 | Not Detected | 48 | Not Detected |
| Bromomethane | 86 | Not Detected | 330 | Not Detected |
| Chloroethane | 86 | Not Detected | 230 | Not Detected |
| Freon 11 | 22 | Not Detected | 120 | Not Detected |
| Ethanol | 86 | Not Detected | 160 | Not Detected |
| Freon 113 | 22 | Not Detected | 160 | Not Detected |
| 1,1-Dichloroethene | 22 | 48 | 85 | 190 |
| Acetone | 86 | Not Detected | 200 | Not Detected |
| 2-Propanol | 86 | Not Detected | 210 | Not Detected |
| Carbon Disulfide | 86 | Not Detected | 270 | Not Detected |
| 3-Chloropropene | 86 | Not Detected | 270 | Not Detected |
| Methylene Chloride | 86 | Not Detected | 300 | Not Detected |
| Methyl tert-butyl ether | 22 | Not Detected | 78 | Not Detected |
| trans-1,2-Dichloroethene | 22 | 640 | 85 | 2600 |
| Hexane | 22 | Not Detected | 76 | Not Detected |
| 1,1-Dichloroethane | 22 | Not Detected | 87 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 86 | Not Detected | 250 | Not Detected |
| cis-1,2-Dichloroethene | 22 | 1600 | 85 | 6100 |
| Tetrahydrofuran | 22 | Not Detected | 63 | Not Detected |
| Chloroform | 22 | 36 | 100 | 180 |
| 1,1,1-Trichloroethane | 22 | Not Detected | 120 | Not Detected |
| Cyclohexane | 22 | Not Detected | 74 | Not Detected |
| Carbon Tetrachloride | 22 | Not Detected | 140 | Not Detected |
| 2,2,4-Trimethylpentane | 22 | Not Detected | 100 | Not Detected |
| Benzene | 22 | Not Detected | 69 | Not Detected |
| 1,2-Dichloroethane | 22 | Not Detected | 87 | Not Detected |
| Heptane | 22 | Not Detected | 88 | Not Detected |
| Trichloroethene | 22 | 3300 | 120 | 18000 |
| 1,2-Dichloropropane | 22 | Not Detected | 99 | Not Detected |
| 1,4-Dioxane | 86 | Not Detected | 310 | Not Detected |
| Bromodichloromethane | 22 | Not Detected | 140 | Not Detected |
| cis-1,3-Dichloropropene | 22 | Not Detected | 98 | Not Detected |
| 4-Methyl-2-pentanone | 22 | Not Detected | 88 | Not Detected |
| Toluene | 22 | Not Detected | 81 | Not Detected |
| trans-1,3-Dichloropropene | 22 | Not Detected | 98 | Not Detected |
| 1,1,2-Trichloroethane | 22 | Not Detected | 120 | Not Detected |
| Tetrachloroethene | 22 | 20000 | 140 | 140000 |
| 2-Hexanone | 86 | Not Detected | 350 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-1-10**

**Lab ID#: 1706400A-10A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062421** | **Date of Collection: 6/9/17 10:55:00 AM** | |
| **Dil. Factor:** | **4.30** | **Date of Analysis: 6/24/17 08:14 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 22 | Not Detected | 180 | Not Detected |
| 1,2-Dibromoethane (EDB) | 22 | Not Detected | 160 | Not Detected |
| Chlorobenzene | 22 | Not Detected | 99 | Not Detected |
| Ethyl Benzene | 22 | Not Detected | 93 | Not Detected |
| m,p-Xylene | 22 | Not Detected | 93 | Not Detected |
| o-Xylene | 22 | Not Detected | 93 | Not Detected |
| Styrene | 22 | Not Detected | 92 | Not Detected |
| Bromoform | 22 | Not Detected | 220 | Not Detected |
| Cumene | 22 | Not Detected | 100 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 22 | Not Detected | 150 | Not Detected |
| Propylbenzene | 22 | Not Detected | 100 | Not Detected |
| 4-Ethyltoluene | 22 | Not Detected | 100 | Not Detected |
| 1,3,5-Trimethylbenzene | 22 | Not Detected | 100 | Not Detected |
| 1,2,4-Trimethylbenzene | 22 | Not Detected | 100 | Not Detected |
| 1,3-Dichlorobenzene | 22 | Not Detected | 130 | Not Detected |
| 1,4-Dichlorobenzene | 22 | Not Detected | 130 | Not Detected |
| alpha-Chlorotoluene | 22 | Not Detected | 110 | Not Detected |
| 1,2-Dichlorobenzene | 22 | Not Detected | 130 | Not Detected |
| 1,2,4-Trichlorobenzene | 86 | Not Detected | 640 | Not Detected |
| Hexachlorobutadiene | 86 | Not Detected | 920 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 112 | 70-130 |
| Toluene-d8 | 102 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-2-SS**

**Lab ID#: 1706400A-11A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062324** | **Date of Collection:** | **6/9/17 12:27:00 PM** |
| **Dil. Factor:** | **2.13** | **Date of Analysis:** | **6/23/17 07:50 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 11 | Not Detected | 53 | Not Detected |
| Freon 114 | 11 | Not Detected | 74 | Not Detected |
| Chloromethane | 43 | Not Detected | 88 | Not Detected |
| Vinyl Chloride | 11 | Not Detected | 27 | Not Detected |
| 1,3-Butadiene | 11 | Not Detected | 24 | Not Detected |
| Bromomethane | 43 | Not Detected | 160 | Not Detected |
| Chloroethane | 43 | Not Detected | 110 | Not Detected |
| Freon 11 | 11 | Not Detected | 60 | Not Detected |
| Ethanol | 43 | Not Detected | 80 | Not Detected |
| Freon 113 | 11 | Not Detected | 82 | Not Detected |
| 1,1-Dichloroethene | 11 | Not Detected | 42 | Not Detected |
| Acetone | 43 | Not Detected | 100 | Not Detected |
| 2-Propanol | 43 | Not Detected | 100 | Not Detected |
| Carbon Disulfide | 43 | Not Detected | 130 | Not Detected |
| 3-Chloropropene | 43 | Not Detected | 130 | Not Detected |
| Methylene Chloride | 43 | Not Detected | 150 | Not Detected |
| Methyl tert-butyl ether | 11 | Not Detected | 38 | Not Detected |
| trans-1,2-Dichloroethene | 11 | Not Detected | 42 | Not Detected |
| Hexane | 11 | Not Detected | 38 | Not Detected |
| 1,1-Dichloroethane | 11 | Not Detected | 43 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 43 | Not Detected | 120 | Not Detected |
| cis-1,2-Dichloroethene | 11 | Not Detected | 42 | Not Detected |
| Tetrahydrofuran | 11 | Not Detected | 31 | Not Detected |
| Chloroform | 11 | Not Detected | 52 | Not Detected |
| 1,1,1-Trichloroethane | 11 | Not Detected | 58 | Not Detected |
| Cyclohexane | 11 | Not Detected | 37 | Not Detected |
| Carbon Tetrachloride | 11 | Not Detected | 67 | Not Detected |
| 2,2,4-Trimethylpentane | 11 | Not Detected | 50 | Not Detected |
| Benzene | 11 | Not Detected | 34 | Not Detected |
| 1,2-Dichloroethane | 11 | Not Detected | 43 | Not Detected |
| Heptane | 11 | Not Detected | 44 | Not Detected |
| Trichloroethene | 11 | 24 | 57 | 130 |
| 1,2-Dichloropropane | 11 | Not Detected | 49 | Not Detected |
| 1,4-Dioxane | 43 | Not Detected | 150 | Not Detected |
| Bromodichloromethane | 11 | Not Detected | 71 | Not Detected |
| cis-1,3-Dichloropropene | 11 | Not Detected | 48 | Not Detected |
| 4-Methyl-2-pentanone | 11 | Not Detected | 44 | Not Detected |
| Toluene | 11 | Not Detected | 40 | Not Detected |
| trans-1,3-Dichloropropene | 11 | Not Detected | 48 | Not Detected |
| 1,1,2-Trichloroethane | 11 | Not Detected | 58 | Not Detected |
| Tetrachloroethene | 11 | 7600 | 72 | 51000 |
| 2-Hexanone | 43 | Not Detected | 170 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-2-SS**

**Lab ID#: 1706400A-11A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062324** | **Date of Collection:** | **6/9/17 12:27:00 PM** |
| **Dil. Factor:** | **2.13** | **Date of Analysis:** | **6/23/17 07:50 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 11 | Not Detected | 91 | Not Detected |
| 1,2-Dibromoethane (EDB) | 11 | Not Detected | 82 | Not Detected |
| Chlorobenzene | 11 | Not Detected | 49 | Not Detected |
| Ethyl Benzene | 11 | Not Detected | 46 | Not Detected |
| m,p-Xylene | 11 | Not Detected | 46 | Not Detected |
| o-Xylene | 11 | Not Detected | 46 | Not Detected |
| Styrene | 11 | Not Detected | 45 | Not Detected |
| Bromoform | 11 | Not Detected | 110 | Not Detected |
| Cumene | 11 | Not Detected | 52 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 11 | Not Detected | 73 | Not Detected |
| Propylbenzene | 11 | Not Detected | 52 | Not Detected |
| 4-Ethyltoluene | 11 | Not Detected | 52 | Not Detected |
| 1,3,5-Trimethylbenzene | 11 | Not Detected | 52 | Not Detected |
| 1,2,4-Trimethylbenzene | 11 | Not Detected | 52 | Not Detected |
| 1,3-Dichlorobenzene | 11 | Not Detected | 64 | Not Detected |
| 1,4-Dichlorobenzene | 11 | Not Detected | 64 | Not Detected |
| alpha-Chlorotoluene | 11 | Not Detected | 55 | Not Detected |
| 1,2-Dichlorobenzene | 11 | Not Detected | 64 | Not Detected |
| 1,2,4-Trichlorobenzene | 43 | Not Detected | 320 | Not Detected |
| Hexachlorobutadiene | 43 | Not Detected | 450 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 111 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-2-5**

**Lab ID#: 1706400A-12A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062326** | **Date of Collection: 6/9/17 12:43:00 PM** | |
| **Dil. Factor:** | **4.54** | **Date of Analysis: 6/23/17 09:00 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 23 | Not Detected | 110 | Not Detected |
| Freon 114 | 23 | Not Detected | 160 | Not Detected |
| Chloromethane | 91 | Not Detected | 190 | Not Detected |
| Vinyl Chloride | 23 | Not Detected | 58 | Not Detected |
| 1,3-Butadiene | 23 | Not Detected | 50 | Not Detected |
| Bromomethane | 91 | Not Detected | 350 | Not Detected |
| Chloroethane | 91 | Not Detected | 240 | Not Detected |
| Freon 11 | 23 | Not Detected | 130 | Not Detected |
| Ethanol | 91 | Not Detected | 170 | Not Detected |
| Freon 113 | 23 | Not Detected | 170 | Not Detected |
| 1,1-Dichloroethene | 23 | Not Detected | 90 | Not Detected |
| Acetone | 91 | Not Detected | 220 | Not Detected |
| 2-Propanol | 91 | Not Detected | 220 | Not Detected |
| Carbon Disulfide | 91 | Not Detected | 280 | Not Detected |
| 3-Chloropropene | 91 | Not Detected | 280 | Not Detected |
| Methylene Chloride | 91 | Not Detected | 320 | Not Detected |
| Methyl tert-butyl ether | 23 | Not Detected | 82 | Not Detected |
| trans-1,2-Dichloroethene | 23 | 36 | 90 | 140 |
| Hexane | 23 | Not Detected | 80 | Not Detected |
| 1,1-Dichloroethane | 23 | Not Detected | 92 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 91 | Not Detected | 270 | Not Detected |
| cis-1,2-Dichloroethene | 23 | Not Detected | 90 | Not Detected |
| Tetrahydrofuran | 23 | Not Detected | 67 | Not Detected |
| Chloroform | 23 | Not Detected | 110 | Not Detected |
| 1,1,1-Trichloroethane | 23 | Not Detected | 120 | Not Detected |
| Cyclohexane | 23 | Not Detected | 78 | Not Detected |
| Carbon Tetrachloride | 23 | Not Detected | 140 | Not Detected |
| 2,2,4-Trimethylpentane | 23 | Not Detected | 110 | Not Detected |
| Benzene | 23 | Not Detected | 72 | Not Detected |
| 1,2-Dichloroethane | 23 | Not Detected | 92 | Not Detected |
| Heptane | 23 | Not Detected | 93 | Not Detected |
| Trichloroethene | 23 | 310 | 120 | 1700 |
| 1,2-Dichloropropane | 23 | Not Detected | 100 | Not Detected |
| 1,4-Dioxane | 91 | Not Detected | 330 | Not Detected |
| Bromodichloromethane | 23 | Not Detected | 150 | Not Detected |
| cis-1,3-Dichloropropene | 23 | Not Detected | 100 | Not Detected |
| 4-Methyl-2-pentanone | 23 | Not Detected | 93 | Not Detected |
| Toluene | 23 | Not Detected | 86 | Not Detected |
| trans-1,3-Dichloropropene | 23 | Not Detected | 100 | Not Detected |
| 1,1,2-Trichloroethane | 23 | Not Detected | 120 | Not Detected |
| Tetrachloroethene | 23 | 16000 | 150 | 110000 |
| 2-Hexanone | 91 | Not Detected | 370 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-2-5**

**Lab ID#: 1706400A-12A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062326** | **Date of Collection: 6/9/17 12:43:00 PM** | |
| **Dil. Factor:** | **4.54** | **Date of Analysis: 6/23/17 09:00 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 23 | Not Detected | 190 | Not Detected |
| 1,2-Dibromoethane (EDB) | 23 | Not Detected | 170 | Not Detected |
| Chlorobenzene | 23 | Not Detected | 100 | Not Detected |
| Ethyl Benzene | 23 | Not Detected | 98 | Not Detected |
| m,p-Xylene | 23 | Not Detected | 98 | Not Detected |
| o-Xylene | 23 | Not Detected | 98 | Not Detected |
| Styrene | 23 | Not Detected | 97 | Not Detected |
| Bromoform | 23 | Not Detected | 230 | Not Detected |
| Cumene | 23 | Not Detected | 110 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 23 | Not Detected | 160 | Not Detected |
| Propylbenzene | 23 | Not Detected | 110 | Not Detected |
| 4-Ethyltoluene | 23 | Not Detected | 110 | Not Detected |
| 1,3,5-Trimethylbenzene | 23 | Not Detected | 110 | Not Detected |
| 1,2,4-Trimethylbenzene | 23 | Not Detected | 110 | Not Detected |
| 1,3-Dichlorobenzene | 23 | Not Detected | 140 | Not Detected |
| 1,4-Dichlorobenzene | 23 | Not Detected | 140 | Not Detected |
| alpha-Chlorotoluene | 23 | Not Detected | 120 | Not Detected |
| 1,2-Dichlorobenzene | 23 | Not Detected | 140 | Not Detected |
| 1,2,4-Trichlorobenzene | 91 | Not Detected | 670 | Not Detected |
| Hexachlorobutadiene | 91 | Not Detected | 970 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 111 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-2-10**

**Lab ID#: 1706400A-13A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062327** | **Date of Collection: 6/9/17 12:58:00 PM** | |
| **Dil. Factor:** | **4.50** | **Date of Analysis: 6/23/17 09:24 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 22 | Not Detected | 110 | Not Detected |
| Freon 114 | 22 | Not Detected | 160 | Not Detected |
| Chloromethane | 90 | Not Detected | 180 | Not Detected |
| Vinyl Chloride | 22 | Not Detected | 58 | Not Detected |
| 1,3-Butadiene | 22 | Not Detected | 50 | Not Detected |
| Bromomethane | 90 | Not Detected | 350 | Not Detected |
| Chloroethane | 90 | Not Detected | 240 | Not Detected |
| Freon 11 | 22 | Not Detected | 130 | Not Detected |
| Ethanol | 90 | Not Detected | 170 | Not Detected |
| Freon 113 | 22 | Not Detected | 170 | Not Detected |
| 1,1-Dichloroethene | 22 | Not Detected | 89 | Not Detected |
| Acetone | 90 | Not Detected | 210 | Not Detected |
| 2-Propanol | 90 | Not Detected | 220 | Not Detected |
| Carbon Disulfide | 90 | Not Detected | 280 | Not Detected |
| 3-Chloropropene | 90 | Not Detected | 280 | Not Detected |
| Methylene Chloride | 90 | Not Detected | 310 | Not Detected |
| Methyl tert-butyl ether | 22 | Not Detected | 81 | Not Detected |
| trans-1,2-Dichloroethene | 22 | 30 | 89 | 120 |
| Hexane | 22 | Not Detected | 79 | Not Detected |
| 1,1-Dichloroethane | 22 | Not Detected | 91 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 90 | Not Detected | 260 | Not Detected |
| cis-1,2-Dichloroethene | 22 | Not Detected | 89 | Not Detected |
| Tetrahydrofuran | 22 | Not Detected | 66 | Not Detected |
| Chloroform | 22 | Not Detected | 110 | Not Detected |
| 1,1,1-Trichloroethane | 22 | Not Detected | 120 | Not Detected |
| Cyclohexane | 22 | Not Detected | 77 | Not Detected |
| Carbon Tetrachloride | 22 | Not Detected | 140 | Not Detected |
| 2,2,4-Trimethylpentane | 22 | Not Detected | 100 | Not Detected |
| Benzene | 22 | Not Detected | 72 | Not Detected |
| 1,2-Dichloroethane | 22 | Not Detected | 91 | Not Detected |
| Heptane | 22 | Not Detected | 92 | Not Detected |
| Trichloroethene | 22 | 300 | 120 | 1600 |
| 1,2-Dichloropropane | 22 | Not Detected | 100 | Not Detected |
| 1,4-Dioxane | 90 | Not Detected | 320 | Not Detected |
| Bromodichloromethane | 22 | Not Detected | 150 | Not Detected |
| cis-1,3-Dichloropropene | 22 | Not Detected | 100 | Not Detected |
| 4-Methyl-2-pentanone | 22 | Not Detected | 92 | Not Detected |
| Toluene | 22 | Not Detected | 85 | Not Detected |
| trans-1,3-Dichloropropene | 22 | Not Detected | 100 | Not Detected |
| 1,1,2-Trichloroethane | 22 | Not Detected | 120 | Not Detected |
| Tetrachloroethene | 22 | 15000 | 150 | 100000 |
| 2-Hexanone | 90 | Not Detected | 370 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-2-10**

**Lab ID#: 1706400A-13A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062327** | **Date of Collection: 6/9/17 12:58:00 PM** | |
| **Dil. Factor:** | **4.50** | **Date of Analysis: 6/23/17 09:24 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 22 | Not Detected | 190 | Not Detected |
| 1,2-Dibromoethane (EDB) | 22 | Not Detected | 170 | Not Detected |
| Chlorobenzene | 22 | Not Detected | 100 | Not Detected |
| Ethyl Benzene | 22 | Not Detected | 98 | Not Detected |
| m,p-Xylene | 22 | Not Detected | 98 | Not Detected |
| o-Xylene | 22 | Not Detected | 98 | Not Detected |
| Styrene | 22 | Not Detected | 96 | Not Detected |
| Bromoform | 22 | Not Detected | 230 | Not Detected |
| Cumene | 22 | Not Detected | 110 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 22 | Not Detected | 150 | Not Detected |
| Propylbenzene | 22 | Not Detected | 110 | Not Detected |
| 4-Ethyltoluene | 22 | Not Detected | 110 | Not Detected |
| 1,3,5-Trimethylbenzene | 22 | Not Detected | 110 | Not Detected |
| 1,2,4-Trimethylbenzene | 22 | Not Detected | 110 | Not Detected |
| 1,3-Dichlorobenzene | 22 | Not Detected | 140 | Not Detected |
| 1,4-Dichlorobenzene | 22 | Not Detected | 140 | Not Detected |
| alpha-Chlorotoluene | 22 | Not Detected | 120 | Not Detected |
| 1,2-Dichlorobenzene | 22 | Not Detected | 140 | Not Detected |
| 1,2,4-Trichlorobenzene | 90 | Not Detected | 670 | Not Detected |
| Hexachlorobutadiene | 90 | Not Detected | 960 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 102 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-3-SS**

**Lab ID#: 1706400A-14A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062328** | **Date of Collection: 6/9/17 2:21:00 PM** | |
| **Dil. Factor:** | **4.70** | **Date of Analysis: 6/23/17 09:55 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 24 | Not Detected | 120 | Not Detected |
| Freon 114 | 24 | Not Detected | 160 | Not Detected |
| Chloromethane | 94 | Not Detected | 190 | Not Detected |
| Vinyl Chloride | 24 | Not Detected | 60 | Not Detected |
| 1,3-Butadiene | 24 | Not Detected | 52 | Not Detected |
| Bromomethane | 94 | Not Detected | 360 | Not Detected |
| Chloroethane | 94 | Not Detected | 250 | Not Detected |
| Freon 11 | 24 | Not Detected | 130 | Not Detected |
| Ethanol | 94 | Not Detected | 180 | Not Detected |
| Freon 113 | 24 | Not Detected | 180 | Not Detected |
| 1,1-Dichloroethene | 24 | Not Detected | 93 | Not Detected |
| Acetone | 94 | Not Detected | 220 | Not Detected |
| 2-Propanol | 94 | Not Detected | 230 | Not Detected |
| Carbon Disulfide | 94 | Not Detected | 290 | Not Detected |
| 3-Chloropropene | 94 | Not Detected | 290 | Not Detected |
| Methylene Chloride | 94 | Not Detected | 330 | Not Detected |
| Methyl tert-butyl ether | 24 | Not Detected | 85 | Not Detected |
| trans-1,2-Dichloroethene | 24 | 33 | 93 | 130 |
| Hexane | 24 | Not Detected | 83 | Not Detected |
| 1,1-Dichloroethane | 24 | Not Detected | 95 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 94 | Not Detected | 280 | Not Detected |
| cis-1,2-Dichloroethene | 24 | 30 | 93 | 120 |
| Tetrahydrofuran | 24 | Not Detected | 69 | Not Detected |
| Chloroform | 24 | Not Detected | 110 | Not Detected |
| 1,1,1-Trichloroethane | 24 | Not Detected | 130 | Not Detected |
| Cyclohexane | 24 | Not Detected | 81 | Not Detected |
| Carbon Tetrachloride | 24 | Not Detected | 150 | Not Detected |
| 2,2,4-Trimethylpentane | 24 | Not Detected | 110 | Not Detected |
| Benzene | 24 | Not Detected | 75 | Not Detected |
| 1,2-Dichloroethane | 24 | Not Detected | 95 | Not Detected |
| Heptane | 24 | Not Detected | 96 | Not Detected |
| Trichloroethene | 24 | 890 | 130 | 4800 |
| 1,2-Dichloropropane | 24 | Not Detected | 110 | Not Detected |
| 1,4-Dioxane | 94 | Not Detected | 340 | Not Detected |
| Bromodichloromethane | 24 | Not Detected | 160 | Not Detected |
| cis-1,3-Dichloropropene | 24 | Not Detected | 110 | Not Detected |
| 4-Methyl-2-pentanone | 24 | Not Detected | 96 | Not Detected |
| Toluene | 24 | Not Detected | 88 | Not Detected |
| trans-1,3-Dichloropropene | 24 | Not Detected | 110 | Not Detected |
| 1,1,2-Trichloroethane | 24 | Not Detected | 130 | Not Detected |
| Tetrachloroethene | 24 | 18000 | 160 | 120000 |
| 2-Hexanone | 94 | Not Detected | 380 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-3-SS**

**Lab ID#: 1706400A-14A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062328** | **Date of Collection:** | **6/9/17 2:21:00 PM** |
| **Dil. Factor:** | **4.70** | **Date of Analysis:** | **6/23/17 09:55 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 24 | Not Detected | 200 | Not Detected |
| 1,2-Dibromoethane (EDB) | 24 | Not Detected | 180 | Not Detected |
| Chlorobenzene | 24 | Not Detected | 110 | Not Detected |
| Ethyl Benzene | 24 | Not Detected | 100 | Not Detected |
| m,p-Xylene | 24 | Not Detected | 100 | Not Detected |
| o-Xylene | 24 | Not Detected | 100 | Not Detected |
| Styrene | 24 | Not Detected | 100 | Not Detected |
| Bromoform | 24 | Not Detected | 240 | Not Detected |
| Cumene | 24 | Not Detected | 120 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 24 | Not Detected | 160 | Not Detected |
| Propylbenzene | 24 | Not Detected | 120 | Not Detected |
| 4-Ethyltoluene | 24 | Not Detected | 120 | Not Detected |
| 1,3,5-Trimethylbenzene | 24 | Not Detected | 120 | Not Detected |
| 1,2,4-Trimethylbenzene | 24 | Not Detected | 120 | Not Detected |
| 1,3-Dichlorobenzene | 24 | Not Detected | 140 | Not Detected |
| 1,4-Dichlorobenzene | 24 | Not Detected | 140 | Not Detected |
| alpha-Chlorotoluene | 24 | Not Detected | 120 | Not Detected |
| 1,2-Dichlorobenzene | 24 | Not Detected | 140 | Not Detected |
| 1,2,4-Trichlorobenzene | 94 | Not Detected | 700 | Not Detected |
| Hexachlorobutadiene | 94 | Not Detected | 1000 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 115 | 70-130 |
| Toluene-d8 | 97 | 70-130 |
| 4-Bromofluorobenzene | 103 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-3-5**

**Lab ID#: 1706400A-15A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062424** | **Date of Collection:** | **6/9/17 2:42:00 PM** |
| **Dil. Factor:** | **27.2** | **Date of Analysis:** | **6/25/17 07:53 AM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 140 | Not Detected | 670 | Not Detected |
| Freon 114 | 140 | Not Detected | 950 | Not Detected |
| Chloromethane | 540 | Not Detected | 1100 | Not Detected |
| Vinyl Chloride | 140 | Not Detected | 350 | Not Detected |
| 1,3-Butadiene | 140 | Not Detected | 300 | Not Detected |
| Bromomethane | 540 | Not Detected | 2100 | Not Detected |
| Chloroethane | 540 | Not Detected | 1400 | Not Detected |
| Freon 11 | 140 | Not Detected | 760 | Not Detected |
| Ethanol | 540 | Not Detected | 1000 | Not Detected |
| Freon 113 | 140 | Not Detected | 1000 | Not Detected |
| 1,1-Dichloroethene | 140 | Not Detected | 540 | Not Detected |
| Acetone | 540 | Not Detected | 1300 | Not Detected |
| 2-Propanol | 540 | Not Detected | 1300 | Not Detected |
| Carbon Disulfide | 540 | Not Detected | 1700 | Not Detected |
| 3-Chloropropene | 540 | Not Detected | 1700 | Not Detected |
| Methylene Chloride | 540 | Not Detected | 1900 | Not Detected |
| Methyl tert-butyl ether | 140 | Not Detected | 490 | Not Detected |
| trans-1,2-Dichloroethene | 140 | 150 | 540 | 600 |
| Hexane | 140 | Not Detected | 480 | Not Detected |
| 1,1-Dichloroethane | 140 | Not Detected | 550 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 540 | Not Detected | 1600 | Not Detected |
| cis-1,2-Dichloroethene | 140 | 390 | 540 | 1600 |
| Tetrahydrofuran | 140 | Not Detected | 400 | Not Detected |
| Chloroform | 140 | Not Detected | 660 | Not Detected |
| 1,1,1-Trichloroethane | 140 | Not Detected | 740 | Not Detected |
| Cyclohexane | 140 | Not Detected | 470 | Not Detected |
| Carbon Tetrachloride | 140 | Not Detected | 860 | Not Detected |
| 2,2,4-Trimethylpentane | 140 | Not Detected | 640 | Not Detected |
| Benzene | 140 | Not Detected | 430 | Not Detected |
| 1,2-Dichloroethane | 140 | Not Detected | 550 | Not Detected |
| Heptane | 140 | Not Detected | 560 | Not Detected |
| Trichloroethene | 140 | 2800 | 730 | 15000 |
| 1,2-Dichloropropane | 140 | Not Detected | 630 | Not Detected |
| 1,4-Dioxane | 540 | Not Detected | 2000 | Not Detected |
| Bromodichloromethane | 140 | Not Detected | 910 | Not Detected |
| cis-1,3-Dichloropropene | 140 | Not Detected | 620 | Not Detected |
| 4-Methyl-2-pentanone | 140 | Not Detected | 560 | Not Detected |
| Toluene | 140 | Not Detected | 510 | Not Detected |
| trans-1,3-Dichloropropene | 140 | Not Detected | 620 | Not Detected |
| 1,1,2-Trichloroethane | 140 | Not Detected | 740 | Not Detected |
| Tetrachloroethene | 140 | 55000 | 920 | 370000 |
| 2-Hexanone | 540 | Not Detected | 2200 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-3-5**

**Lab ID#: 1706400A-15A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062424** | **Date of Collection: 6/9/17 2:42:00 PM** | |
| **Dil. Factor:** | **27.2** | **Date of Analysis: 6/25/17 07:53 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 140 | Not Detected | 1200 | Not Detected |
| 1,2-Dibromoethane (EDB) | 140 | Not Detected | 1000 | Not Detected |
| Chlorobenzene | 140 | Not Detected | 630 | Not Detected |
| Ethyl Benzene | 140 | Not Detected | 590 | Not Detected |
| m,p-Xylene | 140 | Not Detected | 590 | Not Detected |
| o-Xylene | 140 | Not Detected | 590 | Not Detected |
| Styrene | 140 | Not Detected | 580 | Not Detected |
| Bromoform | 140 | Not Detected | 1400 | Not Detected |
| Cumene | 140 | Not Detected | 670 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 140 | Not Detected | 930 | Not Detected |
| Propylbenzene | 140 | Not Detected | 670 | Not Detected |
| 4-Ethyltoluene | 140 | Not Detected | 670 | Not Detected |
| 1,3,5-Trimethylbenzene | 140 | Not Detected | 670 | Not Detected |
| 1,2,4-Trimethylbenzene | 140 | Not Detected | 670 | Not Detected |
| 1,3-Dichlorobenzene | 140 | Not Detected | 820 | Not Detected |
| 1,4-Dichlorobenzene | 140 | Not Detected | 820 | Not Detected |
| alpha-Chlorotoluene | 140 | Not Detected | 700 | Not Detected |
| 1,2-Dichlorobenzene | 140 | Not Detected | 820 | Not Detected |
| 1,2,4-Trichlorobenzene | 540 | Not Detected | 4000 | Not Detected |
| Hexachlorobutadiene | 540 | Not Detected | 5800 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 110 | 70-130 |
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 97 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-3-10**

**Lab ID#: 1706400A-16A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062425** | **Date of Collection:** | **6/9/17 3:35:00 PM** |
| **Dil. Factor:** | **25.4** | **Date of Analysis:** | **6/25/17 08:27 AM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 130 | Not Detected | 630 | Not Detected |
| Freon 114 | 130 | Not Detected | 890 | Not Detected |
| Chloromethane | 510 | Not Detected | 1000 | Not Detected |
| Vinyl Chloride | 130 | Not Detected | 320 | Not Detected |
| 1,3-Butadiene | 130 | Not Detected | 280 | Not Detected |
| Bromomethane | 510 | Not Detected | 2000 | Not Detected |
| Chloroethane | 510 | Not Detected | 1300 | Not Detected |
| Freon 11 | 130 | Not Detected | 710 | Not Detected |
| Ethanol | 510 | Not Detected | 960 | Not Detected |
| Freon 113 | 130 | Not Detected | 970 | Not Detected |
| 1,1-Dichloroethene | 130 | Not Detected | 500 | Not Detected |
| Acetone | 510 | Not Detected | 1200 | Not Detected |
| 2-Propanol | 510 | Not Detected | 1200 | Not Detected |
| Carbon Disulfide | 510 | Not Detected | 1600 | Not Detected |
| 3-Chloropropene | 510 | Not Detected | 1600 | Not Detected |
| Methylene Chloride | 510 | Not Detected | 1800 | Not Detected |
| Methyl tert-butyl ether | 130 | Not Detected | 460 | Not Detected |
| trans-1,2-Dichloroethene | 130 | 180 | 500 | 730 |
| Hexane | 130 | Not Detected | 450 | Not Detected |
| 1,1-Dichloroethane | 130 | Not Detected | 510 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 510 | Not Detected | 1500 | Not Detected |
| cis-1,2-Dichloroethene | 130 | 360 | 500 | 1400 |
| Tetrahydrofuran | 130 | Not Detected | 370 | Not Detected |
| Chloroform | 130 | Not Detected | 620 | Not Detected |
| 1,1,1-Trichloroethane | 130 | Not Detected | 690 | Not Detected |
| Cyclohexane | 130 | Not Detected | 440 | Not Detected |
| Carbon Tetrachloride | 130 | Not Detected | 800 | Not Detected |
| 2,2,4-Trimethylpentane | 130 | Not Detected | 590 | Not Detected |
| Benzene | 130 | Not Detected | 400 | Not Detected |
| 1,2-Dichloroethane | 130 | Not Detected | 510 | Not Detected |
| Heptane | 130 | Not Detected | 520 | Not Detected |
| Trichloroethene | 130 | 2800 | 680 | 15000 |
| 1,2-Dichloropropane | 130 | Not Detected | 590 | Not Detected |
| 1,4-Dioxane | 510 | Not Detected | 1800 | Not Detected |
| Bromodichloromethane | 130 | Not Detected | 850 | Not Detected |
| cis-1,3-Dichloropropene | 130 | Not Detected | 580 | Not Detected |
| 4-Methyl-2-pentanone | 130 | Not Detected | 520 | Not Detected |
| Toluene | 130 | Not Detected | 480 | Not Detected |
| trans-1,3-Dichloropropene | 130 | Not Detected | 580 | Not Detected |
| 1,1,2-Trichloroethane | 130 | Not Detected | 690 | Not Detected |
| Tetrachloroethene | 130 | 57000 | 860 | 380000 |
| 2-Hexanone | 510 | Not Detected | 2100 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-060917-SVP-3-10**

**Lab ID#: 1706400A-16A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062425** | **Date of Collection: 6/9/17 3:35:00 PM** | |
| **Dil. Factor:** | **25.4** | **Date of Analysis: 6/25/17 08:27 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 130 | Not Detected | 1100 | Not Detected |
| 1,2-Dibromoethane (EDB) | 130 | Not Detected | 980 | Not Detected |
| Chlorobenzene | 130 | Not Detected | 580 | Not Detected |
| Ethyl Benzene | 130 | Not Detected | 550 | Not Detected |
| m,p-Xylene | 130 | Not Detected | 550 | Not Detected |
| o-Xylene | 130 | Not Detected | 550 | Not Detected |
| Styrene | 130 | Not Detected | 540 | Not Detected |
| Bromoform | 130 | Not Detected | 1300 | Not Detected |
| Cumene | 130 | Not Detected | 620 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 130 | Not Detected | 870 | Not Detected |
| Propylbenzene | 130 | Not Detected | 620 | Not Detected |
| 4-Ethyltoluene | 130 | Not Detected | 620 | Not Detected |
| 1,3,5-Trimethylbenzene | 130 | Not Detected | 620 | Not Detected |
| 1,2,4-Trimethylbenzene | 130 | Not Detected | 620 | Not Detected |
| 1,3-Dichlorobenzene | 130 | Not Detected | 760 | Not Detected |
| 1,4-Dichlorobenzene | 130 | Not Detected | 760 | Not Detected |
| alpha-Chlorotoluene | 130 | Not Detected | 660 | Not Detected |
| 1,2-Dichlorobenzene | 130 | Not Detected | 760 | Not Detected |
| 1,2,4-Trichlorobenzene | 510 | Not Detected | 3800 | Not Detected |
| Hexachlorobutadiene | 510 | Not Detected | 5400 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 114 | 70-130 |
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 102 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1706400A-17A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062306** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 10:17 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 5.0 | Not Detected | 25 | Not Detected |
| Freon 114 | 5.0 | Not Detected | 35 | Not Detected |
| Chloromethane | 20 | Not Detected | 41 | Not Detected |
| Vinyl Chloride | 5.0 | Not Detected | 13 | Not Detected |
| 1,3-Butadiene | 5.0 | Not Detected | 11 | Not Detected |
| Bromomethane | 20 | Not Detected | 78 | Not Detected |
| Chloroethane | 20 | Not Detected | 53 | Not Detected |
| Freon 11 | 5.0 | Not Detected | 28 | Not Detected |
| Ethanol | 20 | Not Detected | 38 | Not Detected |
| Freon 113 | 5.0 | Not Detected | 38 | Not Detected |
| 1,1-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Acetone | 20 | Not Detected | 48 | Not Detected |
| 2-Propanol | 20 | Not Detected | 49 | Not Detected |
| Carbon Disulfide | 20 | Not Detected | 62 | Not Detected |
| 3-Chloropropene | 20 | Not Detected | 63 | Not Detected |
| Methylene Chloride | 20 | Not Detected | 69 | Not Detected |
| Methyl tert-butyl ether | 5.0 | Not Detected | 18 | Not Detected |
| trans-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Hexane | 5.0 | Not Detected | 18 | Not Detected |
| 1,1-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 20 | Not Detected | 59 | Not Detected |
| cis-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Tetrahydrofuran | 5.0 | Not Detected | 15 | Not Detected |
| Chloroform | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,1-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Cyclohexane | 5.0 | Not Detected | 17 | Not Detected |
| Carbon Tetrachloride | 5.0 | Not Detected | 31 | Not Detected |
| 2,2,4-Trimethylpentane | 5.0 | Not Detected | 23 | Not Detected |
| Benzene | 5.0 | Not Detected | 16 | Not Detected |
| 1,2-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| Heptane | 5.0 | Not Detected | 20 | Not Detected |
| Trichloroethene | 5.0 | Not Detected | 27 | Not Detected |
| 1,2-Dichloropropane | 5.0 | Not Detected | 23 | Not Detected |
| 1,4-Dioxane | 20 | Not Detected | 72 | Not Detected |
| Bromodichloromethane | 5.0 | Not Detected | 34 | Not Detected |
| cis-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 4-Methyl-2-pentanone | 5.0 | Not Detected | 20 | Not Detected |
| Toluene | 5.0 | Not Detected | 19 | Not Detected |
| trans-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 1,1,2-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Tetrachloroethene | 5.0 | Not Detected | 34 | Not Detected |
| 2-Hexanone | 20 | Not Detected | 82 | Not Detected |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1706400A-17A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062306** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 10:17 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 5.0 | Not Detected | 42 | Not Detected |
| 1,2-Dibromoethane (EDB) | 5.0 | Not Detected | 38 | Not Detected |
| Chlorobenzene | 5.0 | Not Detected | 23 | Not Detected |
| Ethyl Benzene | 5.0 | Not Detected | 22 | Not Detected |
| m,p-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| o-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| Styrene | 5.0 | Not Detected | 21 | Not Detected |
| Bromoform | 5.0 | Not Detected | 52 | Not Detected |
| Cumene | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 5.0 | Not Detected | 34 | Not Detected |
| Propylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 4-Ethyltoluene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3,5-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,2,4-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,4-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| alpha-Chlorotoluene | 5.0 | Not Detected | 26 | Not Detected |
| 1,2-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,2,4-Trichlorobenzene | 20 | Not Detected | 150 | Not Detected |
| Hexachlorobutadiene | 20 | Not Detected | 210 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 102 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1706400A-17B**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062305** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 10:05 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.50 | Not Detected | 2.5 | Not Detected |
| Freon 114 | 0.50 | Not Detected | 3.5 | Not Detected |
| Chloromethane | 5.0 | Not Detected | 10 | Not Detected |
| Vinyl Chloride | 0.50 | Not Detected | 1.3 | Not Detected |
| 1,3-Butadiene | 0.50 | Not Detected | 1.1 | Not Detected |
| Bromomethane | 5.0 | Not Detected | 19 | Not Detected |
| Chloroethane | 2.0 | Not Detected | 5.3 | Not Detected |
| Freon 11 | 0.50 | Not Detected | 2.8 | Not Detected |
| Ethanol | 2.0 | Not Detected | 3.8 | Not Detected |
| Freon 113 | 0.50 | Not Detected | 3.8 | Not Detected |
| 1,1-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Acetone | 5.0 | Not Detected | 12 | Not Detected |
| 2-Propanol | 2.0 | Not Detected | 4.9 | Not Detected |
| Carbon Disulfide | 2.0 | Not Detected | 6.2 | Not Detected |
| 3-Chloropropene | 2.0 | Not Detected | 6.3 | Not Detected |
| Methylene Chloride | 5.0 | Not Detected | 17 | Not Detected |
| Methyl tert-butyl ether | 2.0 | Not Detected | 7.2 | Not Detected |
| trans-1,2-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Hexane | 0.50 | Not Detected | 1.8 | Not Detected |
| 1,1-Dichloroethane | 0.50 | Not Detected | 2.0 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 2.0 | Not Detected | 5.9 | Not Detected |
| cis-1,2-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Tetrahydrofuran | 0.50 | Not Detected | 1.5 | Not Detected |
| Chloroform | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,1,1-Trichloroethane | 0.50 | Not Detected | 2.7 | Not Detected |
| Cyclohexane | 0.50 | Not Detected | 1.7 | Not Detected |
| Carbon Tetrachloride | 0.50 | Not Detected | 3.1 | Not Detected |
| 2,2,4-Trimethylpentane | 0.50 | Not Detected | 2.3 | Not Detected |
| Benzene | 0.50 | Not Detected | 1.6 | Not Detected |
| 1,2-Dichloroethane | 0.50 | Not Detected | 2.0 | Not Detected |
| Heptane | 0.50 | Not Detected | 2.0 | Not Detected |
| Trichloroethene | 0.50 | Not Detected | 2.7 | Not Detected |
| 1,2-Dichloropropane | 0.50 | Not Detected | 2.3 | Not Detected |
| 1,4-Dioxane | 2.0 | Not Detected | 7.2 | Not Detected |
| Bromodichloromethane | 0.50 | Not Detected | 3.4 | Not Detected |
| cis-1,3-Dichloropropene | 0.50 | Not Detected | 2.3 | Not Detected |
| 4-Methyl-2-pentanone | 0.50 | Not Detected | 2.0 | Not Detected |
| Toluene | 0.50 | Not Detected | 1.9 | Not Detected |
| trans-1,3-Dichloropropene | 0.50 | Not Detected | 2.3 | Not Detected |
| 1,1,2-Trichloroethane | 0.50 | Not Detected | 2.7 | Not Detected |
| Tetrachloroethene | 0.50 | Not Detected | 3.4 | Not Detected |
| 2-Hexanone | 2.0 | Not Detected | 8.2 | Not Detected |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1706400A-17B**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062305** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 10:05 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 0.50 | Not Detected | 4.2 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.50 | Not Detected | 3.8 | Not Detected |
| Chlorobenzene | 0.50 | Not Detected | 2.3 | Not Detected |
| Ethyl Benzene | 0.50 | Not Detected | 2.2 | Not Detected |
| m,p-Xylene | 0.50 | Not Detected | 2.2 | Not Detected |
| o-Xylene | 0.50 | Not Detected | 2.2 | Not Detected |
| Styrene | 0.50 | Not Detected | 2.1 | Not Detected |
| Bromoform | 0.50 | Not Detected | 5.2 | Not Detected |
| Cumene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.50 | Not Detected | 3.4 | Not Detected |
| Propylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 4-Ethyltoluene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,3,5-Trimethylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,2,4-Trimethylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,3-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| 1,4-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| alpha-Chlorotoluene | 0.50 | Not Detected | 2.6 | Not Detected |
| 1,2-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| 1,2,4-Trichlorobenzene | 2.0 | Not Detected | 15 | Not Detected |
| Hexachlorobutadiene | 2.0 | Not Detected | 21 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 86 | 70-130 |
| 4-Bromofluorobenzene | 107 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1706400A-17C**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062410** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/24/17 03:09 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 5.0 | Not Detected | 25 | Not Detected |
| Freon 114 | 5.0 | Not Detected | 35 | Not Detected |
| Chloromethane | 20 | Not Detected | 41 | Not Detected |
| Vinyl Chloride | 5.0 | Not Detected | 13 | Not Detected |
| 1,3-Butadiene | 5.0 | Not Detected | 11 | Not Detected |
| Bromomethane | 20 | Not Detected | 78 | Not Detected |
| Chloroethane | 20 | Not Detected | 53 | Not Detected |
| Freon 11 | 5.0 | Not Detected | 28 | Not Detected |
| Ethanol | 20 | Not Detected | 38 | Not Detected |
| Freon 113 | 5.0 | Not Detected | 38 | Not Detected |
| 1,1-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Acetone | 20 | Not Detected | 48 | Not Detected |
| 2-Propanol | 20 | Not Detected | 49 | Not Detected |
| Carbon Disulfide | 20 | Not Detected | 62 | Not Detected |
| 3-Chloropropene | 20 | Not Detected | 63 | Not Detected |
| Methylene Chloride | 20 | Not Detected | 69 | Not Detected |
| Methyl tert-butyl ether | 5.0 | Not Detected | 18 | Not Detected |
| trans-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Hexane | 5.0 | Not Detected | 18 | Not Detected |
| 1,1-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 20 | Not Detected | 59 | Not Detected |
| cis-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Tetrahydrofuran | 5.0 | Not Detected | 15 | Not Detected |
| Chloroform | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,1-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Cyclohexane | 5.0 | Not Detected | 17 | Not Detected |
| Carbon Tetrachloride | 5.0 | Not Detected | 31 | Not Detected |
| 2,2,4-Trimethylpentane | 5.0 | Not Detected | 23 | Not Detected |
| Benzene | 5.0 | Not Detected | 16 | Not Detected |
| 1,2-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| Heptane | 5.0 | Not Detected | 20 | Not Detected |
| Trichloroethene | 5.0 | Not Detected | 27 | Not Detected |
| 1,2-Dichloropropane | 5.0 | Not Detected | 23 | Not Detected |
| 1,4-Dioxane | 20 | Not Detected | 72 | Not Detected |
| Bromodichloromethane | 5.0 | Not Detected | 34 | Not Detected |
| cis-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 4-Methyl-2-pentanone | 5.0 | Not Detected | 20 | Not Detected |
| Toluene | 5.0 | Not Detected | 19 | Not Detected |
| trans-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 1,1,2-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Tetrachloroethene | 5.0 | Not Detected | 34 | Not Detected |
| 2-Hexanone | 20 | Not Detected | 82 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1706400A-17C**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062410** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/24/17 03:09 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 5.0 | Not Detected | 42 | Not Detected |
| 1,2-Dibromoethane (EDB) | 5.0 | Not Detected | 38 | Not Detected |
| Chlorobenzene | 5.0 | Not Detected | 23 | Not Detected |
| Ethyl Benzene | 5.0 | Not Detected | 22 | Not Detected |
| m,p-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| o-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| Styrene | 5.0 | Not Detected | 21 | Not Detected |
| Bromoform | 5.0 | Not Detected | 52 | Not Detected |
| Cumene | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 5.0 | Not Detected | 34 | Not Detected |
| Propylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 4-Ethyltoluene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3,5-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,2,4-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,4-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| alpha-Chlorotoluene | 5.0 | Not Detected | 26 | Not Detected |
| 1,2-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,2,4-Trichlorobenzene | 20 | Not Detected | 150 | Not Detected |
| Hexachlorobutadiene | 20 | Not Detected | 210 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 115 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 102 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706400A-18A**

**EPA METHOD TO-15 GC/MS**

| | | |
|---|---|---|
| **File Name:** | **14062302** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 07:51 AM** |

| Compound | %Recovery |
|---|---|
| Freon 12 | 98 |
| Freon 114 | 103 |
| Chloromethane | 91 |
| Vinyl Chloride | 101 |
| 1,3-Butadiene | 93 |
| Bromomethane | 119 |
| Chloroethane | 91 |
| Freon 11 | 122 |
| Ethanol | 90 |
| Freon 113 | 107 |
| 1,1-Dichloroethene | 104 |
| Acetone | 92 |
| 2-Propanol | 97 |
| Carbon Disulfide | 92 |
| 3-Chloropropene | 98 |
| Methylene Chloride | 101 |
| Methyl tert-butyl ether | 103 |
| trans-1,2-Dichloroethene | 92 |
| Hexane | 102 |
| 1,1-Dichloroethane | 99 |
| 2-Butanone (Methyl Ethyl Ketone) | 90 |
| cis-1,2-Dichloroethene | 100 |
| Tetrahydrofuran | 85 |
| Chloroform | 95 |
| 1,1,1-Trichloroethane | 116 |
| Cyclohexane | 105 |
| Carbon Tetrachloride | 120 |
| 2,2,4-Trimethylpentane | 97 |
| Benzene | 90 |
| 1,2-Dichloroethane | 104 |
| Heptane | 90 |
| Trichloroethene | 91 |
| 1,2-Dichloropropane | 84 |
| 1,4-Dioxane | 95 |
| Bromodichloromethane | 99 |
| cis-1,3-Dichloropropene | 93 |
| 4-Methyl-2-pentanone | 103 |
| Toluene | 85 |
| trans-1,3-Dichloropropene | 99 |
| 1,1,2-Trichloroethane | 93 |
| Tetrachloroethene | 94 |
| 2-Hexanone | 99 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706400A-18A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062302** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 07:51 AM** | |

| Compound | %Recovery |
|---|---|
| Dibromochloromethane | 98 |
| 1,2-Dibromoethane (EDB) | 95 |
| Chlorobenzene | 93 |
| Ethyl Benzene | 97 |
| m,p-Xylene | 92 |
| o-Xylene | 93 |
| Styrene | 106 |
| Bromoform | 100 |
| Cumene | 98 |
| 1,1,2,2-Tetrachloroethane | 89 |
| Propylbenzene | 95 |
| 4-Ethyltoluene | 100 |
| 1,3,5-Trimethylbenzene | 104 |
| 1,2,4-Trimethylbenzene | 104 |
| 1,3-Dichlorobenzene | 98 |
| 1,4-Dichlorobenzene | 101 |
| alpha-Chlorotoluene | 98 |
| 1,2-Dichlorobenzene | 98 |
| 1,2,4-Trichlorobenzene | 93 |
| Hexachlorobutadiene | 101 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 95 | 70-130 |
| 4-Bromofluorobenzene | 104 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706400A-18B**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | |
|---|---|---|
| **File Name:** | **17062302** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:43 AM** |

| Compound | %Recovery |
|---|---|
| Freon 12 | 90 |
| Freon 114 | 96 |
| Chloromethane | 93 |
| Vinyl Chloride | 90 |
| 1,3-Butadiene | 82 |
| Bromomethane | 94 |
| Chloroethane | 90 |
| Freon 11 | 92 |
| Ethanol | 81 |
| Freon 113 | 95 |
| 1,1-Dichloroethene | 91 |
| Acetone | 83 |
| 2-Propanol | 84 |
| Carbon Disulfide | 91 |
| 3-Chloropropene | 89 |
| Methylene Chloride | 84 |
| Methyl tert-butyl ether | 86 |
| trans-1,2-Dichloroethene | 90 |
| Hexane | 85 |
| 1,1-Dichloroethane | 85 |
| 2-Butanone (Methyl Ethyl Ketone) | 86 |
| cis-1,2-Dichloroethene | 86 |
| Tetrahydrofuran | 79 |
| Chloroform | 90 |
| 1,1,1-Trichloroethane | 89 |
| Cyclohexane | 83 |
| Carbon Tetrachloride | 89 |
| 2,2,4-Trimethylpentane | 82 |
| Benzene | 91 |
| 1,2-Dichloroethane | 86 |
| Heptane | 87 |
| Trichloroethene | 93 |
| 1,2-Dichloropropane | 88 |
| 1,4-Dioxane | 92 |
| Bromodichloromethane | 94 |
| cis-1,3-Dichloropropene | 92 |
| 4-Methyl-2-pentanone | 82 |
| Toluene | 93 |
| trans-1,3-Dichloropropene | 89 |
| 1,1,2-Trichloroethane | 94 |
| Tetrachloroethene | 100 |
| 2-Hexanone | 81 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706400A-18B**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062302** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:43 AM** | |

| Compound | %Recovery |
|---|---|
| Dibromochloromethane | 97 |
| 1,2-Dibromoethane (EDB) | 95 |
| Chlorobenzene | 93 |
| Ethyl Benzene | 92 |
| m,p-Xylene | 91 |
| o-Xylene | 90 |
| Styrene | 88 |
| Bromoform | 102 |
| Cumene | 90 |
| 1,1,2,2-Tetrachloroethane | 89 |
| Propylbenzene | 90 |
| 4-Ethyltoluene | 92 |
| 1,3,5-Trimethylbenzene | 90 |
| 1,2,4-Trimethylbenzene | 92 |
| 1,3-Dichlorobenzene | 96 |
| 1,4-Dichlorobenzene | 96 |
| alpha-Chlorotoluene | 90 |
| 1,2-Dichlorobenzene | 94 |
| 1,2,4-Trichlorobenzene | 104 |
| Hexachlorobutadiene | 107 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 89 | 70-130 |
| 4-Bromofluorobenzene | 105 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706400A-18C**

**EPA METHOD TO-15 GC/MS**

| | | |
|---|---|---|
| **File Name:** | **14062407** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/24/17 12:29 PM** |

| Compound | %Recovery |
|---|---|
| Freon 12 | 99 |
| Freon 114 | 100 |
| Chloromethane | 90 |
| Vinyl Chloride | 96 |
| 1,3-Butadiene | 91 |
| Bromomethane | 114 |
| Chloroethane | 85 |
| Freon 11 | 119 |
| Ethanol | 92 |
| Freon 113 | 106 |
| 1,1-Dichloroethene | 100 |
| Acetone | 90 |
| 2-Propanol | 95 |
| Carbon Disulfide | 87 |
| 3-Chloropropene | 95 |
| Methylene Chloride | 101 |
| Methyl tert-butyl ether | 102 |
| trans-1,2-Dichloroethene | 88 |
| Hexane | 96 |
| 1,1-Dichloroethane | 99 |
| 2-Butanone (Methyl Ethyl Ketone) | 87 |
| cis-1,2-Dichloroethene | 99 |
| Tetrahydrofuran | 85 |
| Chloroform | 93 |
| 1,1,1-Trichloroethane | 111 |
| Cyclohexane | 103 |
| Carbon Tetrachloride | 118 |
| 2,2,4-Trimethylpentane | 97 |
| Benzene | 88 |
| 1,2-Dichloroethane | 102 |
| Heptane | 86 |
| Trichloroethene | 91 |
| 1,2-Dichloropropane | 84 |
| 1,4-Dioxane | 95 |
| Bromodichloromethane | 100 |
| cis-1,3-Dichloropropene | 90 |
| 4-Methyl-2-pentanone | 104 |
| Toluene | 87 |
| trans-1,3-Dichloropropene | 99 |
| 1,1,2-Trichloroethane | 92 |
| Tetrachloroethene | 95 |
| 2-Hexanone | 100 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706400A-18C**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062407** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/24/17 12:29 PM** | |

| Compound | %Recovery |
|---|---|
| Dibromochloromethane | 96 |
| 1,2-Dibromoethane (EDB) | 91 |
| Chlorobenzene | 93 |
| Ethyl Benzene | 90 |
| m,p-Xylene | 92 |
| o-Xylene | 94 |
| Styrene | 102 |
| Bromoform | 98 |
| Cumene | 99 |
| 1,1,2,2-Tetrachloroethane | 87 |
| Propylbenzene | 98 |
| 4-Ethyltoluene | 100 |
| 1,3,5-Trimethylbenzene | 108 |
| 1,2,4-Trimethylbenzene | 104 |
| 1,3-Dichlorobenzene | 99 |
| 1,4-Dichlorobenzene | 103 |
| alpha-Chlorotoluene | 104 |
| 1,2-Dichlorobenzene | 102 |
| 1,2,4-Trichlorobenzene | 109 |
| Hexachlorobutadiene | 110 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 112 | 70-130 |
| Toluene-d8 | 97 | 70-130 |
| 4-Bromofluorobenzene | 103 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1706400A-19A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062303** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:21 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 109 | 70-130 |
| Freon 114 | 114 | 70-130 |
| Chloromethane | 101 | 70-130 |
| Vinyl Chloride | 108 | 70-130 |
| 1,3-Butadiene | 97 | 70-130 |
| Bromomethane | 137 Q | 70-130 |
| Chloroethane | 102 | 70-130 |
| Freon 11 | 133 Q | 70-130 |
| Ethanol | 104 | 70-130 |
| Freon 113 | 118 | 70-130 |
| 1,1-Dichloroethene | 115 | 70-130 |
| Acetone | 104 | 70-130 |
| 2-Propanol | 113 | 70-130 |
| Carbon Disulfide | 89 | 70-130 |
| 3-Chloropropene | 110 | 70-130 |
| Methylene Chloride | 111 | 70-130 |
| Methyl tert-butyl ether | 116 | 70-130 |
| trans-1,2-Dichloroethene | 92 | 70-130 |
| Hexane | 113 | 70-130 |
| 1,1-Dichloroethane | 111 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 101 | 70-130 |
| cis-1,2-Dichloroethene | 118 | 70-130 |
| Tetrahydrofuran | 95 | 70-130 |
| Chloroform | 107 | 70-130 |
| 1,1,1-Trichloroethane | 129 | 70-130 |
| Cyclohexane | 121 | 70-130 |
| Carbon Tetrachloride | 130 | 70-130 |
| 2,2,4-Trimethylpentane | 110 | 70-130 |
| Benzene | 103 | 70-130 |
| 1,2-Dichloroethane | 113 | 70-130 |
| Heptane | 104 | 70-130 |
| Trichloroethene | 103 | 70-130 |
| 1,2-Dichloropropane | 96 | 70-130 |
| 1,4-Dioxane | 108 | 70-130 |
| Bromodichloromethane | 118 | 70-130 |
| cis-1,3-Dichloropropene | 106 | 70-130 |
| 4-Methyl-2-pentanone | 112 | 70-130 |
| Toluene | 100 | 70-130 |
| trans-1,3-Dichloropropene | 109 | 70-130 |
| 1,1,2-Trichloroethane | 107 | 70-130 |
| Tetrachloroethene | 102 | 70-130 |
| 2-Hexanone | 110 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1706400A-19A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062303** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:21 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 108 | 70-130 |
| 1,2-Dibromoethane (EDB) | 103 | 70-130 |
| Chlorobenzene | 104 | 70-130 |
| Ethyl Benzene | 102 | 70-130 |
| m,p-Xylene | 101 | 70-130 |
| o-Xylene | 104 | 70-130 |
| Styrene | 114 | 70-130 |
| Bromoform | 113 | 70-130 |
| Cumene | 104 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 96 | 70-130 |
| Propylbenzene | 104 | 70-130 |
| 4-Ethyltoluene | 109 | 70-130 |
| 1,3,5-Trimethylbenzene | 110 | 70-130 |
| 1,2,4-Trimethylbenzene | 104 | 70-130 |
| 1,3-Dichlorobenzene | 99 | 70-130 |
| 1,4-Dichlorobenzene | 104 | 70-130 |
| alpha-Chlorotoluene | 108 | 70-130 |
| 1,2-Dichlorobenzene | 97 | 70-130 |
| 1,2,4-Trichlorobenzene | 81 | 70-130 |
| Hexachlorobutadiene | 86 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 108 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 106 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1706400A-19AA**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062304** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:57 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 110 | 70-130 |
| Freon 114 | 116 | 70-130 |
| Chloromethane | 101 | 70-130 |
| Vinyl Chloride | 112 | 70-130 |
| 1,3-Butadiene | 100 | 70-130 |
| Bromomethane | 137 Q | 70-130 |
| Chloroethane | 100 | 70-130 |
| Freon 11 | 137 Q | 70-130 |
| Ethanol | 100 | 70-130 |
| Freon 113 | 120 | 70-130 |
| 1,1-Dichloroethene | 118 | 70-130 |
| Acetone | 105 | 70-130 |
| 2-Propanol | 114 | 70-130 |
| Carbon Disulfide | 91 | 70-130 |
| 3-Chloropropene | 113 | 70-130 |
| Methylene Chloride | 113 | 70-130 |
| Methyl tert-butyl ether | 117 | 70-130 |
| trans-1,2-Dichloroethene | 91 | 70-130 |
| Hexane | 114 | 70-130 |
| 1,1-Dichloroethane | 113 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 108 | 70-130 |
| cis-1,2-Dichloroethene | 118 | 70-130 |
| Tetrahydrofuran | 98 | 70-130 |
| Chloroform | 107 | 70-130 |
| 1,1,1-Trichloroethane | 127 | 70-130 |
| Cyclohexane | 119 | 70-130 |
| Carbon Tetrachloride | 130 | 70-130 |
| 2,2,4-Trimethylpentane | 112 | 70-130 |
| Benzene | 103 | 70-130 |
| 1,2-Dichloroethane | 114 | 70-130 |
| Heptane | 102 | 70-130 |
| Trichloroethene | 108 | 70-130 |
| 1,2-Dichloropropane | 96 | 70-130 |
| 1,4-Dioxane | 107 | 70-130 |
| Bromodichloromethane | 113 | 70-130 |
| cis-1,3-Dichloropropene | 105 | 70-130 |
| 4-Methyl-2-pentanone | 111 | 70-130 |
| Toluene | 101 | 70-130 |
| trans-1,3-Dichloropropene | 109 | 70-130 |
| 1,1,2-Trichloroethane | 107 | 70-130 |
| Tetrachloroethene | 104 | 70-130 |
| 2-Hexanone | 111 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1706400A-19AA**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062304** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:57 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 106 | 70-130 |
| 1,2-Dibromoethane (EDB) | 101 | 70-130 |
| Chlorobenzene | 101 | 70-130 |
| Ethyl Benzene | 103 | 70-130 |
| m,p-Xylene | 100 | 70-130 |
| o-Xylene | 101 | 70-130 |
| Styrene | 114 | 70-130 |
| Bromoform | 110 | 70-130 |
| Cumene | 103 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 94 | 70-130 |
| Propylbenzene | 104 | 70-130 |
| 4-Ethyltoluene | 105 | 70-130 |
| 1,3,5-Trimethylbenzene | 111 | 70-130 |
| 1,2,4-Trimethylbenzene | 103 | 70-130 |
| 1,3-Dichlorobenzene | 100 | 70-130 |
| 1,4-Dichlorobenzene | 103 | 70-130 |
| alpha-Chlorotoluene | 108 | 70-130 |
| 1,2-Dichlorobenzene | 98 | 70-130 |
| 1,2,4-Trichlorobenzene | 80 | 70-130 |
| Hexachlorobutadiene | 86 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 109 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 104 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1706400A-19B**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062303** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 09:10 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 95 | 70-130 |
| Freon 114 | 103 | 70-130 |
| Chloromethane | 98 | 70-130 |
| Vinyl Chloride | 98 | 70-130 |
| 1,3-Butadiene | 86 | 70-130 |
| Bromomethane | 100 | 70-130 |
| Chloroethane | 100 | 70-130 |
| Freon 11 | 98 | 70-130 |
| Ethanol | 74 | 70-130 |
| Freon 113 | 99 | 70-130 |
| 1,1-Dichloroethene | 94 | 70-130 |
| Acetone | 89 | 70-130 |
| 2-Propanol | 87 | 70-130 |
| Carbon Disulfide | 98 | 70-130 |
| 3-Chloropropene | 98 | 70-130 |
| Methylene Chloride | 88 | 70-130 |
| Methyl tert-butyl ether | 91 | 70-130 |
| trans-1,2-Dichloroethene | 103 | 70-130 |
| Hexane | 90 | 70-130 |
| 1,1-Dichloroethane | 89 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 91 | 70-130 |
| cis-1,2-Dichloroethene | 84 | 70-130 |
| Tetrahydrofuran | 81 | 70-130 |
| Chloroform | 93 | 70-130 |
| 1,1,1-Trichloroethane | 92 | 70-130 |
| Cyclohexane | 86 | 70-130 |
| Carbon Tetrachloride | 93 | 70-130 |
| 2,2,4-Trimethylpentane | 87 | 70-130 |
| Benzene | 96 | 70-130 |
| 1,2-Dichloroethane | 90 | 70-130 |
| Heptane | 94 | 70-130 |
| Trichloroethene | 100 | 70-130 |
| 1,2-Dichloropropane | 92 | 70-130 |
| 1,4-Dioxane | 94 | 70-130 |
| Bromodichloromethane | 101 | 70-130 |
| cis-1,3-Dichloropropene | 103 | 70-130 |
| 4-Methyl-2-pentanone | 85 | 70-130 |
| Toluene | 97 | 70-130 |
| trans-1,3-Dichloropropene | 92 | 70-130 |
| 1,1,2-Trichloroethane | 98 | 70-130 |
| Tetrachloroethene | 102 | 70-130 |
| 2-Hexanone | 83 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1706400A-19B**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062303** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 09:10 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 102 | 70-130 |
| 1,2-Dibromoethane (EDB) | 98 | 70-130 |
| Chlorobenzene | 97 | 70-130 |
| Ethyl Benzene | 95 | 70-130 |
| m,p-Xylene | 94 | 70-130 |
| o-Xylene | 93 | 70-130 |
| Styrene | 90 | 70-130 |
| Bromoform | 108 | 70-130 |
| Cumene | 92 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 92 | 70-130 |
| Propylbenzene | 93 | 70-130 |
| 4-Ethyltoluene | 97 | 70-130 |
| 1,3,5-Trimethylbenzene | 94 | 70-130 |
| 1,2,4-Trimethylbenzene | 96 | 70-130 |
| 1,3-Dichlorobenzene | 98 | 70-130 |
| 1,4-Dichlorobenzene | 100 | 70-130 |
| alpha-Chlorotoluene | 94 | 70-130 |
| 1,2-Dichlorobenzene | 98 | 70-130 |
| 1,2,4-Trichlorobenzene | 109 | 70-130 |
| Hexachlorobutadiene | 114 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 1,2-Dichloroethane-d4 | 88 | 70-130 |
| 4-Bromofluorobenzene | 107 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1706400A-19BB**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062304** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 09:36 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 95 | 70-130 |
| Freon 114 | 103 | 70-130 |
| Chloromethane | 95 | 70-130 |
| Vinyl Chloride | 99 | 70-130 |
| 1,3-Butadiene | 88 | 70-130 |
| Bromomethane | 101 | 70-130 |
| Chloroethane | 101 | 70-130 |
| Freon 11 | 98 | 70-130 |
| Ethanol | 74 | 70-130 |
| Freon 113 | 100 | 70-130 |
| 1,1-Dichloroethene | 96 | 70-130 |
| Acetone | 90 | 70-130 |
| 2-Propanol | 88 | 70-130 |
| Carbon Disulfide | 98 | 70-130 |
| 3-Chloropropene | 102 | 70-130 |
| Methylene Chloride | 89 | 70-130 |
| Methyl tert-butyl ether | 91 | 70-130 |
| trans-1,2-Dichloroethene | 105 | 70-130 |
| Hexane | 90 | 70-130 |
| 1,1-Dichloroethane | 89 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 92 | 70-130 |
| cis-1,2-Dichloroethene | 87 | 70-130 |
| Tetrahydrofuran | 83 | 70-130 |
| Chloroform | 93 | 70-130 |
| 1,1,1-Trichloroethane | 93 | 70-130 |
| Cyclohexane | 88 | 70-130 |
| Carbon Tetrachloride | 94 | 70-130 |
| 2,2,4-Trimethylpentane | 86 | 70-130 |
| Benzene | 96 | 70-130 |
| 1,2-Dichloroethane | 91 | 70-130 |
| Heptane | 93 | 70-130 |
| Trichloroethene | 102 | 70-130 |
| 1,2-Dichloropropane | 93 | 70-130 |
| 1,4-Dioxane | 96 | 70-130 |
| Bromodichloromethane | 101 | 70-130 |
| cis-1,3-Dichloropropene | 103 | 70-130 |
| 4-Methyl-2-pentanone | 87 | 70-130 |
| Toluene | 98 | 70-130 |
| trans-1,3-Dichloropropene | 95 | 70-130 |
| 1,1,2-Trichloroethane | 100 | 70-130 |
| Tetrachloroethene | 105 | 70-130 |
| 2-Hexanone | 84 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706400A-19BB**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062304** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 09:36 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 105 | 70-130 |
| 1,2-Dibromoethane (EDB) | 100 | 70-130 |
| Chlorobenzene | 98 | 70-130 |
| Ethyl Benzene | 97 | 70-130 |
| m,p-Xylene | 96 | 70-130 |
| o-Xylene | 96 | 70-130 |
| Styrene | 90 | 70-130 |
| Bromoform | 110 | 70-130 |
| Cumene | 94 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 94 | 70-130 |
| Propylbenzene | 95 | 70-130 |
| 4-Ethyltoluene | 100 | 70-130 |
| 1,3,5-Trimethylbenzene | 96 | 70-130 |
| 1,2,4-Trimethylbenzene | 98 | 70-130 |
| 1,3-Dichlorobenzene | 101 | 70-130 |
| 1,4-Dichlorobenzene | 102 | 70-130 |
| alpha-Chlorotoluene | 95 | 70-130 |
| 1,2-Dichlorobenzene | 100 | 70-130 |
| 1,2,4-Trichlorobenzene | 112 | 70-130 |
| Hexachlorobutadiene | 118 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 1,2-Dichloroethane-d4 | 87 | 70-130 |
| 4-Bromofluorobenzene | 109 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1706400A-19C**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062408** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/24/17 12:58 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 111 | 70-130 |
| Freon 114 | 110 | 70-130 |
| Chloromethane | 104 | 70-130 |
| Vinyl Chloride | 111 | 70-130 |
| 1,3-Butadiene | 100 | 70-130 |
| Bromomethane | 142 Q | 70-130 |
| Chloroethane | 96 | 70-130 |
| Freon 11 | 129 | 70-130 |
| Ethanol | 94 | 70-130 |
| Freon 113 | 118 | 70-130 |
| 1,1-Dichloroethene | 115 | 70-130 |
| Acetone | 102 | 70-130 |
| 2-Propanol | 111 | 70-130 |
| Carbon Disulfide | 101 | 70-130 |
| 3-Chloropropene | 110 | 70-130 |
| Methylene Chloride | 108 | 70-130 |
| Methyl tert-butyl ether | 119 | 70-130 |
| trans-1,2-Dichloroethene | 111 | 70-130 |
| Hexane | 111 | 70-130 |
| 1,1-Dichloroethane | 111 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 106 | 70-130 |
| cis-1,2-Dichloroethene | 102 | 70-130 |
| Tetrahydrofuran | 97 | 70-130 |
| Chloroform | 106 | 70-130 |
| 1,1,1-Trichloroethane | 126 | 70-130 |
| Cyclohexane | 117 | 70-130 |
| Carbon Tetrachloride | 134 Q | 70-130 |
| 2,2,4-Trimethylpentane | 109 | 70-130 |
| Benzene | 96 | 70-130 |
| 1,2-Dichloroethane | 106 | 70-130 |
| Heptane | 96 | 70-130 |
| Trichloroethene | 99 | 70-130 |
| 1,2-Dichloropropane | 92 | 70-130 |
| 1,4-Dioxane | 100 | 70-130 |
| Bromodichloromethane | 106 | 70-130 |
| cis-1,3-Dichloropropene | 106 | 70-130 |
| 4-Methyl-2-pentanone | 108 | 70-130 |
| Toluene | 94 | 70-130 |
| trans-1,3-Dichloropropene | 104 | 70-130 |
| 1,1,2-Trichloroethane | 97 | 70-130 |
| Tetrachloroethene | 100 | 70-130 |
| 2-Hexanone | 100 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1706400A-19C**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062408** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/24/17 12:58 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 105 | 70-130 |
| 1,2-Dibromoethane (EDB) | 98 | 70-130 |
| Chlorobenzene | 100 | 70-130 |
| Ethyl Benzene | 98 | 70-130 |
| m,p-Xylene | 98 | 70-130 |
| o-Xylene | 102 | 70-130 |
| Styrene | 112 | 70-130 |
| Bromoform | 109 | 70-130 |
| Cumene | 102 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 94 | 70-130 |
| Propylbenzene | 100 | 70-130 |
| 4-Ethyltoluene | 105 | 70-130 |
| 1,3,5-Trimethylbenzene | 114 | 70-130 |
| 1,2,4-Trimethylbenzene | 108 | 70-130 |
| 1,3-Dichlorobenzene | 103 | 70-130 |
| 1,4-Dichlorobenzene | 109 | 70-130 |
| alpha-Chlorotoluene | 114 | 70-130 |
| 1,2-Dichlorobenzene | 104 | 70-130 |
| 1,2,4-Trichlorobenzene | 91 | 70-130 |
| Hexachlorobutadiene | 97 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 111 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 103 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706400A-19CC**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062409** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/24/17 01:21 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 108 | 70-130 |
| Freon 114 | 107 | 70-130 |
| Chloromethane | 100 | 70-130 |
| Vinyl Chloride | 108 | 70-130 |
| 1,3-Butadiene | 95 | 70-130 |
| Bromomethane | 136 Q | 70-130 |
| Chloroethane | 95 | 70-130 |
| Freon 11 | 128 | 70-130 |
| Ethanol | 85 | 70-130 |
| Freon 113 | 115 | 70-130 |
| 1,1-Dichloroethene | 110 | 70-130 |
| Acetone | 98 | 70-130 |
| 2-Propanol | 105 | 70-130 |
| Carbon Disulfide | 98 | 70-130 |
| 3-Chloropropene | 112 | 70-130 |
| Methylene Chloride | 109 | 70-130 |
| Methyl tert-butyl ether | 112 | 70-130 |
| trans-1,2-Dichloroethene | 105 | 70-130 |
| Hexane | 106 | 70-130 |
| 1,1-Dichloroethane | 103 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 95 | 70-130 |
| cis-1,2-Dichloroethene | 97 | 70-130 |
| Tetrahydrofuran | 93 | 70-130 |
| Chloroform | 102 | 70-130 |
| 1,1,1-Trichloroethane | 122 | 70-130 |
| Cyclohexane | 110 | 70-130 |
| Carbon Tetrachloride | 130 | 70-130 |
| 2,2,4-Trimethylpentane | 106 | 70-130 |
| Benzene | 94 | 70-130 |
| 1,2-Dichloroethane | 106 | 70-130 |
| Heptane | 96 | 70-130 |
| Trichloroethene | 99 | 70-130 |
| 1,2-Dichloropropane | 90 | 70-130 |
| 1,4-Dioxane | 106 | 70-130 |
| Bromodichloromethane | 106 | 70-130 |
| cis-1,3-Dichloropropene | 106 | 70-130 |
| 4-Methyl-2-pentanone | 104 | 70-130 |
| Toluene | 93 | 70-130 |
| trans-1,3-Dichloropropene | 105 | 70-130 |
| 1,1,2-Trichloroethane | 100 | 70-130 |
| Tetrachloroethene | 101 | 70-130 |
| 2-Hexanone | 106 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706400A-19CC**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062409** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/24/17 01:21 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 108 | 70-130 |
| 1,2-Dibromoethane (EDB) | 101 | 70-130 |
| Chlorobenzene | 101 | 70-130 |
| Ethyl Benzene | 103 | 70-130 |
| m,p-Xylene | 99 | 70-130 |
| o-Xylene | 101 | 70-130 |
| Styrene | 114 | 70-130 |
| Bromoform | 114 | 70-130 |
| Cumene | 108 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 95 | 70-130 |
| Propylbenzene | 106 | 70-130 |
| 4-Ethyltoluene | 112 | 70-130 |
| 1,3,5-Trimethylbenzene | 117 | 70-130 |
| 1,2,4-Trimethylbenzene | 113 | 70-130 |
| 1,3-Dichlorobenzene | 107 | 70-130 |
| 1,4-Dichlorobenzene | 113 | 70-130 |
| alpha-Chlorotoluene | 123 | 70-130 |
| 1,2-Dichlorobenzene | 108 | 70-130 |
| 1,2,4-Trichlorobenzene | 109 | 70-130 |
| Hexachlorobutadiene | 117 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 109 | 70-130 |
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 106 | 70-130 |

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6/30/2017
Mr. William Wertz
GeoSyntec Consultants
26 Century Hill Drive
Suite 205
Latham NY 12110

Project Name: UDB 11193
Project #: TR0626
Workorder #: 1706408B

Dear Mr. William Wertz

The following report includes the data for the above referenced project for sample(s) received on 6/19/2017 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott

Project Manager

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# WORK ORDER #: 1706408B

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. William Wertz<br>GeoSyntec Consultants<br>26 Century Hill Drive<br>Suite 205<br>Latham, NY 12110 | **BILL TO:** | Accounts Payable (NJ)<br>GeoSyntec Consultants<br>7 Graphics Drive<br>Suite 106<br>Ewing, NJ 08628 |
| **PHONE:** | 518-779-3582 | **P.O. #** | |
| **FAX:** | | **PROJECT #** | TR0626 UDB 11193 |
| **DATE RECEIVED:** | 06/19/2017 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 06/30/2017 | | |

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. | FINAL PRESSURE |
|---|---|---|---|---|
| 05A | B11193-061417-SVP-4-SS-10-2 | TO-15 | 1 "Hg | 15 psi |
| 06A | B11193-061417-SVP-2-SS-10-2 | TO-15 | 0.8 "Hg | 14.8 psi |
| 07A | B11193-061417-SVP-3-SS-10-2 | TO-15 | 1.2 "Hg | 15.1 psi |
| 08A | B11193-061417-SVP-1-SS-10-2 | TO-15 | 0.6 "Hg | 14.7 psi |
| 09A | B11193-061417-SVP-1-SS-10-2-DUP | TO-15 | 0 psi | 14.6 psi |
| 16A | B11193-061317-SVP-1-SS-10-1 | TO-15 | 1 "Hg | 15 psi |
| 17A | B11193-061317-SVP-2-SS-10-1 | TO-15 | 2.4 "Hg | 15 psi |
| 18A | B11193-061317-SVP-3-SS-10-1 | TO-15 | 2.4 "Hg | 14.7 psi |
| 19A | B11193-061317-SVP-4-SS-10-1 | TO-15 | 0.6 "Hg | 14.8 psi |
| 20A | Lab Blank | TO-15 | NA | NA |
| 20B | Lab Blank | TO-15 | NA | NA |
| 21A | CCV | TO-15 | NA | NA |
| 21B | CCV | TO-15 | NA | NA |
| 22A | LCS | TO-15 | NA | NA |
| 22AA | LCSD | TO-15 | NA | NA |
| 22B | LCS | TO-15 | NA | NA |
| 22BB | LCSD | TO-15 | NA | NA |

CERTIFIED BY: Heidi Hayes DATE: 06/30/17

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

**LABORATORY NARRATIVE**
**EPA Method TO-15**
**GeoSyntec Consultants**
**Workorder# 1706408B**

Nine 1 Liter Summa Canister samples were received on June 19, 2017. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

**Receiving Notes**

The Chain of Custody (COC) information for sample B11193-061417-SVP-2-SS-10-2 did not match the entry on the sample tag with regard to sample identification. The information on the COC was used to process and report the sample.

Despite the use of flow controllers for sample collection, the final canister vacuum for sample B11193-061417-SVP-1-SS-10-2-DUP was measured at ambient pressure at the laboratory.

**Analytical Notes**

Dilution was performed on all samples due to the presence of high level target species.

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page.

**Definition of Data Qualifying Flags**

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS

**Client Sample ID: B11193-061417-SVP-4-SS-10-2**

**Lab ID#: 1706408B-05A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 260 | 320 | 1000 | 1300 |
| cis-1,2-Dichloroethene | 260 | 5600 | 1000 | 22000 |
| Trichloroethene | 260 | 3700 | 1400 | 20000 |
| Tetrachloroethene | 260 | 180000 | 1800 | 1200000 |

**Client Sample ID: B11193-061417-SVP-2-SS-10-2**

**Lab ID#: 1706408B-06A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Trichloroethene | 10 | 23 | 55 | 120 |
| Tetrachloroethene | 10 | 7400 | 70 | 50000 |

**Client Sample ID: B11193-061417-SVP-3-SS-10-2**

**Lab ID#: 1706408B-07A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 21 | 29 | 84 | 120 |
| cis-1,2-Dichloroethene | 21 | 24 | 84 | 94 |
| Trichloroethene | 21 | 860 | 110 | 4600 |
| Tetrachloroethene | 21 | 18000 | 140 | 120000 |

**Client Sample ID: B11193-061417-SVP-1-SS-10-2**

**Lab ID#: 1706408B-08A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Hexane | 6.8 | 120 | 24 | 410 |
| Cyclohexane | 6.8 | 60 | 23 | 200 |
| Trichloroethene | 6.8 | 71 | 36 | 380 |
| Tetrachloroethene | 6.8 | 1700 | 46 | 12000 |

**Client Sample ID: B11193-061417-SVP-1-SS-10-2-DUP**

**Lab ID#: 1706408B-09A**

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS FULL SCAN

**Client Sample ID: B11193-061417-SVP-1-SS-10-2-DUP**

**Lab ID#: 1706408B-09A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Hexane | 6.6 | 120 | 23 | 410 |
| Cyclohexane | 6.6 | 59 | 23 | 200 |
| Trichloroethene | 6.6 | 66 | 36 | 350 |
| Tetrachloroethene | 6.6 | 1600 | 45 | 11000 |

**Client Sample ID: B11193-061317-SVP-1-SS-10-1**

**Lab ID#: 1706408B-16A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Hexane | 5.2 | 270 | 18 | 940 |
| Cyclohexane | 5.2 | 140 | 18 | 470 |
| Trichloroethene | 5.2 | 66 | 28 | 360 |
| Tetrachloroethene | 5.2 | 1600 | 35 | 11000 |

**Client Sample ID: B11193-061317-SVP-2-SS-10-1**

**Lab ID#: 1706408B-17A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Trichloroethene | 11 | 23 | 59 | 120 |
| Tetrachloroethene | 11 | 7300 | 75 | 49000 |

**Client Sample ID: B11193-061317-SVP-3-SS-10-1**

**Lab ID#: 1706408B-18A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 22 | 25 | 86 | 99 |
| Hexane | 22 | 26 | 77 | 93 |
| cis-1,2-Dichloroethene | 22 | 25 | 86 | 100 |
| Trichloroethene | 22 | 760 | 120 | 4100 |
| Tetrachloroethene | 22 | 15000 | 150 | 100000 |

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS

**Client Sample ID: B11193-061317-SVP-4-SS-10-1**

**Lab ID#: 1706408B-19A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 260 | 5000 | 1000 | 20000 |
| Trichloroethene | 260 | 3600 | 1400 | 19000 |
| Tetrachloroethene | 260 | 170000 | 1700 | 1200000 |

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**Client Sample ID: B11193-061417-SVP-4-SS-10-2**

**Lab ID#: 1706408B-05A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062309** | **Date of Collection:** | **6/14/17 5:49:00 PM** |
| **Dil. Factor:** | **52.2** | **Date of Analysis:** | **6/23/17 12:16 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 260 | Not Detected | 1300 | Not Detected |
| Freon 114 | 260 | Not Detected | 1800 | Not Detected |
| Chloromethane | 1000 | Not Detected | 2200 | Not Detected |
| Vinyl Chloride | 260 | Not Detected | 670 | Not Detected |
| 1,3-Butadiene | 260 | Not Detected | 580 | Not Detected |
| Bromomethane | 1000 | Not Detected | 4000 | Not Detected |
| Chloroethane | 1000 | Not Detected | 2800 | Not Detected |
| Freon 11 | 260 | Not Detected | 1500 | Not Detected |
| Ethanol | 1000 | Not Detected | 2000 | Not Detected |
| Freon 113 | 260 | Not Detected | 2000 | Not Detected |
| 1,1-Dichloroethene | 260 | Not Detected | 1000 | Not Detected |
| Acetone | 1000 | Not Detected | 2500 | Not Detected |
| 2-Propanol | 1000 | Not Detected | 2600 | Not Detected |
| Carbon Disulfide | 1000 | Not Detected | 3200 | Not Detected |
| 3-Chloropropene | 1000 | Not Detected | 3300 | Not Detected |
| Methylene Chloride | 1000 | Not Detected | 3600 | Not Detected |
| Methyl tert-butyl ether | 260 | Not Detected | 940 | Not Detected |
| trans-1,2-Dichloroethene | 260 | 320 | 1000 | 1300 |
| Hexane | 260 | Not Detected | 920 | Not Detected |
| 1,1-Dichloroethane | 260 | Not Detected | 1000 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 1000 | Not Detected | 3100 | Not Detected |
| cis-1,2-Dichloroethene | 260 | 5600 | 1000 | 22000 |
| Tetrahydrofuran | 260 | Not Detected | 770 | Not Detected |
| Chloroform | 260 | Not Detected | 1300 | Not Detected |
| 1,1,1-Trichloroethane | 260 | Not Detected | 1400 | Not Detected |
| Cyclohexane | 260 | Not Detected | 900 | Not Detected |
| Carbon Tetrachloride | 260 | Not Detected | 1600 | Not Detected |
| 2,2,4-Trimethylpentane | 260 | Not Detected | 1200 | Not Detected |
| Benzene | 260 | Not Detected | 830 | Not Detected |
| 1,2-Dichloroethane | 260 | Not Detected | 1000 | Not Detected |
| Heptane | 260 | Not Detected | 1100 | Not Detected |
| Trichloroethene | 260 | 3700 | 1400 | 20000 |
| 1,2-Dichloropropane | 260 | Not Detected | 1200 | Not Detected |
| 1,4-Dioxane | 1000 | Not Detected | 3800 | Not Detected |
| Bromodichloromethane | 260 | Not Detected | 1700 | Not Detected |
| cis-1,3-Dichloropropene | 260 | Not Detected | 1200 | Not Detected |
| 4-Methyl-2-pentanone | 260 | Not Detected | 1100 | Not Detected |
| Toluene | 260 | Not Detected | 980 | Not Detected |
| trans-1,3-Dichloropropene | 260 | Not Detected | 1200 | Not Detected |
| 1,1,2-Trichloroethane | 260 | Not Detected | 1400 | Not Detected |
| Tetrachloroethene | 260 | 180000 | 1800 | 1200000 |
| 2-Hexanone | 1000 | Not Detected | 4300 | Not Detected |

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**Client Sample ID: B11193-061417-SVP-4-SS-10-2**

**Lab ID#: 1706408B-05A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062309** | **Date of Collection: 6/14/17 5:49:00 PM** | |
| **Dil. Factor:** | **52.2** | **Date of Analysis: 6/23/17 12:16 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 260 | Not Detected | 2200 | Not Detected |
| 1,2-Dibromoethane (EDB) | 260 | Not Detected | 2000 | Not Detected |
| Chlorobenzene | 260 | Not Detected | 1200 | Not Detected |
| Ethyl Benzene | 260 | Not Detected | 1100 | Not Detected |
| m,p-Xylene | 260 | Not Detected | 1100 | Not Detected |
| o-Xylene | 260 | Not Detected | 1100 | Not Detected |
| Styrene | 260 | Not Detected | 1100 | Not Detected |
| Bromoform | 260 | Not Detected | 2700 | Not Detected |
| Cumene | 260 | Not Detected | 1300 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 260 | Not Detected | 1800 | Not Detected |
| Propylbenzene | 260 | Not Detected | 1300 | Not Detected |
| 4-Ethyltoluene | 260 | Not Detected | 1300 | Not Detected |
| 1,3,5-Trimethylbenzene | 260 | Not Detected | 1300 | Not Detected |
| 1,2,4-Trimethylbenzene | 260 | Not Detected | 1300 | Not Detected |
| 1,3-Dichlorobenzene | 260 | Not Detected | 1600 | Not Detected |
| 1,4-Dichlorobenzene | 260 | Not Detected | 1600 | Not Detected |
| alpha-Chlorotoluene | 260 | Not Detected | 1400 | Not Detected |
| 1,2-Dichlorobenzene | 260 | Not Detected | 1600 | Not Detected |
| 1,2,4-Trichlorobenzene | 1000 | Not Detected | 7700 | Not Detected |
| Hexachlorobutadiene | 1000 | Not Detected | 11000 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 108 | 70-130 |
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-061417-SVP-2-SS-10-2**

**Lab ID#: 1706408B-06A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062311** | **Date of Collection: 6/14/17 5:50:00 PM** | |
| **Dil. Factor:** | **2.06** | **Date of Analysis: 6/23/17 01:56 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 10 | Not Detected | 51 | Not Detected |
| Freon 114 | 10 | Not Detected | 72 | Not Detected |
| Chloromethane | 41 | Not Detected | 85 | Not Detected |
| Vinyl Chloride | 10 | Not Detected | 26 | Not Detected |
| 1,3-Butadiene | 10 | Not Detected | 23 | Not Detected |
| Bromomethane | 41 | Not Detected | 160 | Not Detected |
| Chloroethane | 41 | Not Detected | 110 | Not Detected |
| Freon 11 | 10 | Not Detected | 58 | Not Detected |
| Ethanol | 41 | Not Detected | 78 | Not Detected |
| Freon 113 | 10 | Not Detected | 79 | Not Detected |
| 1,1-Dichloroethene | 10 | Not Detected | 41 | Not Detected |
| Acetone | 41 | Not Detected | 98 | Not Detected |
| 2-Propanol | 41 | Not Detected | 100 | Not Detected |
| Carbon Disulfide | 41 | Not Detected | 130 | Not Detected |
| 3-Chloropropene | 41 | Not Detected | 130 | Not Detected |
| Methylene Chloride | 41 | Not Detected | 140 | Not Detected |
| Methyl tert-butyl ether | 10 | Not Detected | 37 | Not Detected |
| trans-1,2-Dichloroethene | 10 | Not Detected | 41 | Not Detected |
| Hexane | 10 | Not Detected | 36 | Not Detected |
| 1,1-Dichloroethane | 10 | Not Detected | 42 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 41 | Not Detected | 120 | Not Detected |
| cis-1,2-Dichloroethene | 10 | Not Detected | 41 | Not Detected |
| Tetrahydrofuran | 10 | Not Detected | 30 | Not Detected |
| Chloroform | 10 | Not Detected | 50 | Not Detected |
| 1,1,1-Trichloroethane | 10 | Not Detected | 56 | Not Detected |
| Cyclohexane | 10 | Not Detected | 35 | Not Detected |
| Carbon Tetrachloride | 10 | Not Detected | 65 | Not Detected |
| 2,2,4-Trimethylpentane | 10 | Not Detected | 48 | Not Detected |
| Benzene | 10 | Not Detected | 33 | Not Detected |
| 1,2-Dichloroethane | 10 | Not Detected | 42 | Not Detected |
| Heptane | 10 | Not Detected | 42 | Not Detected |
| Trichloroethene | 10 | 23 | 55 | 120 |
| 1,2-Dichloropropane | 10 | Not Detected | 48 | Not Detected |
| 1,4-Dioxane | 41 | Not Detected | 150 | Not Detected |
| Bromodichloromethane | 10 | Not Detected | 69 | Not Detected |
| cis-1,3-Dichloropropene | 10 | Not Detected | 47 | Not Detected |
| 4-Methyl-2-pentanone | 10 | Not Detected | 42 | Not Detected |
| Toluene | 10 | Not Detected | 39 | Not Detected |
| trans-1,3-Dichloropropene | 10 | Not Detected | 47 | Not Detected |
| 1,1,2-Trichloroethane | 10 | Not Detected | 56 | Not Detected |
| Tetrachloroethene | 10 | 7400 | 70 | 50000 |
| 2-Hexanone | 41 | Not Detected | 170 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-061417-SVP-2-SS-10-2**

**Lab ID#: 1706408B-06A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062311** | **Date of Collection: 6/14/17 5:50:00 PM** | |
| **Dil. Factor:** | **2.06** | **Date of Analysis: 6/23/17 01:56 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 10 | Not Detected | 88 | Not Detected |
| 1,2-Dibromoethane (EDB) | 10 | Not Detected | 79 | Not Detected |
| Chlorobenzene | 10 | Not Detected | 47 | Not Detected |
| Ethyl Benzene | 10 | Not Detected | 45 | Not Detected |
| m,p-Xylene | 10 | Not Detected | 45 | Not Detected |
| o-Xylene | 10 | Not Detected | 45 | Not Detected |
| Styrene | 10 | Not Detected | 44 | Not Detected |
| Bromoform | 10 | Not Detected | 110 | Not Detected |
| Cumene | 10 | Not Detected | 51 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 10 | Not Detected | 71 | Not Detected |
| Propylbenzene | 10 | Not Detected | 51 | Not Detected |
| 4-Ethyltoluene | 10 | Not Detected | 51 | Not Detected |
| 1,3,5-Trimethylbenzene | 10 | Not Detected | 51 | Not Detected |
| 1,2,4-Trimethylbenzene | 10 | Not Detected | 51 | Not Detected |
| 1,3-Dichlorobenzene | 10 | Not Detected | 62 | Not Detected |
| 1,4-Dichlorobenzene | 10 | Not Detected | 62 | Not Detected |
| alpha-Chlorotoluene | 10 | Not Detected | 53 | Not Detected |
| 1,2-Dichlorobenzene | 10 | Not Detected | 62 | Not Detected |
| 1,2,4-Trichlorobenzene | 41 | Not Detected | 300 | Not Detected |
| Hexachlorobutadiene | 41 | Not Detected | 440 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 106 | 70-130 |
| Toluene-d8 | 102 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-061417-SVP-3-SS-10-2**

**Lab ID#: 1706408B-07A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062317** | **Date of Collection:** | **6/14/17 5:51:00 PM** |
| **Dil. Factor:** | **4.22** | **Date of Analysis:** | **6/23/17 04:14 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 21 | Not Detected | 100 | Not Detected |
| Freon 114 | 21 | Not Detected | 150 | Not Detected |
| Chloromethane | 84 | Not Detected | 170 | Not Detected |
| Vinyl Chloride | 21 | Not Detected | 54 | Not Detected |
| 1,3-Butadiene | 21 | Not Detected | 47 | Not Detected |
| Bromomethane | 84 | Not Detected | 330 | Not Detected |
| Chloroethane | 84 | Not Detected | 220 | Not Detected |
| Freon 11 | 21 | Not Detected | 120 | Not Detected |
| Ethanol | 84 | Not Detected | 160 | Not Detected |
| Freon 113 | 21 | Not Detected | 160 | Not Detected |
| 1,1-Dichloroethene | 21 | Not Detected | 84 | Not Detected |
| Acetone | 84 | Not Detected | 200 | Not Detected |
| 2-Propanol | 84 | Not Detected | 210 | Not Detected |
| Carbon Disulfide | 84 | Not Detected | 260 | Not Detected |
| 3-Chloropropene | 84 | Not Detected | 260 | Not Detected |
| Methylene Chloride | 84 | Not Detected | 290 | Not Detected |
| Methyl tert-butyl ether | 21 | Not Detected | 76 | Not Detected |
| trans-1,2-Dichloroethene | 21 | 29 | 84 | 120 |
| Hexane | 21 | Not Detected | 74 | Not Detected |
| 1,1-Dichloroethane | 21 | Not Detected | 85 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 84 | Not Detected | 250 | Not Detected |
| cis-1,2-Dichloroethene | 21 | 24 | 84 | 94 |
| Tetrahydrofuran | 21 | Not Detected | 62 | Not Detected |
| Chloroform | 21 | Not Detected | 100 | Not Detected |
| 1,1,1-Trichloroethane | 21 | Not Detected | 120 | Not Detected |
| Cyclohexane | 21 | Not Detected | 73 | Not Detected |
| Carbon Tetrachloride | 21 | Not Detected | 130 | Not Detected |
| 2,2,4-Trimethylpentane | 21 | Not Detected | 98 | Not Detected |
| Benzene | 21 | Not Detected | 67 | Not Detected |
| 1,2-Dichloroethane | 21 | Not Detected | 85 | Not Detected |
| Heptane | 21 | Not Detected | 86 | Not Detected |
| Trichloroethene | 21 | 860 | 110 | 4600 |
| 1,2-Dichloropropane | 21 | Not Detected | 98 | Not Detected |
| 1,4-Dioxane | 84 | Not Detected | 300 | Not Detected |
| Bromodichloromethane | 21 | Not Detected | 140 | Not Detected |
| cis-1,3-Dichloropropene | 21 | Not Detected | 96 | Not Detected |
| 4-Methyl-2-pentanone | 21 | Not Detected | 86 | Not Detected |
| Toluene | 21 | Not Detected | 80 | Not Detected |
| trans-1,3-Dichloropropene | 21 | Not Detected | 96 | Not Detected |
| 1,1,2-Trichloroethane | 21 | Not Detected | 120 | Not Detected |
| Tetrachloroethene | 21 | 18000 | 140 | 120000 |
| 2-Hexanone | 84 | Not Detected | 340 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-061417-SVP-3-SS-10-2**

**Lab ID#: 1706408B-07A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062317** | **Date of Collection: 6/14/17 5:51:00 PM** | |
| **Dil. Factor:** | **4.22** | **Date of Analysis: 6/23/17 04:14 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 21 | Not Detected | 180 | Not Detected |
| 1,2-Dibromoethane (EDB) | 21 | Not Detected | 160 | Not Detected |
| Chlorobenzene | 21 | Not Detected | 97 | Not Detected |
| Ethyl Benzene | 21 | Not Detected | 92 | Not Detected |
| m,p-Xylene | 21 | Not Detected | 92 | Not Detected |
| o-Xylene | 21 | Not Detected | 92 | Not Detected |
| Styrene | 21 | Not Detected | 90 | Not Detected |
| Bromoform | 21 | Not Detected | 220 | Not Detected |
| Cumene | 21 | Not Detected | 100 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 21 | Not Detected | 140 | Not Detected |
| Propylbenzene | 21 | Not Detected | 100 | Not Detected |
| 4-Ethyltoluene | 21 | Not Detected | 100 | Not Detected |
| 1,3,5-Trimethylbenzene | 21 | Not Detected | 100 | Not Detected |
| 1,2,4-Trimethylbenzene | 21 | Not Detected | 100 | Not Detected |
| 1,3-Dichlorobenzene | 21 | Not Detected | 130 | Not Detected |
| 1,4-Dichlorobenzene | 21 | Not Detected | 130 | Not Detected |
| alpha-Chlorotoluene | 21 | Not Detected | 110 | Not Detected |
| 1,2-Dichlorobenzene | 21 | Not Detected | 130 | Not Detected |
| 1,2,4-Trichlorobenzene | 84 | Not Detected | 630 | Not Detected |
| Hexachlorobutadiene | 84 | Not Detected | 900 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 97 | 70-130 |
| 4-Bromofluorobenzene | 102 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-061417-SVP-1-SS-10-2**

**Lab ID#: 1706408B-08A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062314** | **Date of Collection:** | **6/14/17 6:10:00 PM** |
| **Dil. Factor:** | **13.6** | **Date of Analysis:** | **6/23/17 10:38 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 6.8 | Not Detected | 34 | Not Detected |
| Freon 114 | 6.8 | Not Detected | 48 | Not Detected |
| Chloromethane | 68 | Not Detected | 140 | Not Detected |
| Vinyl Chloride | 6.8 | Not Detected | 17 | Not Detected |
| 1,3-Butadiene | 6.8 | Not Detected | 15 | Not Detected |
| Bromomethane | 68 | Not Detected | 260 | Not Detected |
| Chloroethane | 27 | Not Detected | 72 | Not Detected |
| Freon 11 | 6.8 | Not Detected | 38 | Not Detected |
| Ethanol | 27 | Not Detected | 51 | Not Detected |
| Freon 113 | 6.8 | Not Detected | 52 | Not Detected |
| 1,1-Dichloroethene | 6.8 | Not Detected | 27 | Not Detected |
| Acetone | 68 | Not Detected | 160 | Not Detected |
| 2-Propanol | 27 | Not Detected | 67 | Not Detected |
| Carbon Disulfide | 27 | Not Detected | 85 | Not Detected |
| 3-Chloropropene | 27 | Not Detected | 85 | Not Detected |
| Methylene Chloride | 68 | Not Detected | 240 | Not Detected |
| Methyl tert-butyl ether | 27 | Not Detected | 98 | Not Detected |
| trans-1,2-Dichloroethene | 6.8 | Not Detected | 27 | Not Detected |
| Hexane | 6.8 | 120 | 24 | 410 |
| 1,1-Dichloroethane | 6.8 | Not Detected | 28 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 27 | Not Detected | 80 | Not Detected |
| cis-1,2-Dichloroethene | 6.8 | Not Detected | 27 | Not Detected |
| Tetrahydrofuran | 6.8 | Not Detected | 20 | Not Detected |
| Chloroform | 6.8 | Not Detected | 33 | Not Detected |
| 1,1,1-Trichloroethane | 6.8 | Not Detected | 37 | Not Detected |
| Cyclohexane | 6.8 | 60 | 23 | 200 |
| Carbon Tetrachloride | 6.8 | Not Detected | 43 | Not Detected |
| 2,2,4-Trimethylpentane | 6.8 | Not Detected | 32 | Not Detected |
| Benzene | 6.8 | Not Detected | 22 | Not Detected |
| 1,2-Dichloroethane | 6.8 | Not Detected | 28 | Not Detected |
| Heptane | 6.8 | Not Detected | 28 | Not Detected |
| Trichloroethene | 6.8 | 71 | 36 | 380 |
| 1,2-Dichloropropane | 6.8 | Not Detected | 31 | Not Detected |
| 1,4-Dioxane | 27 | Not Detected | 98 | Not Detected |
| Bromodichloromethane | 6.8 | Not Detected | 46 | Not Detected |
| cis-1,3-Dichloropropene | 6.8 | Not Detected | 31 | Not Detected |
| 4-Methyl-2-pentanone | 6.8 | Not Detected | 28 | Not Detected |
| Toluene | 6.8 | Not Detected | 26 | Not Detected |
| trans-1,3-Dichloropropene | 6.8 | Not Detected | 31 | Not Detected |
| 1,1,2-Trichloroethane | 6.8 | Not Detected | 37 | Not Detected |
| Tetrachloroethene | 6.8 | 1700 | 46 | 12000 |
| 2-Hexanone | 27 | Not Detected | 110 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-061417-SVP-1-SS-10-2**

**Lab ID#: 1706408B-08A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062314** | **Date of Collection:** | **6/14/17 6:10:00 PM** |
| **Dil. Factor:** | **13.6** | **Date of Analysis:** | **6/23/17 10:38 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 6.8 | Not Detected | 58 | Not Detected |
| 1,2-Dibromoethane (EDB) | 6.8 | Not Detected | 52 | Not Detected |
| Chlorobenzene | 6.8 | Not Detected | 31 | Not Detected |
| Ethyl Benzene | 6.8 | Not Detected | 30 | Not Detected |
| m,p-Xylene | 6.8 | Not Detected | 30 | Not Detected |
| o-Xylene | 6.8 | Not Detected | 30 | Not Detected |
| Styrene | 6.8 | Not Detected | 29 | Not Detected |
| Bromoform | 6.8 | Not Detected | 70 | Not Detected |
| Cumene | 6.8 | Not Detected | 33 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 6.8 | Not Detected | 47 | Not Detected |
| Propylbenzene | 6.8 | Not Detected | 33 | Not Detected |
| 4-Ethyltoluene | 6.8 | Not Detected | 33 | Not Detected |
| 1,3,5-Trimethylbenzene | 6.8 | Not Detected | 33 | Not Detected |
| 1,2,4-Trimethylbenzene | 6.8 | Not Detected | 33 | Not Detected |
| 1,3-Dichlorobenzene | 6.8 | Not Detected | 41 | Not Detected |
| 1,4-Dichlorobenzene | 6.8 | Not Detected | 41 | Not Detected |
| alpha-Chlorotoluene | 6.8 | Not Detected | 35 | Not Detected |
| 1,2-Dichlorobenzene | 6.8 | Not Detected | 41 | Not Detected |
| 1,2,4-Trichlorobenzene | 27 | Not Detected | 200 | Not Detected |
| Hexachlorobutadiene | 27 | Not Detected | 290 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 84 | 70-130 |
| 4-Bromofluorobenzene | 105 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-061417-SVP-1-SS-10-2-DUP**

**Lab ID#: 1706408B-09A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062315** | **Date of Collection:** | **6/14/17 6:11:00 PM** |
| **Dil. Factor:** | **13.3** | **Date of Analysis:** | **6/23/17 11:03 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 6.6 | Not Detected | 33 | Not Detected |
| Freon 114 | 6.6 | Not Detected | 46 | Not Detected |
| Chloromethane | 66 | Not Detected | 140 | Not Detected |
| Vinyl Chloride | 6.6 | Not Detected | 17 | Not Detected |
| 1,3-Butadiene | 6.6 | Not Detected | 15 | Not Detected |
| Bromomethane | 66 | Not Detected | 260 | Not Detected |
| Chloroethane | 27 | Not Detected | 70 | Not Detected |
| Freon 11 | 6.6 | Not Detected | 37 | Not Detected |
| Ethanol | 27 | Not Detected | 50 | Not Detected |
| Freon 113 | 6.6 | Not Detected | 51 | Not Detected |
| 1,1-Dichloroethene | 6.6 | Not Detected | 26 | Not Detected |
| Acetone | 66 | Not Detected | 160 | Not Detected |
| 2-Propanol | 27 | Not Detected | 65 | Not Detected |
| Carbon Disulfide | 27 | Not Detected | 83 | Not Detected |
| 3-Chloropropene | 27 | Not Detected | 83 | Not Detected |
| Methylene Chloride | 66 | Not Detected | 230 | Not Detected |
| Methyl tert-butyl ether | 27 | Not Detected | 96 | Not Detected |
| trans-1,2-Dichloroethene | 6.6 | Not Detected | 26 | Not Detected |
| Hexane | 6.6 | 120 | 23 | 410 |
| 1,1-Dichloroethane | 6.6 | Not Detected | 27 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 27 | Not Detected | 78 | Not Detected |
| cis-1,2-Dichloroethene | 6.6 | Not Detected | 26 | Not Detected |
| Tetrahydrofuran | 6.6 | Not Detected | 20 | Not Detected |
| Chloroform | 6.6 | Not Detected | 32 | Not Detected |
| 1,1,1-Trichloroethane | 6.6 | Not Detected | 36 | Not Detected |
| Cyclohexane | 6.6 | 59 | 23 | 200 |
| Carbon Tetrachloride | 6.6 | Not Detected | 42 | Not Detected |
| 2,2,4-Trimethylpentane | 6.6 | Not Detected | 31 | Not Detected |
| Benzene | 6.6 | Not Detected | 21 | Not Detected |
| 1,2-Dichloroethane | 6.6 | Not Detected | 27 | Not Detected |
| Heptane | 6.6 | Not Detected | 27 | Not Detected |
| Trichloroethene | 6.6 | 66 | 36 | 350 |
| 1,2-Dichloropropane | 6.6 | Not Detected | 31 | Not Detected |
| 1,4-Dioxane | 27 | Not Detected | 96 | Not Detected |
| Bromodichloromethane | 6.6 | Not Detected | 44 | Not Detected |
| cis-1,3-Dichloropropene | 6.6 | Not Detected | 30 | Not Detected |
| 4-Methyl-2-pentanone | 6.6 | Not Detected | 27 | Not Detected |
| Toluene | 6.6 | Not Detected | 25 | Not Detected |
| trans-1,3-Dichloropropene | 6.6 | Not Detected | 30 | Not Detected |
| 1,1,2-Trichloroethane | 6.6 | Not Detected | 36 | Not Detected |
| Tetrachloroethene | 6.6 | 1600 | 45 | 11000 |
| 2-Hexanone | 27 | Not Detected | 110 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-061417-SVP-1-SS-10-2-DUP**

**Lab ID#: 1706408B-09A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062315** | **Date of Collection:** | **6/14/17 6:11:00 PM** |
| **Dil. Factor:** | **13.3** | **Date of Analysis:** | **6/23/17 11:03 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 6.6 | Not Detected | 57 | Not Detected |
| 1,2-Dibromoethane (EDB) | 6.6 | Not Detected | 51 | Not Detected |
| Chlorobenzene | 6.6 | Not Detected | 31 | Not Detected |
| Ethyl Benzene | 6.6 | Not Detected | 29 | Not Detected |
| m,p-Xylene | 6.6 | Not Detected | 29 | Not Detected |
| o-Xylene | 6.6 | Not Detected | 29 | Not Detected |
| Styrene | 6.6 | Not Detected | 28 | Not Detected |
| Bromoform | 6.6 | Not Detected | 69 | Not Detected |
| Cumene | 6.6 | Not Detected | 33 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 6.6 | Not Detected | 46 | Not Detected |
| Propylbenzene | 6.6 | Not Detected | 33 | Not Detected |
| 4-Ethyltoluene | 6.6 | Not Detected | 33 | Not Detected |
| 1,3,5-Trimethylbenzene | 6.6 | Not Detected | 33 | Not Detected |
| 1,2,4-Trimethylbenzene | 6.6 | Not Detected | 33 | Not Detected |
| 1,3-Dichlorobenzene | 6.6 | Not Detected | 40 | Not Detected |
| 1,4-Dichlorobenzene | 6.6 | Not Detected | 40 | Not Detected |
| alpha-Chlorotoluene | 6.6 | Not Detected | 34 | Not Detected |
| 1,2-Dichlorobenzene | 6.6 | Not Detected | 40 | Not Detected |
| 1,2,4-Trichlorobenzene | 27 | Not Detected | 200 | Not Detected |
| Hexachlorobutadiene | 27 | Not Detected | 280 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 82 | 70-130 |
| 4-Bromofluorobenzene | 105 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-061317-SVP-1-SS-10-1**

**Lab ID#: 1706408B-16A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062316** | **Date of Collection:** | **6/13/17 12:21:00 PM** |
| **Dil. Factor:** | **10.4** | **Date of Analysis:** | **6/23/17 11:29 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 5.2 | Not Detected | 26 | Not Detected |
| Freon 114 | 5.2 | Not Detected | 36 | Not Detected |
| Chloromethane | 52 | Not Detected | 110 | Not Detected |
| Vinyl Chloride | 5.2 | Not Detected | 13 | Not Detected |
| 1,3-Butadiene | 5.2 | Not Detected | 12 | Not Detected |
| Bromomethane | 52 | Not Detected | 200 | Not Detected |
| Chloroethane | 21 | Not Detected | 55 | Not Detected |
| Freon 11 | 5.2 | Not Detected | 29 | Not Detected |
| Ethanol | 21 | Not Detected | 39 | Not Detected |
| Freon 113 | 5.2 | Not Detected | 40 | Not Detected |
| 1,1-Dichloroethene | 5.2 | Not Detected | 21 | Not Detected |
| Acetone | 52 | Not Detected | 120 | Not Detected |
| 2-Propanol | 21 | Not Detected | 51 | Not Detected |
| Carbon Disulfide | 21 | Not Detected | 65 | Not Detected |
| 3-Chloropropene | 21 | Not Detected | 65 | Not Detected |
| Methylene Chloride | 52 | Not Detected | 180 | Not Detected |
| Methyl tert-butyl ether | 21 | Not Detected | 75 | Not Detected |
| trans-1,2-Dichloroethene | 5.2 | Not Detected | 21 | Not Detected |
| Hexane | 5.2 | 270 | 18 | 940 |
| 1,1-Dichloroethane | 5.2 | Not Detected | 21 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 21 | Not Detected | 61 | Not Detected |
| cis-1,2-Dichloroethene | 5.2 | Not Detected | 21 | Not Detected |
| Tetrahydrofuran | 5.2 | Not Detected | 15 | Not Detected |
| Chloroform | 5.2 | Not Detected | 25 | Not Detected |
| 1,1,1-Trichloroethane | 5.2 | Not Detected | 28 | Not Detected |
| Cyclohexane | 5.2 | 140 | 18 | 470 |
| Carbon Tetrachloride | 5.2 | Not Detected | 33 | Not Detected |
| 2,2,4-Trimethylpentane | 5.2 | Not Detected | 24 | Not Detected |
| Benzene | 5.2 | Not Detected | 17 | Not Detected |
| 1,2-Dichloroethane | 5.2 | Not Detected | 21 | Not Detected |
| Heptane | 5.2 | Not Detected | 21 | Not Detected |
| Trichloroethene | 5.2 | 66 | 28 | 360 |
| 1,2-Dichloropropane | 5.2 | Not Detected | 24 | Not Detected |
| 1,4-Dioxane | 21 | Not Detected | 75 | Not Detected |
| Bromodichloromethane | 5.2 | Not Detected | 35 | Not Detected |
| cis-1,3-Dichloropropene | 5.2 | Not Detected | 24 | Not Detected |
| 4-Methyl-2-pentanone | 5.2 | Not Detected | 21 | Not Detected |
| Toluene | 5.2 | Not Detected | 20 | Not Detected |
| trans-1,3-Dichloropropene | 5.2 | Not Detected | 24 | Not Detected |
| 1,1,2-Trichloroethane | 5.2 | Not Detected | 28 | Not Detected |
| Tetrachloroethene | 5.2 | 1600 | 35 | 11000 |
| 2-Hexanone | 21 | Not Detected | 85 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-061317-SVP-1-SS-10-1**

**Lab ID#: 1706408B-16A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062316** | **Date of Collection:** | **6/13/17 12:21:00 PM** |
| **Dil. Factor:** | **10.4** | **Date of Analysis:** | **6/23/17 11:29 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 5.2 | Not Detected | 44 | Not Detected |
| 1,2-Dibromoethane (EDB) | 5.2 | Not Detected | 40 | Not Detected |
| Chlorobenzene | 5.2 | Not Detected | 24 | Not Detected |
| Ethyl Benzene | 5.2 | Not Detected | 22 | Not Detected |
| m,p-Xylene | 5.2 | Not Detected | 22 | Not Detected |
| o-Xylene | 5.2 | Not Detected | 22 | Not Detected |
| Styrene | 5.2 | Not Detected | 22 | Not Detected |
| Bromoform | 5.2 | Not Detected | 54 | Not Detected |
| Cumene | 5.2 | Not Detected | 26 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 5.2 | Not Detected | 36 | Not Detected |
| Propylbenzene | 5.2 | Not Detected | 26 | Not Detected |
| 4-Ethyltoluene | 5.2 | Not Detected | 26 | Not Detected |
| 1,3,5-Trimethylbenzene | 5.2 | Not Detected | 26 | Not Detected |
| 1,2,4-Trimethylbenzene | 5.2 | Not Detected | 26 | Not Detected |
| 1,3-Dichlorobenzene | 5.2 | Not Detected | 31 | Not Detected |
| 1,4-Dichlorobenzene | 5.2 | Not Detected | 31 | Not Detected |
| alpha-Chlorotoluene | 5.2 | Not Detected | 27 | Not Detected |
| 1,2-Dichlorobenzene | 5.2 | Not Detected | 31 | Not Detected |
| 1,2,4-Trichlorobenzene | 21 | Not Detected | 150 | Not Detected |
| Hexachlorobutadiene | 21 | Not Detected | 220 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 83 | 70-130 |
| 4-Bromofluorobenzene | 107 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-061317-SVP-2-SS-10-1**

**Lab ID#: 1706408B-17A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062322** | **Date of Collection:** | **6/13/17 12:16:00 PM** |
| **Dil. Factor:** | **2.20** | **Date of Analysis:** | **6/23/17 06:44 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 11 | Not Detected | 54 | Not Detected |
| Freon 114 | 11 | Not Detected | 77 | Not Detected |
| Chloromethane | 44 | Not Detected | 91 | Not Detected |
| Vinyl Chloride | 11 | Not Detected | 28 | Not Detected |
| 1,3-Butadiene | 11 | Not Detected | 24 | Not Detected |
| Bromomethane | 44 | Not Detected | 170 | Not Detected |
| Chloroethane | 44 | Not Detected | 120 | Not Detected |
| Freon 11 | 11 | Not Detected | 62 | Not Detected |
| Ethanol | 44 | Not Detected | 83 | Not Detected |
| Freon 113 | 11 | Not Detected | 84 | Not Detected |
| 1,1-Dichloroethene | 11 | Not Detected | 44 | Not Detected |
| Acetone | 44 | Not Detected | 100 | Not Detected |
| 2-Propanol | 44 | Not Detected | 110 | Not Detected |
| Carbon Disulfide | 44 | Not Detected | 140 | Not Detected |
| 3-Chloropropene | 44 | Not Detected | 140 | Not Detected |
| Methylene Chloride | 44 | Not Detected | 150 | Not Detected |
| Methyl tert-butyl ether | 11 | Not Detected | 40 | Not Detected |
| trans-1,2-Dichloroethene | 11 | Not Detected | 44 | Not Detected |
| Hexane | 11 | Not Detected | 39 | Not Detected |
| 1,1-Dichloroethane | 11 | Not Detected | 44 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 44 | Not Detected | 130 | Not Detected |
| cis-1,2-Dichloroethene | 11 | Not Detected | 44 | Not Detected |
| Tetrahydrofuran | 11 | Not Detected | 32 | Not Detected |
| Chloroform | 11 | Not Detected | 54 | Not Detected |
| 1,1,1-Trichloroethane | 11 | Not Detected | 60 | Not Detected |
| Cyclohexane | 11 | Not Detected | 38 | Not Detected |
| Carbon Tetrachloride | 11 | Not Detected | 69 | Not Detected |
| 2,2,4-Trimethylpentane | 11 | Not Detected | 51 | Not Detected |
| Benzene | 11 | Not Detected | 35 | Not Detected |
| 1,2-Dichloroethane | 11 | Not Detected | 44 | Not Detected |
| Heptane | 11 | Not Detected | 45 | Not Detected |
| Trichloroethene | 11 | 23 | 59 | 120 |
| 1,2-Dichloropropane | 11 | Not Detected | 51 | Not Detected |
| 1,4-Dioxane | 44 | Not Detected | 160 | Not Detected |
| Bromodichloromethane | 11 | Not Detected | 74 | Not Detected |
| cis-1,3-Dichloropropene | 11 | Not Detected | 50 | Not Detected |
| 4-Methyl-2-pentanone | 11 | Not Detected | 45 | Not Detected |
| Toluene | 11 | Not Detected | 41 | Not Detected |
| trans-1,3-Dichloropropene | 11 | Not Detected | 50 | Not Detected |
| 1,1,2-Trichloroethane | 11 | Not Detected | 60 | Not Detected |
| Tetrachloroethene | 11 | 7300 | 75 | 49000 |
| 2-Hexanone | 44 | Not Detected | 180 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-061317-SVP-2-SS-10-1**

**Lab ID#: 1706408B-17A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062322** | **Date of Collection: 6/13/17 12:16:00 PM** | |
| **Dil. Factor:** | **2.20** | **Date of Analysis: 6/23/17 06:44 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 11 | Not Detected | 94 | Not Detected |
| 1,2-Dibromoethane (EDB) | 11 | Not Detected | 84 | Not Detected |
| Chlorobenzene | 11 | Not Detected | 51 | Not Detected |
| Ethyl Benzene | 11 | Not Detected | 48 | Not Detected |
| m,p-Xylene | 11 | Not Detected | 48 | Not Detected |
| o-Xylene | 11 | Not Detected | 48 | Not Detected |
| Styrene | 11 | Not Detected | 47 | Not Detected |
| Bromoform | 11 | Not Detected | 110 | Not Detected |
| Cumene | 11 | Not Detected | 54 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 11 | Not Detected | 76 | Not Detected |
| Propylbenzene | 11 | Not Detected | 54 | Not Detected |
| 4-Ethyltoluene | 11 | Not Detected | 54 | Not Detected |
| 1,3,5-Trimethylbenzene | 11 | Not Detected | 54 | Not Detected |
| 1,2,4-Trimethylbenzene | 11 | Not Detected | 54 | Not Detected |
| 1,3-Dichlorobenzene | 11 | Not Detected | 66 | Not Detected |
| 1,4-Dichlorobenzene | 11 | Not Detected | 66 | Not Detected |
| alpha-Chlorotoluene | 11 | Not Detected | 57 | Not Detected |
| 1,2-Dichlorobenzene | 11 | Not Detected | 66 | Not Detected |
| 1,2,4-Trichlorobenzene | 44 | Not Detected | 330 | Not Detected |
| Hexachlorobutadiene | 44 | Not Detected | 470 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 112 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 102 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-061317-SVP-3-SS-10-1**

**Lab ID#: 1706408B-18A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062321** | **Date of Collection: 6/13/17 12:13:00 PM** | |
| **Dil. Factor:** | **4.36** | **Date of Analysis: 6/23/17 06:18 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 22 | Not Detected | 110 | Not Detected |
| Freon 114 | 22 | Not Detected | 150 | Not Detected |
| Chloromethane | 87 | Not Detected | 180 | Not Detected |
| Vinyl Chloride | 22 | Not Detected | 56 | Not Detected |
| 1,3-Butadiene | 22 | Not Detected | 48 | Not Detected |
| Bromomethane | 87 | Not Detected | 340 | Not Detected |
| Chloroethane | 87 | Not Detected | 230 | Not Detected |
| Freon 11 | 22 | Not Detected | 120 | Not Detected |
| Ethanol | 87 | Not Detected | 160 | Not Detected |
| Freon 113 | 22 | Not Detected | 170 | Not Detected |
| 1,1-Dichloroethene | 22 | Not Detected | 86 | Not Detected |
| Acetone | 87 | Not Detected | 210 | Not Detected |
| 2-Propanol | 87 | Not Detected | 210 | Not Detected |
| Carbon Disulfide | 87 | Not Detected | 270 | Not Detected |
| 3-Chloropropene | 87 | Not Detected | 270 | Not Detected |
| Methylene Chloride | 87 | Not Detected | 300 | Not Detected |
| Methyl tert-butyl ether | 22 | Not Detected | 78 | Not Detected |
| trans-1,2-Dichloroethene | 22 | 25 | 86 | 99 |
| Hexane | 22 | 26 | 77 | 93 |
| 1,1-Dichloroethane | 22 | Not Detected | 88 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 87 | Not Detected | 260 | Not Detected |
| cis-1,2-Dichloroethene | 22 | 25 | 86 | 100 |
| Tetrahydrofuran | 22 | Not Detected | 64 | Not Detected |
| Chloroform | 22 | Not Detected | 110 | Not Detected |
| 1,1,1-Trichloroethane | 22 | Not Detected | 120 | Not Detected |
| Cyclohexane | 22 | Not Detected | 75 | Not Detected |
| Carbon Tetrachloride | 22 | Not Detected | 140 | Not Detected |
| 2,2,4-Trimethylpentane | 22 | Not Detected | 100 | Not Detected |
| Benzene | 22 | Not Detected | 70 | Not Detected |
| 1,2-Dichloroethane | 22 | Not Detected | 88 | Not Detected |
| Heptane | 22 | Not Detected | 89 | Not Detected |
| Trichloroethene | 22 | 760 | 120 | 4100 |
| 1,2-Dichloropropane | 22 | Not Detected | 100 | Not Detected |
| 1,4-Dioxane | 87 | Not Detected | 310 | Not Detected |
| Bromodichloromethane | 22 | Not Detected | 150 | Not Detected |
| cis-1,3-Dichloropropene | 22 | Not Detected | 99 | Not Detected |
| 4-Methyl-2-pentanone | 22 | Not Detected | 89 | Not Detected |
| Toluene | 22 | Not Detected | 82 | Not Detected |
| trans-1,3-Dichloropropene | 22 | Not Detected | 99 | Not Detected |
| 1,1,2-Trichloroethane | 22 | Not Detected | 120 | Not Detected |
| Tetrachloroethene | 22 | 15000 | 150 | 100000 |
| 2-Hexanone | 87 | Not Detected | 360 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-061317-SVP-3-SS-10-1**

**Lab ID#: 1706408B-18A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062321** | **Date of Collection: 6/13/17 12:13:00 PM** | |
| **Dil. Factor:** | **4.36** | **Date of Analysis: 6/23/17 06:18 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 22 | Not Detected | 180 | Not Detected |
| 1,2-Dibromoethane (EDB) | 22 | Not Detected | 170 | Not Detected |
| Chlorobenzene | 22 | Not Detected | 100 | Not Detected |
| Ethyl Benzene | 22 | Not Detected | 95 | Not Detected |
| m,p-Xylene | 22 | Not Detected | 95 | Not Detected |
| o-Xylene | 22 | Not Detected | 95 | Not Detected |
| Styrene | 22 | Not Detected | 93 | Not Detected |
| Bromoform | 22 | Not Detected | 220 | Not Detected |
| Cumene | 22 | Not Detected | 110 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 22 | Not Detected | 150 | Not Detected |
| Propylbenzene | 22 | Not Detected | 110 | Not Detected |
| 4-Ethyltoluene | 22 | Not Detected | 110 | Not Detected |
| 1,3,5-Trimethylbenzene | 22 | Not Detected | 110 | Not Detected |
| 1,2,4-Trimethylbenzene | 22 | Not Detected | 110 | Not Detected |
| 1,3-Dichlorobenzene | 22 | Not Detected | 130 | Not Detected |
| 1,4-Dichlorobenzene | 22 | Not Detected | 130 | Not Detected |
| alpha-Chlorotoluene | 22 | Not Detected | 110 | Not Detected |
| 1,2-Dichlorobenzene | 22 | Not Detected | 130 | Not Detected |
| 1,2,4-Trichlorobenzene | 87 | Not Detected | 650 | Not Detected |
| Hexachlorobutadiene | 87 | Not Detected | 930 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 110 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-061317-SVP-4-SS-10-1**

**Lab ID#: 1706408B-19A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062323** | **Date of Collection:** | **6/13/17 12:24:00 PM** |
| **Dil. Factor:** | **51.2** | **Date of Analysis:** | **6/23/17 07:18 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 260 | Not Detected | 1300 | Not Detected |
| Freon 114 | 260 | Not Detected | 1800 | Not Detected |
| Chloromethane | 1000 | Not Detected | 2100 | Not Detected |
| Vinyl Chloride | 260 | Not Detected | 650 | Not Detected |
| 1,3-Butadiene | 260 | Not Detected | 570 | Not Detected |
| Bromomethane | 1000 | Not Detected | 4000 | Not Detected |
| Chloroethane | 1000 | Not Detected | 2700 | Not Detected |
| Freon 11 | 260 | Not Detected | 1400 | Not Detected |
| Ethanol | 1000 | Not Detected | 1900 | Not Detected |
| Freon 113 | 260 | Not Detected | 2000 | Not Detected |
| 1,1-Dichloroethene | 260 | Not Detected | 1000 | Not Detected |
| Acetone | 1000 | Not Detected | 2400 | Not Detected |
| 2-Propanol | 1000 | Not Detected | 2500 | Not Detected |
| Carbon Disulfide | 1000 | Not Detected | 3200 | Not Detected |
| 3-Chloropropene | 1000 | Not Detected | 3200 | Not Detected |
| Methylene Chloride | 1000 | Not Detected | 3600 | Not Detected |
| Methyl tert-butyl ether | 260 | Not Detected | 920 | Not Detected |
| trans-1,2-Dichloroethene | 260 | Not Detected | 1000 | Not Detected |
| Hexane | 260 | Not Detected | 900 | Not Detected |
| 1,1-Dichloroethane | 260 | Not Detected | 1000 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 1000 | Not Detected | 3000 | Not Detected |
| cis-1,2-Dichloroethene | 260 | 5000 | 1000 | 20000 |
| Tetrahydrofuran | 260 | Not Detected | 750 | Not Detected |
| Chloroform | 260 | Not Detected | 1200 | Not Detected |
| 1,1,1-Trichloroethane | 260 | Not Detected | 1400 | Not Detected |
| Cyclohexane | 260 | Not Detected | 880 | Not Detected |
| Carbon Tetrachloride | 260 | Not Detected | 1600 | Not Detected |
| 2,2,4-Trimethylpentane | 260 | Not Detected | 1200 | Not Detected |
| Benzene | 260 | Not Detected | 820 | Not Detected |
| 1,2-Dichloroethane | 260 | Not Detected | 1000 | Not Detected |
| Heptane | 260 | Not Detected | 1000 | Not Detected |
| Trichloroethene | 260 | 3600 | 1400 | 19000 |
| 1,2-Dichloropropane | 260 | Not Detected | 1200 | Not Detected |
| 1,4-Dioxane | 1000 | Not Detected | 3700 | Not Detected |
| Bromodichloromethane | 260 | Not Detected | 1700 | Not Detected |
| cis-1,3-Dichloropropene | 260 | Not Detected | 1200 | Not Detected |
| 4-Methyl-2-pentanone | 260 | Not Detected | 1000 | Not Detected |
| Toluene | 260 | Not Detected | 960 | Not Detected |
| trans-1,3-Dichloropropene | 260 | Not Detected | 1200 | Not Detected |
| 1,1,2-Trichloroethane | 260 | Not Detected | 1400 | Not Detected |
| Tetrachloroethene | 260 | 170000 | 1700 | 1200000 |
| 2-Hexanone | 1000 | Not Detected | 4200 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-061317-SVP-4-SS-10-1**

**Lab ID#: 1706408B-19A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062323** | **Date of Collection:** | **6/13/17 12:24:00 PM** |
| **Dil. Factor:** | **51.2** | **Date of Analysis:** | **6/23/17 07:18 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 260 | Not Detected | 2200 | Not Detected |
| 1,2-Dibromoethane (EDB) | 260 | Not Detected | 2000 | Not Detected |
| Chlorobenzene | 260 | Not Detected | 1200 | Not Detected |
| Ethyl Benzene | 260 | Not Detected | 1100 | Not Detected |
| m,p-Xylene | 260 | Not Detected | 1100 | Not Detected |
| o-Xylene | 260 | Not Detected | 1100 | Not Detected |
| Styrene | 260 | Not Detected | 1100 | Not Detected |
| Bromoform | 260 | Not Detected | 2600 | Not Detected |
| Cumene | 260 | Not Detected | 1200 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 260 | Not Detected | 1800 | Not Detected |
| Propylbenzene | 260 | Not Detected | 1200 | Not Detected |
| 4-Ethyltoluene | 260 | Not Detected | 1200 | Not Detected |
| 1,3,5-Trimethylbenzene | 260 | Not Detected | 1200 | Not Detected |
| 1,2,4-Trimethylbenzene | 260 | Not Detected | 1200 | Not Detected |
| 1,3-Dichlorobenzene | 260 | Not Detected | 1500 | Not Detected |
| 1,4-Dichlorobenzene | 260 | Not Detected | 1500 | Not Detected |
| alpha-Chlorotoluene | 260 | Not Detected | 1300 | Not Detected |
| 1,2-Dichlorobenzene | 260 | Not Detected | 1500 | Not Detected |
| 1,2,4-Trichlorobenzene | 1000 | Not Detected | 7600 | Not Detected |
| Hexachlorobutadiene | 1000 | Not Detected | 11000 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 109 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1706408B-20A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062305** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 10:05 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.50 | Not Detected | 2.5 | Not Detected |
| Freon 114 | 0.50 | Not Detected | 3.5 | Not Detected |
| Chloromethane | 5.0 | Not Detected | 10 | Not Detected |
| Vinyl Chloride | 0.50 | Not Detected | 1.3 | Not Detected |
| 1,3-Butadiene | 0.50 | Not Detected | 1.1 | Not Detected |
| Bromomethane | 5.0 | Not Detected | 19 | Not Detected |
| Chloroethane | 2.0 | Not Detected | 5.3 | Not Detected |
| Freon 11 | 0.50 | Not Detected | 2.8 | Not Detected |
| Ethanol | 2.0 | Not Detected | 3.8 | Not Detected |
| Freon 113 | 0.50 | Not Detected | 3.8 | Not Detected |
| 1,1-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Acetone | 5.0 | Not Detected | 12 | Not Detected |
| 2-Propanol | 2.0 | Not Detected | 4.9 | Not Detected |
| Carbon Disulfide | 2.0 | Not Detected | 6.2 | Not Detected |
| 3-Chloropropene | 2.0 | Not Detected | 6.3 | Not Detected |
| Methylene Chloride | 5.0 | Not Detected | 17 | Not Detected |
| Methyl tert-butyl ether | 2.0 | Not Detected | 7.2 | Not Detected |
| trans-1,2-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Hexane | 0.50 | Not Detected | 1.8 | Not Detected |
| 1,1-Dichloroethane | 0.50 | Not Detected | 2.0 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 2.0 | Not Detected | 5.9 | Not Detected |
| cis-1,2-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Tetrahydrofuran | 0.50 | Not Detected | 1.5 | Not Detected |
| Chloroform | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,1,1-Trichloroethane | 0.50 | Not Detected | 2.7 | Not Detected |
| Cyclohexane | 0.50 | Not Detected | 1.7 | Not Detected |
| Carbon Tetrachloride | 0.50 | Not Detected | 3.1 | Not Detected |
| 2,2,4-Trimethylpentane | 0.50 | Not Detected | 2.3 | Not Detected |
| Benzene | 0.50 | Not Detected | 1.6 | Not Detected |
| 1,2-Dichloroethane | 0.50 | Not Detected | 2.0 | Not Detected |
| Heptane | 0.50 | Not Detected | 2.0 | Not Detected |
| Trichloroethene | 0.50 | Not Detected | 2.7 | Not Detected |
| 1,2-Dichloropropane | 0.50 | Not Detected | 2.3 | Not Detected |
| 1,4-Dioxane | 2.0 | Not Detected | 7.2 | Not Detected |
| Bromodichloromethane | 0.50 | Not Detected | 3.4 | Not Detected |
| cis-1,3-Dichloropropene | 0.50 | Not Detected | 2.3 | Not Detected |
| 4-Methyl-2-pentanone | 0.50 | Not Detected | 2.0 | Not Detected |
| Toluene | 0.50 | Not Detected | 1.9 | Not Detected |
| trans-1,3-Dichloropropene | 0.50 | Not Detected | 2.3 | Not Detected |
| 1,1,2-Trichloroethane | 0.50 | Not Detected | 2.7 | Not Detected |
| Tetrachloroethene | 0.50 | Not Detected | 3.4 | Not Detected |
| 2-Hexanone | 2.0 | Not Detected | 8.2 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1706408B-20A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062305** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 10:05 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 0.50 | Not Detected | 4.2 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.50 | Not Detected | 3.8 | Not Detected |
| Chlorobenzene | 0.50 | Not Detected | 2.3 | Not Detected |
| Ethyl Benzene | 0.50 | Not Detected | 2.2 | Not Detected |
| m,p-Xylene | 0.50 | Not Detected | 2.2 | Not Detected |
| o-Xylene | 0.50 | Not Detected | 2.2 | Not Detected |
| Styrene | 0.50 | Not Detected | 2.1 | Not Detected |
| Bromoform | 0.50 | Not Detected | 5.2 | Not Detected |
| Cumene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.50 | Not Detected | 3.4 | Not Detected |
| Propylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 4-Ethyltoluene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,3,5-Trimethylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,2,4-Trimethylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,3-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| 1,4-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| alpha-Chlorotoluene | 0.50 | Not Detected | 2.6 | Not Detected |
| 1,2-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| 1,2,4-Trichlorobenzene | 2.0 | Not Detected | 15 | Not Detected |
| Hexachlorobutadiene | 2.0 | Not Detected | 21 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 86 | 70-130 |
| 4-Bromofluorobenzene | 107 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1706408B-20B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062306** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 10:17 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 5.0 | Not Detected | 25 | Not Detected |
| Freon 114 | 5.0 | Not Detected | 35 | Not Detected |
| Chloromethane | 20 | Not Detected | 41 | Not Detected |
| Vinyl Chloride | 5.0 | Not Detected | 13 | Not Detected |
| 1,3-Butadiene | 5.0 | Not Detected | 11 | Not Detected |
| Bromomethane | 20 | Not Detected | 78 | Not Detected |
| Chloroethane | 20 | Not Detected | 53 | Not Detected |
| Freon 11 | 5.0 | Not Detected | 28 | Not Detected |
| Ethanol | 20 | Not Detected | 38 | Not Detected |
| Freon 113 | 5.0 | Not Detected | 38 | Not Detected |
| 1,1-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Acetone | 20 | Not Detected | 48 | Not Detected |
| 2-Propanol | 20 | Not Detected | 49 | Not Detected |
| Carbon Disulfide | 20 | Not Detected | 62 | Not Detected |
| 3-Chloropropene | 20 | Not Detected | 63 | Not Detected |
| Methylene Chloride | 20 | Not Detected | 69 | Not Detected |
| Methyl tert-butyl ether | 5.0 | Not Detected | 18 | Not Detected |
| trans-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Hexane | 5.0 | Not Detected | 18 | Not Detected |
| 1,1-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 20 | Not Detected | 59 | Not Detected |
| cis-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Tetrahydrofuran | 5.0 | Not Detected | 15 | Not Detected |
| Chloroform | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,1-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Cyclohexane | 5.0 | Not Detected | 17 | Not Detected |
| Carbon Tetrachloride | 5.0 | Not Detected | 31 | Not Detected |
| 2,2,4-Trimethylpentane | 5.0 | Not Detected | 23 | Not Detected |
| Benzene | 5.0 | Not Detected | 16 | Not Detected |
| 1,2-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| Heptane | 5.0 | Not Detected | 20 | Not Detected |
| Trichloroethene | 5.0 | Not Detected | 27 | Not Detected |
| 1,2-Dichloropropane | 5.0 | Not Detected | 23 | Not Detected |
| 1,4-Dioxane | 20 | Not Detected | 72 | Not Detected |
| Bromodichloromethane | 5.0 | Not Detected | 34 | Not Detected |
| cis-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 4-Methyl-2-pentanone | 5.0 | Not Detected | 20 | Not Detected |
| Toluene | 5.0 | Not Detected | 19 | Not Detected |
| trans-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 1,1,2-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Tetrachloroethene | 5.0 | Not Detected | 34 | Not Detected |
| 2-Hexanone | 20 | Not Detected | 82 | Not Detected |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1706408B-20B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062306** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 10:17 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 5.0 | Not Detected | 42 | Not Detected |
| 1,2-Dibromoethane (EDB) | 5.0 | Not Detected | 38 | Not Detected |
| Chlorobenzene | 5.0 | Not Detected | 23 | Not Detected |
| Ethyl Benzene | 5.0 | Not Detected | 22 | Not Detected |
| m,p-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| o-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| Styrene | 5.0 | Not Detected | 21 | Not Detected |
| Bromoform | 5.0 | Not Detected | 52 | Not Detected |
| Cumene | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 5.0 | Not Detected | 34 | Not Detected |
| Propylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 4-Ethyltoluene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3,5-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,2,4-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,4-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| alpha-Chlorotoluene | 5.0 | Not Detected | 26 | Not Detected |
| 1,2-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,2,4-Trichlorobenzene | 20 | Not Detected | 150 | Not Detected |
| Hexachlorobutadiene | 20 | Not Detected | 210 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 102 | 70-130 |

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**Client Sample ID: CCV**

**Lab ID#: 1706408B-21A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | |
|---|---|---|
| **File Name:** | **17062302** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:43 AM** |

| Compound | %Recovery |
|---|---|
| Freon 12 | 90 |
| Freon 114 | 96 |
| Chloromethane | 93 |
| Vinyl Chloride | 90 |
| 1,3-Butadiene | 82 |
| Bromomethane | 94 |
| Chloroethane | 90 |
| Freon 11 | 92 |
| Ethanol | 81 |
| Freon 113 | 95 |
| 1,1-Dichloroethene | 91 |
| Acetone | 83 |
| 2-Propanol | 84 |
| Carbon Disulfide | 91 |
| 3-Chloropropene | 89 |
| Methylene Chloride | 84 |
| Methyl tert-butyl ether | 86 |
| trans-1,2-Dichloroethene | 90 |
| Hexane | 85 |
| 1,1-Dichloroethane | 85 |
| 2-Butanone (Methyl Ethyl Ketone) | 86 |
| cis-1,2-Dichloroethene | 86 |
| Tetrahydrofuran | 79 |
| Chloroform | 90 |
| 1,1,1-Trichloroethane | 89 |
| Cyclohexane | 83 |
| Carbon Tetrachloride | 89 |
| 2,2,4-Trimethylpentane | 82 |
| Benzene | 91 |
| 1,2-Dichloroethane | 86 |
| Heptane | 87 |
| Trichloroethene | 93 |
| 1,2-Dichloropropane | 88 |
| 1,4-Dioxane | 92 |
| Bromodichloromethane | 94 |
| cis-1,3-Dichloropropene | 92 |
| 4-Methyl-2-pentanone | 82 |
| Toluene | 93 |
| trans-1,3-Dichloropropene | 89 |
| 1,1,2-Trichloroethane | 94 |
| Tetrachloroethene | 100 |
| 2-Hexanone | 81 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706408B-21A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062302** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:43 AM** | |

| Compound | %Recovery |
|---|---|
| Dibromochloromethane | 97 |
| 1,2-Dibromoethane (EDB) | 95 |
| Chlorobenzene | 93 |
| Ethyl Benzene | 92 |
| m,p-Xylene | 91 |
| o-Xylene | 90 |
| Styrene | 88 |
| Bromoform | 102 |
| Cumene | 90 |
| 1,1,2,2-Tetrachloroethane | 89 |
| Propylbenzene | 90 |
| 4-Ethyltoluene | 92 |
| 1,3,5-Trimethylbenzene | 90 |
| 1,2,4-Trimethylbenzene | 92 |
| 1,3-Dichlorobenzene | 96 |
| 1,4-Dichlorobenzene | 96 |
| alpha-Chlorotoluene | 90 |
| 1,2-Dichlorobenzene | 94 |
| 1,2,4-Trichlorobenzene | 104 |
| Hexachlorobutadiene | 107 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 89 | 70-130 |
| 4-Bromofluorobenzene | 105 | 70-130 |

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**Client Sample ID: CCV**

**Lab ID#: 1706408B-21B**

**EPA METHOD TO-15 GC/MS**

| | | |
|---|---|---|
| **File Name:** | **14062302** | **Date of Collection: NA** |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 07:51 AM** |

| Compound | %Recovery |
|---|---|
| Freon 12 | 98 |
| Freon 114 | 103 |
| Chloromethane | 91 |
| Vinyl Chloride | 101 |
| 1,3-Butadiene | 93 |
| Bromomethane | 119 |
| Chloroethane | 91 |
| Freon 11 | 122 |
| Ethanol | 90 |
| Freon 113 | 107 |
| 1,1-Dichloroethene | 104 |
| Acetone | 92 |
| 2-Propanol | 97 |
| Carbon Disulfide | 92 |
| 3-Chloropropene | 98 |
| Methylene Chloride | 101 |
| Methyl tert-butyl ether | 103 |
| trans-1,2-Dichloroethene | 92 |
| Hexane | 102 |
| 1,1-Dichloroethane | 99 |
| 2-Butanone (Methyl Ethyl Ketone) | 90 |
| cis-1,2-Dichloroethene | 100 |
| Tetrahydrofuran | 85 |
| Chloroform | 95 |
| 1,1,1-Trichloroethane | 116 |
| Cyclohexane | 105 |
| Carbon Tetrachloride | 120 |
| 2,2,4-Trimethylpentane | 97 |
| Benzene | 90 |
| 1,2-Dichloroethane | 104 |
| Heptane | 90 |
| Trichloroethene | 91 |
| 1,2-Dichloropropane | 84 |
| 1,4-Dioxane | 95 |
| Bromodichloromethane | 99 |
| cis-1,3-Dichloropropene | 93 |
| 4-Methyl-2-pentanone | 103 |
| Toluene | 85 |
| trans-1,3-Dichloropropene | 99 |
| 1,1,2-Trichloroethane | 93 |
| Tetrachloroethene | 94 |
| 2-Hexanone | 99 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706408B-21B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062302** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 07:51 AM** | |

| Compound | %Recovery |
|---|---|
| Dibromochloromethane | 98 |
| 1,2-Dibromoethane (EDB) | 95 |
| Chlorobenzene | 93 |
| Ethyl Benzene | 97 |
| m,p-Xylene | 92 |
| o-Xylene | 93 |
| Styrene | 106 |
| Bromoform | 100 |
| Cumene | 98 |
| 1,1,2,2-Tetrachloroethane | 89 |
| Propylbenzene | 95 |
| 4-Ethyltoluene | 100 |
| 1,3,5-Trimethylbenzene | 104 |
| 1,2,4-Trimethylbenzene | 104 |
| 1,3-Dichlorobenzene | 98 |
| 1,4-Dichlorobenzene | 101 |
| alpha-Chlorotoluene | 98 |
| 1,2-Dichlorobenzene | 98 |
| 1,2,4-Trichlorobenzene | 93 |
| Hexachlorobutadiene | 101 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 95 | 70-130 |
| 4-Bromofluorobenzene | 104 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1706408B-22A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062303** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 09:10 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 95 | 70-130 |
| Freon 114 | 103 | 70-130 |
| Chloromethane | 98 | 70-130 |
| Vinyl Chloride | 98 | 70-130 |
| 1,3-Butadiene | 86 | 70-130 |
| Bromomethane | 100 | 70-130 |
| Chloroethane | 100 | 70-130 |
| Freon 11 | 98 | 70-130 |
| Ethanol | 74 | 70-130 |
| Freon 113 | 99 | 70-130 |
| 1,1-Dichloroethene | 94 | 70-130 |
| Acetone | 89 | 70-130 |
| 2-Propanol | 87 | 70-130 |
| Carbon Disulfide | 98 | 70-130 |
| 3-Chloropropene | 98 | 70-130 |
| Methylene Chloride | 88 | 70-130 |
| Methyl tert-butyl ether | 91 | 70-130 |
| trans-1,2-Dichloroethene | 103 | 70-130 |
| Hexane | 90 | 70-130 |
| 1,1-Dichloroethane | 89 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 91 | 70-130 |
| cis-1,2-Dichloroethene | 84 | 70-130 |
| Tetrahydrofuran | 81 | 70-130 |
| Chloroform | 93 | 70-130 |
| 1,1,1-Trichloroethane | 92 | 70-130 |
| Cyclohexane | 86 | 70-130 |
| Carbon Tetrachloride | 93 | 70-130 |
| 2,2,4-Trimethylpentane | 87 | 70-130 |
| Benzene | 96 | 70-130 |
| 1,2-Dichloroethane | 90 | 70-130 |
| Heptane | 94 | 70-130 |
| Trichloroethene | 100 | 70-130 |
| 1,2-Dichloropropane | 92 | 70-130 |
| 1,4-Dioxane | 94 | 70-130 |
| Bromodichloromethane | 101 | 70-130 |
| cis-1,3-Dichloropropene | 103 | 70-130 |
| 4-Methyl-2-pentanone | 85 | 70-130 |
| Toluene | 97 | 70-130 |
| trans-1,3-Dichloropropene | 92 | 70-130 |
| 1,1,2-Trichloroethane | 98 | 70-130 |
| Tetrachloroethene | 102 | 70-130 |
| 2-Hexanone | 83 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1706408B-22A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062303** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 09:10 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 102 | 70-130 |
| 1,2-Dibromoethane (EDB) | 98 | 70-130 |
| Chlorobenzene | 97 | 70-130 |
| Ethyl Benzene | 95 | 70-130 |
| m,p-Xylene | 94 | 70-130 |
| o-Xylene | 93 | 70-130 |
| Styrene | 90 | 70-130 |
| Bromoform | 108 | 70-130 |
| Cumene | 92 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 92 | 70-130 |
| Propylbenzene | 93 | 70-130 |
| 4-Ethyltoluene | 97 | 70-130 |
| 1,3,5-Trimethylbenzene | 94 | 70-130 |
| 1,2,4-Trimethylbenzene | 96 | 70-130 |
| 1,3-Dichlorobenzene | 98 | 70-130 |
| 1,4-Dichlorobenzene | 100 | 70-130 |
| alpha-Chlorotoluene | 94 | 70-130 |
| 1,2-Dichlorobenzene | 98 | 70-130 |
| 1,2,4-Trichlorobenzene | 109 | 70-130 |
| Hexachlorobutadiene | 114 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 1,2-Dichloroethane-d4 | 88 | 70-130 |
| 4-Bromofluorobenzene | 107 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1706408B-22AA**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062304** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 09:36 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 95 | 70-130 |
| Freon 114 | 103 | 70-130 |
| Chloromethane | 95 | 70-130 |
| Vinyl Chloride | 99 | 70-130 |
| 1,3-Butadiene | 88 | 70-130 |
| Bromomethane | 101 | 70-130 |
| Chloroethane | 101 | 70-130 |
| Freon 11 | 98 | 70-130 |
| Ethanol | 74 | 70-130 |
| Freon 113 | 100 | 70-130 |
| 1,1-Dichloroethene | 96 | 70-130 |
| Acetone | 90 | 70-130 |
| 2-Propanol | 88 | 70-130 |
| Carbon Disulfide | 98 | 70-130 |
| 3-Chloropropene | 102 | 70-130 |
| Methylene Chloride | 89 | 70-130 |
| Methyl tert-butyl ether | 91 | 70-130 |
| trans-1,2-Dichloroethene | 105 | 70-130 |
| Hexane | 90 | 70-130 |
| 1,1-Dichloroethane | 89 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 92 | 70-130 |
| cis-1,2-Dichloroethene | 87 | 70-130 |
| Tetrahydrofuran | 83 | 70-130 |
| Chloroform | 93 | 70-130 |
| 1,1,1-Trichloroethane | 93 | 70-130 |
| Cyclohexane | 88 | 70-130 |
| Carbon Tetrachloride | 94 | 70-130 |
| 2,2,4-Trimethylpentane | 86 | 70-130 |
| Benzene | 96 | 70-130 |
| 1,2-Dichloroethane | 91 | 70-130 |
| Heptane | 93 | 70-130 |
| Trichloroethene | 102 | 70-130 |
| 1,2-Dichloropropane | 93 | 70-130 |
| 1,4-Dioxane | 96 | 70-130 |
| Bromodichloromethane | 101 | 70-130 |
| cis-1,3-Dichloropropene | 103 | 70-130 |
| 4-Methyl-2-pentanone | 87 | 70-130 |
| Toluene | 98 | 70-130 |
| trans-1,3-Dichloropropene | 95 | 70-130 |
| 1,1,2-Trichloroethane | 100 | 70-130 |
| Tetrachloroethene | 105 | 70-130 |
| 2-Hexanone | 84 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1706408B-22AA**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **17062304** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 09:36 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 105 | 70-130 |
| 1,2-Dibromoethane (EDB) | 100 | 70-130 |
| Chlorobenzene | 98 | 70-130 |
| Ethyl Benzene | 97 | 70-130 |
| m,p-Xylene | 96 | 70-130 |
| o-Xylene | 96 | 70-130 |
| Styrene | 90 | 70-130 |
| Bromoform | 110 | 70-130 |
| Cumene | 94 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 94 | 70-130 |
| Propylbenzene | 95 | 70-130 |
| 4-Ethyltoluene | 100 | 70-130 |
| 1,3,5-Trimethylbenzene | 96 | 70-130 |
| 1,2,4-Trimethylbenzene | 98 | 70-130 |
| 1,3-Dichlorobenzene | 101 | 70-130 |
| 1,4-Dichlorobenzene | 102 | 70-130 |
| alpha-Chlorotoluene | 95 | 70-130 |
| 1,2-Dichlorobenzene | 100 | 70-130 |
| 1,2,4-Trichlorobenzene | 112 | 70-130 |
| Hexachlorobutadiene | 118 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 1,2-Dichloroethane-d4 | 87 | 70-130 |
| 4-Bromofluorobenzene | 109 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1706408B-22B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062303** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:21 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 109 | 70-130 |
| Freon 114 | 114 | 70-130 |
| Chloromethane | 101 | 70-130 |
| Vinyl Chloride | 108 | 70-130 |
| 1,3-Butadiene | 97 | 70-130 |
| Bromomethane | 137 Q | 70-130 |
| Chloroethane | 102 | 70-130 |
| Freon 11 | 133 Q | 70-130 |
| Ethanol | 104 | 70-130 |
| Freon 113 | 118 | 70-130 |
| 1,1-Dichloroethene | 115 | 70-130 |
| Acetone | 104 | 70-130 |
| 2-Propanol | 113 | 70-130 |
| Carbon Disulfide | 89 | 70-130 |
| 3-Chloropropene | 110 | 70-130 |
| Methylene Chloride | 111 | 70-130 |
| Methyl tert-butyl ether | 116 | 70-130 |
| trans-1,2-Dichloroethene | 92 | 70-130 |
| Hexane | 113 | 70-130 |
| 1,1-Dichloroethane | 111 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 101 | 70-130 |
| cis-1,2-Dichloroethene | 118 | 70-130 |
| Tetrahydrofuran | 95 | 70-130 |
| Chloroform | 107 | 70-130 |
| 1,1,1-Trichloroethane | 129 | 70-130 |
| Cyclohexane | 121 | 70-130 |
| Carbon Tetrachloride | 130 | 70-130 |
| 2,2,4-Trimethylpentane | 110 | 70-130 |
| Benzene | 103 | 70-130 |
| 1,2-Dichloroethane | 113 | 70-130 |
| Heptane | 104 | 70-130 |
| Trichloroethene | 103 | 70-130 |
| 1,2-Dichloropropane | 96 | 70-130 |
| 1,4-Dioxane | 108 | 70-130 |
| Bromodichloromethane | 118 | 70-130 |
| cis-1,3-Dichloropropene | 106 | 70-130 |
| 4-Methyl-2-pentanone | 112 | 70-130 |
| Toluene | 100 | 70-130 |
| trans-1,3-Dichloropropene | 109 | 70-130 |
| 1,1,2-Trichloroethane | 107 | 70-130 |
| Tetrachloroethene | 102 | 70-130 |
| 2-Hexanone | 110 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1706408B-22B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062303** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:21 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 108 | 70-130 |
| 1,2-Dibromoethane (EDB) | 103 | 70-130 |
| Chlorobenzene | 104 | 70-130 |
| Ethyl Benzene | 102 | 70-130 |
| m,p-Xylene | 101 | 70-130 |
| o-Xylene | 104 | 70-130 |
| Styrene | 114 | 70-130 |
| Bromoform | 113 | 70-130 |
| Cumene | 104 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 96 | 70-130 |
| Propylbenzene | 104 | 70-130 |
| 4-Ethyltoluene | 109 | 70-130 |
| 1,3,5-Trimethylbenzene | 110 | 70-130 |
| 1,2,4-Trimethylbenzene | 104 | 70-130 |
| 1,3-Dichlorobenzene | 99 | 70-130 |
| 1,4-Dichlorobenzene | 104 | 70-130 |
| alpha-Chlorotoluene | 108 | 70-130 |
| 1,2-Dichlorobenzene | 97 | 70-130 |
| 1,2,4-Trichlorobenzene | 81 | 70-130 |
| Hexachlorobutadiene | 86 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 108 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 106 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706408B-22BB**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062304** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:57 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 110 | 70-130 |
| Freon 114 | 116 | 70-130 |
| Chloromethane | 101 | 70-130 |
| Vinyl Chloride | 112 | 70-130 |
| 1,3-Butadiene | 100 | 70-130 |
| Bromomethane | 137 Q | 70-130 |
| Chloroethane | 100 | 70-130 |
| Freon 11 | 137 Q | 70-130 |
| Ethanol | 100 | 70-130 |
| Freon 113 | 120 | 70-130 |
| 1,1-Dichloroethene | 118 | 70-130 |
| Acetone | 105 | 70-130 |
| 2-Propanol | 114 | 70-130 |
| Carbon Disulfide | 91 | 70-130 |
| 3-Chloropropene | 113 | 70-130 |
| Methylene Chloride | 113 | 70-130 |
| Methyl tert-butyl ether | 117 | 70-130 |
| trans-1,2-Dichloroethene | 91 | 70-130 |
| Hexane | 114 | 70-130 |
| 1,1-Dichloroethane | 113 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 108 | 70-130 |
| cis-1,2-Dichloroethene | 118 | 70-130 |
| Tetrahydrofuran | 98 | 70-130 |
| Chloroform | 107 | 70-130 |
| 1,1,1-Trichloroethane | 127 | 70-130 |
| Cyclohexane | 119 | 70-130 |
| Carbon Tetrachloride | 130 | 70-130 |
| 2,2,4-Trimethylpentane | 112 | 70-130 |
| Benzene | 103 | 70-130 |
| 1,2-Dichloroethane | 114 | 70-130 |
| Heptane | 102 | 70-130 |
| Trichloroethene | 108 | 70-130 |
| 1,2-Dichloropropane | 96 | 70-130 |
| 1,4-Dioxane | 107 | 70-130 |
| Bromodichloromethane | 113 | 70-130 |
| cis-1,3-Dichloropropene | 105 | 70-130 |
| 4-Methyl-2-pentanone | 111 | 70-130 |
| Toluene | 101 | 70-130 |
| trans-1,3-Dichloropropene | 109 | 70-130 |
| 1,1,2-Trichloroethane | 107 | 70-130 |
| Tetrachloroethene | 104 | 70-130 |
| 2-Hexanone | 111 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706408B-22BB**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14062304** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/23/17 08:57 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 106 | 70-130 |
| 1,2-Dibromoethane (EDB) | 101 | 70-130 |
| Chlorobenzene | 101 | 70-130 |
| Ethyl Benzene | 103 | 70-130 |
| m,p-Xylene | 100 | 70-130 |
| o-Xylene | 101 | 70-130 |
| Styrene | 114 | 70-130 |
| Bromoform | 110 | 70-130 |
| Cumene | 103 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 94 | 70-130 |
| Propylbenzene | 104 | 70-130 |
| 4-Ethyltoluene | 105 | 70-130 |
| 1,3,5-Trimethylbenzene | 111 | 70-130 |
| 1,2,4-Trimethylbenzene | 103 | 70-130 |
| 1,3-Dichlorobenzene | 100 | 70-130 |
| 1,4-Dichlorobenzene | 103 | 70-130 |
| alpha-Chlorotoluene | 108 | 70-130 |
| 1,2-Dichlorobenzene | 98 | 70-130 |
| 1,2,4-Trichlorobenzene | 80 | 70-130 |
| Hexachlorobutadiene | 86 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 109 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 104 | 70-130 |

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7/10/2017
Mr. William Wertz
GeoSyntec Consultants
26 Century Hill Drive
Suite 205
Latham NY 12110

Project Name: VDB 11193
Project #: TR0479
Workorder #: 1706492A

Dear Mr. William Wertz

The following report includes the data for the above referenced project for sample(s) received on 6/26/2017 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 SIM are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott

Project Manager

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# WORK ORDER #: 1706492A

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. William Wertz<br>GeoSyntec Consultants<br>26 Century Hill Drive<br>Suite 205<br>Latham, NY 12110 | **BILL TO:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Stone Road West<br>Guelph, Ontario N1G3Z2 |
| **PHONE:** | 518-779-3582 | **P.O. #** | |
| **FAX:** | | **PROJECT #** | TR0479 VDB 11193 |
| **DATE RECEIVED:** | 06/26/2017 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 07/10/2017 | | |

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. | FINAL PRESSURE |
|---|---|---|---|---|
| 01A | B11193-061917-SSV-OA-A | Modified TO-15 SIM | 5.0 "Hg | 5 psi |
| 02A | B11193-061917-SSV-OA-B | Modified TO-15 SIM | 5.5 "Hg | 5 psi |
| 03A | B11193-062017-SSV-OA-A | Modified TO-15 SIM | 5.0 "Hg | 5 psi |
| 04A | B11193-062017-SSV-OA-B | Modified TO-15 SIM | 5.5 "Hg | 5 psi |
| 20A | B11193-062117-ST-5-IA-A-5 | Modified TO-15 SIM | 4.5 "Hg | 5 psi |
| 21A | B11193-062117-SSV-OA-B | Modified TO-15 SIM | 6.5 "Hg | 5 psi |
| 22A | B11193-062117-SSV-OA-A | Modified TO-15 SIM | 6.0 "Hg | 5 psi |
| 24A | B11193-062117-ST-6-IA-A-5 | Modified TO-15 SIM | 3.3 "Hg | 5 psi |
| 25A | Lab Blank | Modified TO-15 SIM | NA | NA |
| 26A | CCV | Modified TO-15 SIM | NA | NA |
| 27A | LCS | Modified TO-15 SIM | NA | NA |
| 27AA | LCSD | Modified TO-15 SIM | NA | NA |

CERTIFIED BY: Heidi Hayes DATE: 07/10/17

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

**LABORATORY NARRATIVE**
**Modified TO-15 SIM**
**GeoSyntec Consultants**
**Workorder# 1706492A**

Seven 6 Liter Summa Canister (SIM Certified) samples were received on June 26, 2017. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the SIM acquisition mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

| ***Requirement*** | ***TO-15*** | ***ATL Modifications*** |
|---|---|---|
| ICAL %RSD acceptance criteria | </=30% RSD with 2 compounds allowed out to < 40% RSD | Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD |
| Daily Calibration | +- 30% Difference | Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers |
| Blank and standards | Zero air | Nitrogen |
| Method Detection Limit | Follow 40CFR Pt.136 App. B | The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases |

## Receiving Notes

The Chain of Custody (COC) was not relinquished properly. A signature, date, and time were not provided by the field sampler.

The number of samples received did not match the information on the Chain of Custody (COC). Sample B11193-062117-ST-6-IA-A-5 was added to the analytical request.

## Analytical Notes

There were no analytical discrepancies.

## Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# MODIFIED EPA METHOD TO-15 GC/MS SIM

**Client Sample ID: B11193-061917-SSV-OA-A**

**Lab ID#: 1706492A-01A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.032 | 0.48 | 0.16 | 2.4 |
| Carbon Tetrachloride | 0.032 | 0.054 | 0.20 | 0.34 |
| Toluene | 0.032 | 0.12 | 0.12 | 0.44 |

**Client Sample ID: B11193-061917-SSV-OA-B**

**Lab ID#: 1706492A-02A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.033 | 0.46 | 0.16 | 2.2 |
| Carbon Tetrachloride | 0.033 | 0.057 | 0.21 | 0.36 |
| Tetrachloroethene | 0.033 | 0.039 | 0.22 | 0.26 |

**Client Sample ID: B11193-062017-SSV-OA-A**

**Lab ID#: 1706492A-03A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.032 | 0.44 | 0.16 | 2.2 |
| Carbon Tetrachloride | 0.032 | 0.067 | 0.20 | 0.42 |
| Toluene | 0.032 | 0.036 | 0.12 | 0.13 |

**Client Sample ID: B11193-062017-SSV-OA-B**

**Lab ID#: 1706492A-04A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.033 | 0.45 | 0.16 | 2.2 |
| Carbon Tetrachloride | 0.033 | 0.059 | 0.21 | 0.37 |

**Client Sample ID: B11193-062117-ST-5-IA-A-5**

**Lab ID#: 1706492A-20A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.032 | 0.46 | 0.16 | 2.3 |

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# Summary of Detected Compounds
# MODIFIED EPA METHOD TO-15 GC/MS SIM

**Client Sample ID: B11193-062117-ST-5-IA-A-5**

**Lab ID#: 1706492A-20A**

| | | | | |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 0.032 | 0.32 | 0.12 | 1.2 |
| Carbon Tetrachloride | 0.032 | 0.056 | 0.20 | 0.36 |
| Trichloroethene | 0.032 | 0.15 | 0.17 | 0.82 |
| Toluene | 0.032 | 0.047 | 0.12 | 0.18 |
| Tetrachloroethene | 0.032 | 5.5 | 0.21 | 37 |

**Client Sample ID: B11193-062117-SSV-OA-B**

**Lab ID#: 1706492A-21A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.034 | 0.46 | 0.17 | 2.3 |
| Carbon Tetrachloride | 0.034 | 0.051 | 0.22 | 0.32 |
| Tetrachloroethene | 0.034 | 0.067 | 0.23 | 0.46 |

**Client Sample ID: B11193-062117-SSV-OA-A**

**Lab ID#: 1706492A-22A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.034 | 0.45 | 0.17 | 2.2 |
| Carbon Tetrachloride | 0.034 | 0.063 | 0.21 | 0.40 |

**Client Sample ID: B11193-062117-ST-6-IA-A-5**

**Lab ID#: 1706492A-24A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.030 | 0.43 | 0.15 | 2.1 |
| cis-1,2-Dichloroethene | 0.030 | 0.19 | 0.12 | 0.76 |
| Carbon Tetrachloride | 0.030 | 0.064 | 0.19 | 0.40 |
| Benzene | 0.075 | 0.24 | 0.24 | 0.76 |
| Trichloroethene | 0.030 | 0.10 | 0.16 | 0.55 |
| Toluene | 0.030 | 0.45 | 0.11 | 1.7 |
| Tetrachloroethene | 0.030 | 3.4 | 0.20 | 23 |
| Ethyl Benzene | 0.030 | 0.033 | 0.13 | 0.14 |
| m,p-Xylene | 0.060 | 0.068 | 0.26 | 0.29 |

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# Summary of Detected Compounds
# MODIFIED EPA METHOD TO-15 GC/MS SIM

**Client Sample ID: B11193-062117-ST-6-IA-A-5**

**Lab ID#: 1706492A-24A**

| | | | | |
|---|---|---|---|---|
| o-Xylene | 0.030 | 0.036 | 0.13 | 0.16 |

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**Client Sample ID: B11193-061917-SSV-OA-A**

**Lab ID#: 1706492A-01A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062914sim** | **Date of Collection: 6/19/17 6:28:00 PM** | |
| **Dil. Factor:** | **1.61** | **Date of Analysis: 6/29/17 07:35 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.032 | 0.48 | 0.16 | 2.4 |
| Freon 114 | 0.032 | Not Detected | 0.22 | Not Detected |
| Chloromethane | 0.80 | Not Detected | 1.7 | Not Detected |
| Vinyl Chloride | 0.016 | Not Detected | 0.041 | Not Detected |
| Chloroethane | 0.080 | Not Detected | 0.21 | Not Detected |
| 1,1-Dichloroethene | 0.016 | Not Detected | 0.064 | Not Detected |
| trans-1,2-Dichloroethene | 0.16 | Not Detected | 0.64 | Not Detected |
| Methyl tert-butyl ether | 0.16 | Not Detected | 0.58 | Not Detected |
| 1,1-Dichloroethane | 0.032 | Not Detected | 0.13 | Not Detected |
| cis-1,2-Dichloroethene | 0.032 | Not Detected | 0.13 | Not Detected |
| Chloroform | 0.032 | Not Detected | 0.16 | Not Detected |
| 1,1,1-Trichloroethane | 0.032 | Not Detected | 0.18 | Not Detected |
| Carbon Tetrachloride | 0.032 | 0.054 | 0.20 | 0.34 |
| Benzene | 0.080 | Not Detected | 0.26 | Not Detected |
| 1,2-Dichloroethane | 0.032 | Not Detected | 0.13 | Not Detected |
| Trichloroethene | 0.032 | Not Detected | 0.17 | Not Detected |
| Toluene | 0.032 | 0.12 | 0.12 | 0.44 |
| 1,1,2-Trichloroethane | 0.032 | Not Detected | 0.18 | Not Detected |
| Tetrachloroethene | 0.032 | Not Detected | 0.22 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.032 | Not Detected | 0.25 | Not Detected |
| Ethyl Benzene | 0.032 | Not Detected | 0.14 | Not Detected |
| m,p-Xylene | 0.064 | Not Detected | 0.28 | Not Detected |
| o-Xylene | 0.032 | Not Detected | 0.14 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.032 | Not Detected | 0.22 | Not Detected |
| 1,4-Dichlorobenzene | 0.032 | Not Detected | 0.19 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 117 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 92 | 70-130 |

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**Client Sample ID: B11193-061917-SSV-OA-B**

**Lab ID#: 1706492A-02A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062915sim** | **Date of Collection: 6/19/17 6:38:00 PM** | |
| **Dil. Factor:** | **1.64** | **Date of Analysis: 6/29/17 08:07 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.033 | 0.46 | 0.16 | 2.2 |
| Freon 114 | 0.033 | Not Detected | 0.23 | Not Detected |
| Chloromethane | 0.82 | Not Detected | 1.7 | Not Detected |
| Vinyl Chloride | 0.016 | Not Detected | 0.042 | Not Detected |
| Chloroethane | 0.082 | Not Detected | 0.22 | Not Detected |
| 1,1-Dichloroethene | 0.016 | Not Detected | 0.065 | Not Detected |
| trans-1,2-Dichloroethene | 0.16 | Not Detected | 0.65 | Not Detected |
| Methyl tert-butyl ether | 0.16 | Not Detected | 0.59 | Not Detected |
| 1,1-Dichloroethane | 0.033 | Not Detected | 0.13 | Not Detected |
| cis-1,2-Dichloroethene | 0.033 | Not Detected | 0.13 | Not Detected |
| Chloroform | 0.033 | Not Detected | 0.16 | Not Detected |
| 1,1,1-Trichloroethane | 0.033 | Not Detected | 0.18 | Not Detected |
| Carbon Tetrachloride | 0.033 | 0.057 | 0.21 | 0.36 |
| Benzene | 0.082 | Not Detected | 0.26 | Not Detected |
| 1,2-Dichloroethane | 0.033 | Not Detected | 0.13 | Not Detected |
| Trichloroethene | 0.033 | Not Detected | 0.18 | Not Detected |
| Toluene | 0.033 | Not Detected | 0.12 | Not Detected |
| 1,1,2-Trichloroethane | 0.033 | Not Detected | 0.18 | Not Detected |
| Tetrachloroethene | 0.033 | 0.039 | 0.22 | 0.26 |
| 1,2-Dibromoethane (EDB) | 0.033 | Not Detected | 0.25 | Not Detected |
| Ethyl Benzene | 0.033 | Not Detected | 0.14 | Not Detected |
| m,p-Xylene | 0.066 | Not Detected | 0.28 | Not Detected |
| o-Xylene | 0.033 | Not Detected | 0.14 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.033 | Not Detected | 0.22 | Not Detected |
| 1,4-Dichlorobenzene | 0.033 | Not Detected | 0.20 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | 70-130 |
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 89 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-OA-A**

**Lab ID#: 1706492A-03A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062916sim** | **Date of Collection:** | **6/20/17 4:04:00 PM** |
| **Dil. Factor:** | **1.61** | **Date of Analysis:** | **6/29/17 08:50 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.032 | 0.44 | 0.16 | 2.2 |
| Freon 114 | 0.032 | Not Detected | 0.22 | Not Detected |
| Chloromethane | 0.80 | Not Detected | 1.7 | Not Detected |
| Vinyl Chloride | 0.016 | Not Detected | 0.041 | Not Detected |
| Chloroethane | 0.080 | Not Detected | 0.21 | Not Detected |
| 1,1-Dichloroethene | 0.016 | Not Detected | 0.064 | Not Detected |
| trans-1,2-Dichloroethene | 0.16 | Not Detected | 0.64 | Not Detected |
| Methyl tert-butyl ether | 0.16 | Not Detected | 0.58 | Not Detected |
| 1,1-Dichloroethane | 0.032 | Not Detected | 0.13 | Not Detected |
| cis-1,2-Dichloroethene | 0.032 | Not Detected | 0.13 | Not Detected |
| Chloroform | 0.032 | Not Detected | 0.16 | Not Detected |
| 1,1,1-Trichloroethane | 0.032 | Not Detected | 0.18 | Not Detected |
| Carbon Tetrachloride | 0.032 | 0.067 | 0.20 | 0.42 |
| Benzene | 0.080 | Not Detected | 0.26 | Not Detected |
| 1,2-Dichloroethane | 0.032 | Not Detected | 0.13 | Not Detected |
| Trichloroethene | 0.032 | Not Detected | 0.17 | Not Detected |
| Toluene | 0.032 | 0.036 | 0.12 | 0.13 |
| 1,1,2-Trichloroethane | 0.032 | Not Detected | 0.18 | Not Detected |
| Tetrachloroethene | 0.032 | Not Detected | 0.22 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.032 | Not Detected | 0.25 | Not Detected |
| Ethyl Benzene | 0.032 | Not Detected | 0.14 | Not Detected |
| m,p-Xylene | 0.064 | Not Detected | 0.28 | Not Detected |
| o-Xylene | 0.032 | Not Detected | 0.14 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.032 | Not Detected | 0.22 | Not Detected |
| 1,4-Dichlorobenzene | 0.032 | Not Detected | 0.19 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 109 | 70-130 |
| Toluene-d8 | 96 | 70-130 |
| 4-Bromofluorobenzene | 94 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-OA-B**

**Lab ID#: 1706492A-04A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062917sim** | **Date of Collection: 6/20/17 4:05:00 PM** | |
| **Dil. Factor:** | **1.64** | **Date of Analysis: 6/29/17 09:22 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.033 | 0.45 | 0.16 | 2.2 |
| Freon 114 | 0.033 | Not Detected | 0.23 | Not Detected |
| Chloromethane | 0.82 | Not Detected | 1.7 | Not Detected |
| Vinyl Chloride | 0.016 | Not Detected | 0.042 | Not Detected |
| Chloroethane | 0.082 | Not Detected | 0.22 | Not Detected |
| 1,1-Dichloroethene | 0.016 | Not Detected | 0.065 | Not Detected |
| trans-1,2-Dichloroethene | 0.16 | Not Detected | 0.65 | Not Detected |
| Methyl tert-butyl ether | 0.16 | Not Detected | 0.59 | Not Detected |
| 1,1-Dichloroethane | 0.033 | Not Detected | 0.13 | Not Detected |
| cis-1,2-Dichloroethene | 0.033 | Not Detected | 0.13 | Not Detected |
| Chloroform | 0.033 | Not Detected | 0.16 | Not Detected |
| 1,1,1-Trichloroethane | 0.033 | Not Detected | 0.18 | Not Detected |
| Carbon Tetrachloride | 0.033 | 0.059 | 0.21 | 0.37 |
| Benzene | 0.082 | Not Detected | 0.26 | Not Detected |
| 1,2-Dichloroethane | 0.033 | Not Detected | 0.13 | Not Detected |
| Trichloroethene | 0.033 | Not Detected | 0.18 | Not Detected |
| Toluene | 0.033 | Not Detected | 0.12 | Not Detected |
| 1,1,2-Trichloroethane | 0.033 | Not Detected | 0.18 | Not Detected |
| Tetrachloroethene | 0.033 | Not Detected | 0.22 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.033 | Not Detected | 0.25 | Not Detected |
| Ethyl Benzene | 0.033 | Not Detected | 0.14 | Not Detected |
| m,p-Xylene | 0.066 | Not Detected | 0.28 | Not Detected |
| o-Xylene | 0.033 | Not Detected | 0.14 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.033 | Not Detected | 0.22 | Not Detected |
| 1,4-Dichlorobenzene | 0.033 | Not Detected | 0.20 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 110 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 93 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062117-ST-5-IA-A-5**

**Lab ID#: 1706492A-20A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062918sim** | **Date of Collection: 6/21/17 1:35:00 PM** | |
| **Dil. Factor:** | **1.58** | **Date of Analysis: 6/29/17 09:54 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.032 | 0.46 | 0.16 | 2.3 |
| Freon 114 | 0.032 | Not Detected | 0.22 | Not Detected |
| Chloromethane | 0.79 | Not Detected | 1.6 | Not Detected |
| Vinyl Chloride | 0.016 | Not Detected | 0.040 | Not Detected |
| Chloroethane | 0.079 | Not Detected | 0.21 | Not Detected |
| 1,1-Dichloroethene | 0.016 | Not Detected | 0.063 | Not Detected |
| trans-1,2-Dichloroethene | 0.16 | Not Detected | 0.63 | Not Detected |
| Methyl tert-butyl ether | 0.16 | Not Detected | 0.57 | Not Detected |
| 1,1-Dichloroethane | 0.032 | Not Detected | 0.13 | Not Detected |
| cis-1,2-Dichloroethene | 0.032 | 0.32 | 0.12 | 1.2 |
| Chloroform | 0.032 | Not Detected | 0.15 | Not Detected |
| 1,1,1-Trichloroethane | 0.032 | Not Detected | 0.17 | Not Detected |
| Carbon Tetrachloride | 0.032 | 0.056 | 0.20 | 0.36 |
| Benzene | 0.079 | Not Detected | 0.25 | Not Detected |
| 1,2-Dichloroethane | 0.032 | Not Detected | 0.13 | Not Detected |
| Trichloroethene | 0.032 | 0.15 | 0.17 | 0.82 |
| Toluene | 0.032 | 0.047 | 0.12 | 0.18 |
| 1,1,2-Trichloroethane | 0.032 | Not Detected | 0.17 | Not Detected |
| Tetrachloroethene | 0.032 | 5.5 | 0.21 | 37 |
| 1,2-Dibromoethane (EDB) | 0.032 | Not Detected | 0.24 | Not Detected |
| Ethyl Benzene | 0.032 | Not Detected | 0.14 | Not Detected |
| m,p-Xylene | 0.063 | Not Detected | 0.27 | Not Detected |
| o-Xylene | 0.032 | Not Detected | 0.14 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.032 | Not Detected | 0.22 | Not Detected |
| 1,4-Dichlorobenzene | 0.032 | Not Detected | 0.19 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 112 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 88 | 70-130 |

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**Client Sample ID: B11193-062117-SSV-OA-B**

**Lab ID#: 1706492A-21A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062919sim** | **Date of Collection: 6/21/17 3:35:00 PM** | |
| **Dil. Factor:** | **1.71** | **Date of Analysis: 6/29/17 10:25 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.034 | 0.46 | 0.17 | 2.3 |
| Freon 114 | 0.034 | Not Detected | 0.24 | Not Detected |
| Chloromethane | 0.86 | Not Detected | 1.8 | Not Detected |
| Vinyl Chloride | 0.017 | Not Detected | 0.044 | Not Detected |
| Chloroethane | 0.086 | Not Detected | 0.22 | Not Detected |
| 1,1-Dichloroethene | 0.017 | Not Detected | 0.068 | Not Detected |
| trans-1,2-Dichloroethene | 0.17 | Not Detected | 0.68 | Not Detected |
| Methyl tert-butyl ether | 0.17 | Not Detected | 0.62 | Not Detected |
| 1,1-Dichloroethane | 0.034 | Not Detected | 0.14 | Not Detected |
| cis-1,2-Dichloroethene | 0.034 | Not Detected | 0.14 | Not Detected |
| Chloroform | 0.034 | Not Detected | 0.17 | Not Detected |
| 1,1,1-Trichloroethane | 0.034 | Not Detected | 0.19 | Not Detected |
| Carbon Tetrachloride | 0.034 | 0.051 | 0.22 | 0.32 |
| Benzene | 0.086 | Not Detected | 0.27 | Not Detected |
| 1,2-Dichloroethane | 0.034 | Not Detected | 0.14 | Not Detected |
| Trichloroethene | 0.034 | Not Detected | 0.18 | Not Detected |
| Toluene | 0.034 | Not Detected | 0.13 | Not Detected |
| 1,1,2-Trichloroethane | 0.034 | Not Detected | 0.19 | Not Detected |
| Tetrachloroethene | 0.034 | 0.067 | 0.23 | 0.46 |
| 1,2-Dibromoethane (EDB) | 0.034 | Not Detected | 0.26 | Not Detected |
| Ethyl Benzene | 0.034 | Not Detected | 0.15 | Not Detected |
| m,p-Xylene | 0.068 | Not Detected | 0.30 | Not Detected |
| o-Xylene | 0.034 | Not Detected | 0.15 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.034 | Not Detected | 0.23 | Not Detected |
| 1,4-Dichlorobenzene | 0.034 | Not Detected | 0.20 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 112 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 91 | 70-130 |

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**Client Sample ID: B11193-062117-SSV-OA-A**

**Lab ID#: 1706492A-22A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062920sim** | **Date of Collection: 6/21/17 3:35:00 PM** | |
| **Dil. Factor:** | **1.68** | **Date of Analysis: 6/29/17 10:57 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.034 | 0.45 | 0.17 | 2.2 |
| Freon 114 | 0.034 | Not Detected | 0.23 | Not Detected |
| Chloromethane | 0.84 | Not Detected | 1.7 | Not Detected |
| Vinyl Chloride | 0.017 | Not Detected | 0.043 | Not Detected |
| Chloroethane | 0.084 | Not Detected | 0.22 | Not Detected |
| 1,1-Dichloroethene | 0.017 | Not Detected | 0.067 | Not Detected |
| trans-1,2-Dichloroethene | 0.17 | Not Detected | 0.67 | Not Detected |
| Methyl tert-butyl ether | 0.17 | Not Detected | 0.60 | Not Detected |
| 1,1-Dichloroethane | 0.034 | Not Detected | 0.14 | Not Detected |
| cis-1,2-Dichloroethene | 0.034 | Not Detected | 0.13 | Not Detected |
| Chloroform | 0.034 | Not Detected | 0.16 | Not Detected |
| 1,1,1-Trichloroethane | 0.034 | Not Detected | 0.18 | Not Detected |
| Carbon Tetrachloride | 0.034 | 0.063 | 0.21 | 0.40 |
| Benzene | 0.084 | Not Detected | 0.27 | Not Detected |
| 1,2-Dichloroethane | 0.034 | Not Detected | 0.14 | Not Detected |
| Trichloroethene | 0.034 | Not Detected | 0.18 | Not Detected |
| Toluene | 0.034 | Not Detected | 0.13 | Not Detected |
| 1,1,2-Trichloroethane | 0.034 | Not Detected | 0.18 | Not Detected |
| Tetrachloroethene | 0.034 | Not Detected | 0.23 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.034 | Not Detected | 0.26 | Not Detected |
| Ethyl Benzene | 0.034 | Not Detected | 0.14 | Not Detected |
| m,p-Xylene | 0.067 | Not Detected | 0.29 | Not Detected |
| o-Xylene | 0.034 | Not Detected | 0.14 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.034 | Not Detected | 0.23 | Not Detected |
| 1,4-Dichlorobenzene | 0.034 | Not Detected | 0.20 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 110 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 88 | 70-130 |

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**Client Sample ID: B11193-062117-ST-6-IA-A-5**

**Lab ID#: 1706492A-24A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062921sim** | **Date of Collection:** | **6/21/17 6:05:00 PM** |
| **Dil. Factor:** | **1.50** | **Date of Analysis:** | **6/30/17 07:51 AM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.030 | 0.43 | 0.15 | 2.1 |
| Freon 114 | 0.030 | Not Detected | 0.21 | Not Detected |
| Chloromethane | 0.75 | Not Detected | 1.5 | Not Detected |
| Vinyl Chloride | 0.015 | Not Detected | 0.038 | Not Detected |
| Chloroethane | 0.075 | Not Detected | 0.20 | Not Detected |
| 1,1-Dichloroethene | 0.015 | Not Detected | 0.059 | Not Detected |
| trans-1,2-Dichloroethene | 0.15 | Not Detected | 0.59 | Not Detected |
| Methyl tert-butyl ether | 0.15 | Not Detected | 0.54 | Not Detected |
| 1,1-Dichloroethane | 0.030 | Not Detected | 0.12 | Not Detected |
| cis-1,2-Dichloroethene | 0.030 | 0.19 | 0.12 | 0.76 |
| Chloroform | 0.030 | Not Detected | 0.15 | Not Detected |
| 1,1,1-Trichloroethane | 0.030 | Not Detected | 0.16 | Not Detected |
| Carbon Tetrachloride | 0.030 | 0.064 | 0.19 | 0.40 |
| Benzene | 0.075 | 0.24 | 0.24 | 0.76 |
| 1,2-Dichloroethane | 0.030 | Not Detected | 0.12 | Not Detected |
| Trichloroethene | 0.030 | 0.10 | 0.16 | 0.55 |
| Toluene | 0.030 | 0.45 | 0.11 | 1.7 |
| 1,1,2-Trichloroethane | 0.030 | Not Detected | 0.16 | Not Detected |
| Tetrachloroethene | 0.030 | 3.4 | 0.20 | 23 |
| 1,2-Dibromoethane (EDB) | 0.030 | Not Detected | 0.23 | Not Detected |
| Ethyl Benzene | 0.030 | 0.033 | 0.13 | 0.14 |
| m,p-Xylene | 0.060 | 0.068 | 0.26 | 0.29 |
| o-Xylene | 0.030 | 0.036 | 0.13 | 0.16 |
| 1,1,2,2-Tetrachloroethane | 0.030 | Not Detected | 0.20 | Not Detected |
| 1,4-Dichlorobenzene | 0.030 | Not Detected | 0.18 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 106 | 70-130 |
| Toluene-d8 | 97 | 70-130 |
| 4-Bromofluorobenzene | 97 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1706492A-25A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062906sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 01:52 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.020 | Not Detected | 0.099 | Not Detected |
| Freon 114 | 0.020 | Not Detected | 0.14 | Not Detected |
| Chloromethane | 0.50 | Not Detected | 1.0 | Not Detected |
| Vinyl Chloride | 0.010 | Not Detected | 0.026 | Not Detected |
| Chloroethane | 0.050 | Not Detected | 0.13 | Not Detected |
| 1,1-Dichloroethene | 0.010 | Not Detected | 0.040 | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | Not Detected | 0.40 | Not Detected |
| Methyl tert-butyl ether | 0.10 | Not Detected | 0.36 | Not Detected |
| 1,1-Dichloroethane | 0.020 | Not Detected | 0.081 | Not Detected |
| cis-1,2-Dichloroethene | 0.020 | Not Detected | 0.079 | Not Detected |
| Chloroform | 0.020 | Not Detected | 0.098 | Not Detected |
| 1,1,1-Trichloroethane | 0.020 | Not Detected | 0.11 | Not Detected |
| Carbon Tetrachloride | 0.020 | Not Detected | 0.12 | Not Detected |
| Benzene | 0.050 | Not Detected | 0.16 | Not Detected |
| 1,2-Dichloroethane | 0.020 | Not Detected | 0.081 | Not Detected |
| Trichloroethene | 0.020 | Not Detected | 0.11 | Not Detected |
| Toluene | 0.020 | Not Detected | 0.075 | Not Detected |
| 1,1,2-Trichloroethane | 0.020 | Not Detected | 0.11 | Not Detected |
| Tetrachloroethene | 0.020 | Not Detected | 0.14 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.020 | Not Detected | 0.15 | Not Detected |
| Ethyl Benzene | 0.020 | Not Detected | 0.087 | Not Detected |
| m,p-Xylene | 0.040 | Not Detected | 0.17 | Not Detected |
| o-Xylene | 0.020 | Not Detected | 0.087 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.020 | Not Detected | 0.14 | Not Detected |
| 1,4-Dichlorobenzene | 0.020 | Not Detected | 0.12 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 113 | 70-130 |
| Toluene-d8 | 97 | 70-130 |
| 4-Bromofluorobenzene | 84 | 70-130 |

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**Client Sample ID: CCV**

**Lab ID#: 1706492A-26A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062902sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 11:01 AM** | |

| Compound | %Recovery |
|---|---|
| Freon 12 | 95 |
| Freon 114 | 87 |
| Chloromethane | 78 |
| Vinyl Chloride | 90 |
| Chloroethane | 95 |
| 1,1-Dichloroethene | 94 |
| trans-1,2-Dichloroethene | 91 |
| Methyl tert-butyl ether | 108 |
| 1,1-Dichloroethane | 92 |
| cis-1,2-Dichloroethene | 94 |
| Chloroform | 81 |
| 1,1,1-Trichloroethane | 90 |
| Carbon Tetrachloride | 107 |
| Benzene | 79 |
| 1,2-Dichloroethane | 80 |
| Trichloroethene | 86 |
| Toluene | 86 |
| 1,1,2-Trichloroethane | 99 |
| Tetrachloroethene | 87 |
| 1,2-Dibromoethane (EDB) | 103 |
| Ethyl Benzene | 100 |
| m,p-Xylene | 102 |
| o-Xylene | 106 |
| 1,1,2,2-Tetrachloroethane | 101 |
| 1,4-Dichlorobenzene | 80 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 93 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 93 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1706492A-27A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062903sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 11:39 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 107 | 70-130 |
| Freon 114 | 104 | 70-130 |
| Chloromethane | 94 | 70-130 |
| Vinyl Chloride | 105 | 70-130 |
| Chloroethane | 110 | 70-130 |
| 1,1-Dichloroethene | 105 | 70-130 |
| trans-1,2-Dichloroethene | 88 | 70-130 |
| Methyl tert-butyl ether | 119 | 70-130 |
| 1,1-Dichloroethane | 105 | 70-130 |
| cis-1,2-Dichloroethene | 116 | 70-130 |
| Chloroform | 91 | 70-130 |
| 1,1,1-Trichloroethane | 100 | 70-130 |
| Carbon Tetrachloride | 128 | 60-140 |
| Benzene | 88 | 70-130 |
| 1,2-Dichloroethane | 91 | 70-130 |
| Trichloroethene | 95 | 70-130 |
| Toluene | 94 | 70-130 |
| 1,1,2-Trichloroethane | 108 | 70-130 |
| Tetrachloroethene | 96 | 70-130 |
| 1,2-Dibromoethane (EDB) | 113 | 70-130 |
| Ethyl Benzene | 110 | 70-130 |
| m,p-Xylene | 115 | 70-130 |
| o-Xylene | 122 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 110 | 70-130 |
| 1,4-Dichlorobenzene | 92 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 96 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 96 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706492A-27AA**

**MODIFIED EPA METHOD TO-15 GC/MS SIM**

| | | | |
|---|---|---|---|
| **File Name:** | **21062904sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 12:09 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 104 | 70-130 |
| Freon 114 | 102 | 70-130 |
| Chloromethane | 88 | 70-130 |
| Vinyl Chloride | 104 | 70-130 |
| Chloroethane | 110 | 70-130 |
| 1,1-Dichloroethene | 104 | 70-130 |
| trans-1,2-Dichloroethene | 87 | 70-130 |
| Methyl tert-butyl ether | 118 | 70-130 |
| 1,1-Dichloroethane | 104 | 70-130 |
| cis-1,2-Dichloroethene | 114 | 70-130 |
| Chloroform | 90 | 70-130 |
| 1,1,1-Trichloroethane | 100 | 70-130 |
| Carbon Tetrachloride | 127 | 60-140 |
| Benzene | 87 | 70-130 |
| 1,2-Dichloroethane | 90 | 70-130 |
| Trichloroethene | 94 | 70-130 |
| Toluene | 94 | 70-130 |
| 1,1,2-Trichloroethane | 108 | 70-130 |
| Tetrachloroethene | 99 | 70-130 |
| 1,2-Dibromoethane (EDB) | 113 | 70-130 |
| Ethyl Benzene | 112 | 70-130 |
| m,p-Xylene | 117 | 70-130 |
| o-Xylene | 126 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 117 | 70-130 |
| 1,4-Dichlorobenzene | 92 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 96 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

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7/10/2017
Mr. William Wertz
GeoSyntec Consultants
26 Century Hill Drive
Suite 205
Latham NY 12110

Project Name: VDB 11193
Project #: TR0479
Workorder #: 1706492B

Dear Mr. William Wertz

The following report includes the data for the above referenced project for sample(s) received on 6/26/2017 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Ausha Scott

Project Manager

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# WORK ORDER #: 1706492B

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. William Wertz<br>GeoSyntec Consultants<br>26 Century Hill Drive<br>Suite 205<br>Latham, NY 12110 | **BILL TO:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Stone Road West<br>Guelph, Ontario N1G3Z2 |
| **PHONE:** | 518-779-3582 | **P.O. #** | |
| **FAX:** | | **PROJECT #** | TR0479 VDB 11193 |
| **DATE RECEIVED:** | 06/26/2017 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 07/10/2017 | | |

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. | FINAL PRESSURE |
|---|---|---|---|---|
| 05A | B11193-061917-SSV-2-22 | TO-15 | 0.6 "Hg | 15.1 psi |
| 06A | B11193-062017-SSV-3-22 | TO-15 | 0.4 "Hg | 15.2 psi |
| 07A | B11193-062017-SSV-4-22 | TO-15 | 1 "Hg | 14.9 psi |
| 08A | B11193-062017-SSV-4-22-DUP | TO-15 | 1 "Hg | 14.8 psi |
| 09A | B11193-062017-SSV-5-59 | TO-15 | 0.2 "Hg | 15.1 psi |
| 10A | B11193-062017-SSV-1-44 | TO-15 | 2.4 "Hg | 14.9 psi |
| 11A | B11193-062117-SSV-6-59 | TO-15 | 1.6 "Hg | 14.9 psi |
| 12A | B11193-062117-SSV-7-65 | TO-15 | 2.6 "Hg | 15 psi |
| 13A | B11193-062117-SSV-8-65 | TO-15 | 2.8 "Hg | 15 psi |
| 14A | B11193-062217-SVP1SS | TO-15 | 2.8 "Hg | 14.6 psi |
| 15A | B11193-062217-SVP3SS | TO-15 | 3.7 "Hg | 15 psi |
| 16A | B11193-062217-SSPE3 | TO-15 | 0.4 "Hg | 14.9 psi |
| 17A | B11193-062217-SVP4SS | TO-15 | 6.5 "Hg | 14.9 psi |
| 18A | B11193-062217-SSPN2 | TO-15 | 9.0 "Hg | 15 psi |
| 19A | B11193-062217-SVP2SS | TO-15 | 3.0 "Hg | 15 psi |
| 23A | B11193-062117-SSV-9-58 | TO-15 | 3.0 "Hg | 15 psi |
| 24A | Lab Blank | TO-15 | NA | NA |
| 24B | Lab Blank | TO-15 | NA | NA |
| 25A | CCV | TO-15 | NA | NA |
| 25B | CCV | TO-15 | NA | NA |
| 26A | LCS | TO-15 | NA | NA |
| 26AA | LCSD | TO-15 | NA | NA |
| 26B | LCS | TO-15 | NA | NA |

Continued on next page

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# WORK ORDER #: 1706492B

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. William Wertz<br>GeoSyntec Consultants<br>26 Century Hill Drive<br>Suite 205<br>Latham, NY 12110 | **BILL TO:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Stone Road West<br>Guelph, Ontario N1G3Z2 |
| **PHONE:** | 518-779-3582 | **P.O. #** | |
| **FAX:** | | **PROJECT #** | TR0479 VDB 11193 |
| **DATE RECEIVED:** | 06/26/2017 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 07/10/2017 | | |

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. | FINAL PRESSURE |
|---|---|---|---|---|
| 26BB | LCSD | TO-15 | NA | NA |

CERTIFIED BY: Heidi Hayes DATE: 07/10/17

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

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**LABORATORY NARRATIVE**
**EPA Method TO-15**
**GeoSyntec Consultants**
**Workorder# 1706492B**

Sixteen 1 Liter Summa Canister samples were received on June 26, 2017. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

**Receiving Notes**

The Chain of Custody (COC) was not relinquished properly. A signature, date, and time were not provided by the field sampler.

The Chain of Custody (COC) information for sample B11193-062017-SSV-4-22-DUP did not match the entry on the sample tag with regard to sample identification. The information on the sample tag was used to process and report the sample.

Sample B11193-062117-SSV-8-65 was included twice on the Chain of Custody (COC). The sample information listed on the second page of the COC only was used to process and report the sample. The sample listing on the third page was not included in the workorder.

**Analytical Notes**

Dilution was performed on samples B11193-061917-SSV-2-22, B11193-062017-SSV-3-22, B11193-062017-SSV-4-22, B11193-062017-SSV-4-22-DUP, B11193-062017-SSV-5-59, B11193-062017-SSV-1-44, B11193-062117-SSV-6-59, B11193-062117-SSV-7-65, B11193-062117-SSV-8-65, B11193-062217-SVP1SS, B11193-062217-SVP3SS, B11193-062217-SSPE3, B11193-062217-SVP4SS, B11193-062217-SVP2SS and B11193-062117-SSV-9-58 due to the presence of high level target species.

**Definition of Data Qualifying Flags**

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates

as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS FULL SCAN

**Client Sample ID: B11193-061917-SSV-2-22**

**Lab ID#: 1706492B-05A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 14 | 75 | 55 | 300 |
| Trichloroethene | 14 | 73 | 74 | 390 |
| Tetrachloroethene | 14 | 3600 | 94 | 25000 |

**Client Sample ID: B11193-062017-SSV-3-22**

**Lab ID#: 1706492B-06A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 14 | 61 | 54 | 240 |
| Trichloroethene | 14 | 56 | 74 | 300 |
| Tetrachloroethene | 14 | 3300 | 93 | 22000 |

**Client Sample ID: B11193-062017-SSV-4-22**

**Lab ID#: 1706492B-07A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 21 | 60 | 83 | 240 |
| Trichloroethene | 21 | 58 | 110 | 310 |
| Tetrachloroethene | 21 | 4000 | 140 | 27000 |

**Client Sample ID: B11193-062017-SSV-4-22-DUP**

**Lab ID#: 1706492B-08A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 21 | 56 | 82 | 220 |
| Trichloroethene | 21 | 58 | 110 | 310 |
| Tetrachloroethene | 21 | 3900 | 140 | 27000 |

**Client Sample ID: B11193-062017-SSV-5-59**

**Lab ID#: 1706492B-09A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS FULL SCAN

**Client Sample ID: B11193-062017-SSV-5-59**

**Lab ID#: 1706492B-09A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 14 | 67 | 54 | 270 |
| Trichloroethene | 14 | 58 | 73 | 310 |
| Tetrachloroethene | 14 | 4100 | 92 | 28000 |

**Client Sample ID: B11193-062017-SSV-1-44**

**Lab ID#: 1706492B-10A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 15 | 74 | 58 | 290 |
| Trichloroethene | 15 | 76 | 78 | 410 |
| Tetrachloroethene | 15 | 3900 | 99 | 26000 |

**Client Sample ID: B11193-062117-SSV-6-59**

**Lab ID#: 1706492B-11A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 14 | 44 | 56 | 170 |
| Trichloroethene | 14 | 41 | 76 | 220 |
| Tetrachloroethene | 14 | 3200 | 96 | 21000 |

**Client Sample ID: B11193-062117-SSV-7-65**

**Lab ID#: 1706492B-12A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 15 | 47 | 58 | 180 |
| Trichloroethene | 15 | 39 | 79 | 210 |
| Tetrachloroethene | 15 | 3100 | 100 | 21000 |

**Client Sample ID: B11193-062117-SSV-8-65**

**Lab ID#: 1706492B-13A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS FULL SCAN

**Client Sample ID: B11193-062117-SSV-8-65**

**Lab ID#: 1706492B-13A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 11 | 44 | 44 | 170 |
| Trichloroethene | 11 | 39 | 60 | 210 |
| Tetrachloroethene | 11 | 2900 | 76 | 20000 |

**Client Sample ID: B11193-062217-SVP1SS**

**Lab ID#: 1706492B-14A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 2.2 | 3.0 | 8.7 | 12 |
| Trichloroethene | 2.2 | 15 | 12 | 82 |
| Tetrachloroethene | 2.2 | 620 | 15 | 4200 |

**Client Sample ID: B11193-062217-SVP3SS**

**Lab ID#: 1706492B-15A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 29 | 290 | 110 | 1200 |
| cis-1,2-Dichloroethene | 29 | 4700 | 110 | 19000 |
| Trichloroethene | 29 | 660 | 150 | 3600 |
| Tetrachloroethene | 29 | 29000 | 200 | 190000 |

**Client Sample ID: B11193-062217-SSPE3**

**Lab ID#: 1706492B-16A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| trans-1,2-Dichloroethene | 13 | 59 | 50 | 240 |
| cis-1,2-Dichloroethene | 13 | 850 | 50 | 3400 |
| Trichloroethene | 13 | 420 | 68 | 2200 |
| Tetrachloroethene | 13 | 15000 | 86 | 100000 |

**Client Sample ID: B11193-062217-SVP4SS**

**Lab ID#: 1706492B-17A**

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS

**Client Sample ID: B11193-062217-SVP4SS**

**Lab ID#: 1706492B-17A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 64 | 650 | 250 | 2600 |
| Trichloroethene | 64 | 410 | 340 | 2200 |
| 1,1,2-Trichloroethane | 64 | 390 | 350 | 2100 |
| Tetrachloroethene | 64 | 50000 | 430 | 340000 |

**Client Sample ID: B11193-062217-SSPN2**

**Lab ID#: 1706492B-18A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 1.4 | 6.6 | 5.7 | 26 |
| Trichloroethene | 1.4 | 5.0 | 7.8 | 27 |
| Tetrachloroethene | 1.4 | 87 | 9.8 | 590 |

**Client Sample ID: B11193-062217-SVP2SS**

**Lab ID#: 1706492B-19A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Tetrachloroethene | 9.0 | 1800 | 61 | 12000 |

**Client Sample ID: B11193-062117-SSV-9-58**

**Lab ID#: 1706492B-23A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 11 | 40 | 44 | 160 |
| Trichloroethene | 11 | 33 | 60 | 180 |
| Tetrachloroethene | 11 | 2400 | 76 | 16000 |

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**Client Sample ID: B11193-061917-SSV-2-22**

**Lab ID#: 1706492B-05A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062810** | **Date of Collection: 6/19/17 5:48:00 PM** | |
| **Dil. Factor:** | **27.6** | **Date of Analysis: 6/28/17 04:42 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 14 | Not Detected | 68 | Not Detected |
| Freon 114 | 14 | Not Detected | 96 | Not Detected |
| Chloromethane | 140 | Not Detected | 280 | Not Detected |
| Vinyl Chloride | 14 | Not Detected | 35 | Not Detected |
| 1,3-Butadiene | 14 | Not Detected | 30 | Not Detected |
| Bromomethane | 140 | Not Detected | 540 | Not Detected |
| Chloroethane | 55 | Not Detected | 140 | Not Detected |
| Freon 11 | 14 | Not Detected | 78 | Not Detected |
| Ethanol | 55 | Not Detected | 100 | Not Detected |
| Freon 113 | 14 | Not Detected | 100 | Not Detected |
| 1,1-Dichloroethene | 14 | Not Detected | 55 | Not Detected |
| Acetone | 140 | Not Detected | 330 | Not Detected |
| 2-Propanol | 55 | Not Detected | 140 | Not Detected |
| Carbon Disulfide | 55 | Not Detected | 170 | Not Detected |
| 3-Chloropropene | 55 | Not Detected | 170 | Not Detected |
| Methylene Chloride | 140 | Not Detected | 480 | Not Detected |
| Methyl tert-butyl ether | 55 | Not Detected | 200 | Not Detected |
| trans-1,2-Dichloroethene | 14 | Not Detected | 55 | Not Detected |
| Hexane | 14 | Not Detected | 49 | Not Detected |
| 1,1-Dichloroethane | 14 | Not Detected | 56 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 55 | Not Detected | 160 | Not Detected |
| cis-1,2-Dichloroethene | 14 | 75 | 55 | 300 |
| Tetrahydrofuran | 14 | Not Detected | 41 | Not Detected |
| Chloroform | 14 | Not Detected | 67 | Not Detected |
| 1,1,1-Trichloroethane | 14 | Not Detected | 75 | Not Detected |
| Cyclohexane | 14 | Not Detected | 48 | Not Detected |
| Carbon Tetrachloride | 14 | Not Detected | 87 | Not Detected |
| 2,2,4-Trimethylpentane | 14 | Not Detected | 64 | Not Detected |
| Benzene | 14 | Not Detected | 44 | Not Detected |
| 1,2-Dichloroethane | 14 | Not Detected | 56 | Not Detected |
| Heptane | 14 | Not Detected | 56 | Not Detected |
| Trichloroethene | 14 | 73 | 74 | 390 |
| 1,2-Dichloropropane | 14 | Not Detected | 64 | Not Detected |
| 1,4-Dioxane | 55 | Not Detected | 200 | Not Detected |
| Bromodichloromethane | 14 | Not Detected | 92 | Not Detected |
| cis-1,3-Dichloropropene | 14 | Not Detected | 63 | Not Detected |
| 4-Methyl-2-pentanone | 14 | Not Detected | 56 | Not Detected |
| Toluene | 14 | Not Detected | 52 | Not Detected |
| trans-1,3-Dichloropropene | 14 | Not Detected | 63 | Not Detected |
| 1,1,2-Trichloroethane | 14 | Not Detected | 75 | Not Detected |
| Tetrachloroethene | 14 | 3600 | 94 | 25000 |
| 2-Hexanone | 55 | Not Detected | 230 | Not Detected |

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**Client Sample ID: B11193-061917-SSV-2-22**

**Lab ID#: 1706492B-05A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062810** | **Date of Collection:** | **6/19/17 5:48:00 PM** |
| **Dil. Factor:** | **27.6** | **Date of Analysis:** | **6/28/17 04:42 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 14 | Not Detected | 120 | Not Detected |
| 1,2-Dibromoethane (EDB) | 14 | Not Detected | 110 | Not Detected |
| Chlorobenzene | 14 | Not Detected | 64 | Not Detected |
| Ethyl Benzene | 14 | Not Detected | 60 | Not Detected |
| m,p-Xylene | 14 | Not Detected | 60 | Not Detected |
| o-Xylene | 14 | Not Detected | 60 | Not Detected |
| Styrene | 14 | Not Detected | 59 | Not Detected |
| Bromoform | 14 | Not Detected | 140 | Not Detected |
| Cumene | 14 | Not Detected | 68 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 14 | Not Detected | 95 | Not Detected |
| Propylbenzene | 14 | Not Detected | 68 | Not Detected |
| 4-Ethyltoluene | 14 | Not Detected | 68 | Not Detected |
| 1,3,5-Trimethylbenzene | 14 | Not Detected | 68 | Not Detected |
| 1,2,4-Trimethylbenzene | 14 | Not Detected | 68 | Not Detected |
| 1,3-Dichlorobenzene | 14 | Not Detected | 83 | Not Detected |
| 1,4-Dichlorobenzene | 14 | Not Detected | 83 | Not Detected |
| alpha-Chlorotoluene | 14 | Not Detected | 71 | Not Detected |
| 1,2-Dichlorobenzene | 14 | Not Detected | 83 | Not Detected |
| 1,2,4-Trichlorobenzene | 55 | Not Detected | 410 | Not Detected |
| Hexachlorobutadiene | 55 | Not Detected | 590 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 97 | 70-130 |
| 1,2-Dichloroethane-d4 | 91 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

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**Client Sample ID: B11193-062017-SSV-3-22**

**Lab ID#: 1706492B-06A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062811** | **Date of Collection:** | **6/20/17 8:52:00 AM** |
| **Dil. Factor:** | **27.5** | **Date of Analysis:** | **6/28/17 05:06 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 14 | Not Detected | 68 | Not Detected |
| Freon 114 | 14 | Not Detected | 96 | Not Detected |
| Chloromethane | 140 | Not Detected | 280 | Not Detected |
| Vinyl Chloride | 14 | Not Detected | 35 | Not Detected |
| 1,3-Butadiene | 14 | Not Detected | 30 | Not Detected |
| Bromomethane | 140 | Not Detected | 530 | Not Detected |
| Chloroethane | 55 | Not Detected | 140 | Not Detected |
| Freon 11 | 14 | Not Detected | 77 | Not Detected |
| Ethanol | 55 | Not Detected | 100 | Not Detected |
| Freon 113 | 14 | Not Detected | 100 | Not Detected |
| 1,1-Dichloroethene | 14 | Not Detected | 54 | Not Detected |
| Acetone | 140 | Not Detected | 330 | Not Detected |
| 2-Propanol | 55 | Not Detected | 140 | Not Detected |
| Carbon Disulfide | 55 | Not Detected | 170 | Not Detected |
| 3-Chloropropene | 55 | Not Detected | 170 | Not Detected |
| Methylene Chloride | 140 | Not Detected | 480 | Not Detected |
| Methyl tert-butyl ether | 55 | Not Detected | 200 | Not Detected |
| trans-1,2-Dichloroethene | 14 | Not Detected | 54 | Not Detected |
| Hexane | 14 | Not Detected | 48 | Not Detected |
| 1,1-Dichloroethane | 14 | Not Detected | 56 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 55 | Not Detected | 160 | Not Detected |
| cis-1,2-Dichloroethene | 14 | 61 | 54 | 240 |
| Tetrahydrofuran | 14 | Not Detected | 40 | Not Detected |
| Chloroform | 14 | Not Detected | 67 | Not Detected |
| 1,1,1-Trichloroethane | 14 | Not Detected | 75 | Not Detected |
| Cyclohexane | 14 | Not Detected | 47 | Not Detected |
| Carbon Tetrachloride | 14 | Not Detected | 86 | Not Detected |
| 2,2,4-Trimethylpentane | 14 | Not Detected | 64 | Not Detected |
| Benzene | 14 | Not Detected | 44 | Not Detected |
| 1,2-Dichloroethane | 14 | Not Detected | 56 | Not Detected |
| Heptane | 14 | Not Detected | 56 | Not Detected |
| Trichloroethene | 14 | 56 | 74 | 300 |
| 1,2-Dichloropropane | 14 | Not Detected | 64 | Not Detected |
| 1,4-Dioxane | 55 | Not Detected | 200 | Not Detected |
| Bromodichloromethane | 14 | Not Detected | 92 | Not Detected |
| cis-1,3-Dichloropropene | 14 | Not Detected | 62 | Not Detected |
| 4-Methyl-2-pentanone | 14 | Not Detected | 56 | Not Detected |
| Toluene | 14 | Not Detected | 52 | Not Detected |
| trans-1,3-Dichloropropene | 14 | Not Detected | 62 | Not Detected |
| 1,1,2-Trichloroethane | 14 | Not Detected | 75 | Not Detected |
| Tetrachloroethene | 14 | 3300 | 93 | 22000 |
| 2-Hexanone | 55 | Not Detected | 220 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-3-22**

**Lab ID#: 1706492B-06A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062811** | **Date of Collection:** | **6/20/17 8:52:00 AM** |
| **Dil. Factor:** | **27.5** | **Date of Analysis:** | **6/28/17 05:06 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 14 | Not Detected | 120 | Not Detected |
| 1,2-Dibromoethane (EDB) | 14 | Not Detected | 100 | Not Detected |
| Chlorobenzene | 14 | Not Detected | 63 | Not Detected |
| Ethyl Benzene | 14 | Not Detected | 60 | Not Detected |
| m,p-Xylene | 14 | Not Detected | 60 | Not Detected |
| o-Xylene | 14 | Not Detected | 60 | Not Detected |
| Styrene | 14 | Not Detected | 58 | Not Detected |
| Bromoform | 14 | Not Detected | 140 | Not Detected |
| Cumene | 14 | Not Detected | 68 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 14 | Not Detected | 94 | Not Detected |
| Propylbenzene | 14 | Not Detected | 68 | Not Detected |
| 4-Ethyltoluene | 14 | Not Detected | 68 | Not Detected |
| 1,3,5-Trimethylbenzene | 14 | Not Detected | 68 | Not Detected |
| 1,2,4-Trimethylbenzene | 14 | Not Detected | 68 | Not Detected |
| 1,3-Dichlorobenzene | 14 | Not Detected | 83 | Not Detected |
| 1,4-Dichlorobenzene | 14 | Not Detected | 83 | Not Detected |
| alpha-Chlorotoluene | 14 | Not Detected | 71 | Not Detected |
| 1,2-Dichlorobenzene | 14 | Not Detected | 83 | Not Detected |
| 1,2,4-Trichlorobenzene | 55 | Not Detected | 410 | Not Detected |
| Hexachlorobutadiene | 55 | Not Detected | 590 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 91 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-4-22**

**Lab ID#: 1706492B-07A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062814** | **Date of Collection:** | **6/20/17 2:48:00 PM** |
| **Dil. Factor:** | **41.7** | **Date of Analysis:** | **6/28/17 06:17 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 21 | Not Detected | 100 | Not Detected |
| Freon 114 | 21 | Not Detected | 140 | Not Detected |
| Chloromethane | 210 | Not Detected | 430 | Not Detected |
| Vinyl Chloride | 21 | Not Detected | 53 | Not Detected |
| 1,3-Butadiene | 21 | Not Detected | 46 | Not Detected |
| Bromomethane | 210 | Not Detected | 810 | Not Detected |
| Chloroethane | 83 | Not Detected | 220 | Not Detected |
| Freon 11 | 21 | Not Detected | 120 | Not Detected |
| Ethanol | 83 | Not Detected | 160 | Not Detected |
| Freon 113 | 21 | Not Detected | 160 | Not Detected |
| 1,1-Dichloroethene | 21 | Not Detected | 83 | Not Detected |
| Acetone | 210 | Not Detected | 500 | Not Detected |
| 2-Propanol | 83 | Not Detected | 200 | Not Detected |
| Carbon Disulfide | 83 | Not Detected | 260 | Not Detected |
| 3-Chloropropene | 83 | Not Detected | 260 | Not Detected |
| Methylene Chloride | 210 | Not Detected | 720 | Not Detected |
| Methyl tert-butyl ether | 83 | Not Detected | 300 | Not Detected |
| trans-1,2-Dichloroethene | 21 | Not Detected | 83 | Not Detected |
| Hexane | 21 | Not Detected | 73 | Not Detected |
| 1,1-Dichloroethane | 21 | Not Detected | 84 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 83 | Not Detected | 240 | Not Detected |
| cis-1,2-Dichloroethene | 21 | 60 | 83 | 240 |
| Tetrahydrofuran | 21 | Not Detected | 61 | Not Detected |
| Chloroform | 21 | Not Detected | 100 | Not Detected |
| 1,1,1-Trichloroethane | 21 | Not Detected | 110 | Not Detected |
| Cyclohexane | 21 | Not Detected | 72 | Not Detected |
| Carbon Tetrachloride | 21 | Not Detected | 130 | Not Detected |
| 2,2,4-Trimethylpentane | 21 | Not Detected | 97 | Not Detected |
| Benzene | 21 | Not Detected | 67 | Not Detected |
| 1,2-Dichloroethane | 21 | Not Detected | 84 | Not Detected |
| Heptane | 21 | Not Detected | 85 | Not Detected |
| Trichloroethene | 21 | 58 | 110 | 310 |
| 1,2-Dichloropropane | 21 | Not Detected | 96 | Not Detected |
| 1,4-Dioxane | 83 | Not Detected | 300 | Not Detected |
| Bromodichloromethane | 21 | Not Detected | 140 | Not Detected |
| cis-1,3-Dichloropropene | 21 | Not Detected | 95 | Not Detected |
| 4-Methyl-2-pentanone | 21 | Not Detected | 85 | Not Detected |
| Toluene | 21 | Not Detected | 78 | Not Detected |
| trans-1,3-Dichloropropene | 21 | Not Detected | 95 | Not Detected |
| 1,1,2-Trichloroethane | 21 | Not Detected | 110 | Not Detected |
| Tetrachloroethene | 21 | 4000 | 140 | 27000 |
| 2-Hexanone | 83 | Not Detected | 340 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-4-22**

**Lab ID#: 1706492B-07A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062814** | **Date of Collection:** | **6/20/17 2:48:00 PM** |
| **Dil. Factor:** | **41.7** | **Date of Analysis:** | **6/28/17 06:17 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 21 | Not Detected | 180 | Not Detected |
| 1,2-Dibromoethane (EDB) | 21 | Not Detected | 160 | Not Detected |
| Chlorobenzene | 21 | Not Detected | 96 | Not Detected |
| Ethyl Benzene | 21 | Not Detected | 90 | Not Detected |
| m,p-Xylene | 21 | Not Detected | 90 | Not Detected |
| o-Xylene | 21 | Not Detected | 90 | Not Detected |
| Styrene | 21 | Not Detected | 89 | Not Detected |
| Bromoform | 21 | Not Detected | 220 | Not Detected |
| Cumene | 21 | Not Detected | 100 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 21 | Not Detected | 140 | Not Detected |
| Propylbenzene | 21 | Not Detected | 100 | Not Detected |
| 4-Ethyltoluene | 21 | Not Detected | 100 | Not Detected |
| 1,3,5-Trimethylbenzene | 21 | Not Detected | 100 | Not Detected |
| 1,2,4-Trimethylbenzene | 21 | Not Detected | 100 | Not Detected |
| 1,3-Dichlorobenzene | 21 | Not Detected | 120 | Not Detected |
| 1,4-Dichlorobenzene | 21 | Not Detected | 120 | Not Detected |
| alpha-Chlorotoluene | 21 | Not Detected | 110 | Not Detected |
| 1,2-Dichlorobenzene | 21 | Not Detected | 120 | Not Detected |
| 1,2,4-Trichlorobenzene | 83 | Not Detected | 620 | Not Detected |
| Hexachlorobutadiene | 83 | Not Detected | 890 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 1,2-Dichloroethane-d4 | 91 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-4-22-DUP**

**Lab ID#: 1706492B-08A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062815** | **Date of Collection:** | **6/20/17 2:48:00 PM** |
| **Dil. Factor:** | **41.5** | **Date of Analysis:** | **6/28/17 06:40 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 21 | Not Detected | 100 | Not Detected |
| Freon 114 | 21 | Not Detected | 140 | Not Detected |
| Chloromethane | 210 | Not Detected | 430 | Not Detected |
| Vinyl Chloride | 21 | Not Detected | 53 | Not Detected |
| 1,3-Butadiene | 21 | Not Detected | 46 | Not Detected |
| Bromomethane | 210 | Not Detected | 800 | Not Detected |
| Chloroethane | 83 | Not Detected | 220 | Not Detected |
| Freon 11 | 21 | Not Detected | 120 | Not Detected |
| Ethanol | 83 | Not Detected | 160 | Not Detected |
| Freon 113 | 21 | Not Detected | 160 | Not Detected |
| 1,1-Dichloroethene | 21 | Not Detected | 82 | Not Detected |
| Acetone | 210 | Not Detected | 490 | Not Detected |
| 2-Propanol | 83 | Not Detected | 200 | Not Detected |
| Carbon Disulfide | 83 | Not Detected | 260 | Not Detected |
| 3-Chloropropene | 83 | Not Detected | 260 | Not Detected |
| Methylene Chloride | 210 | Not Detected | 720 | Not Detected |
| Methyl tert-butyl ether | 83 | Not Detected | 300 | Not Detected |
| trans-1,2-Dichloroethene | 21 | Not Detected | 82 | Not Detected |
| Hexane | 21 | Not Detected | 73 | Not Detected |
| 1,1-Dichloroethane | 21 | Not Detected | 84 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 83 | Not Detected | 240 | Not Detected |
| cis-1,2-Dichloroethene | 21 | 56 | 82 | 220 |
| Tetrahydrofuran | 21 | Not Detected | 61 | Not Detected |
| Chloroform | 21 | Not Detected | 100 | Not Detected |
| 1,1,1-Trichloroethane | 21 | Not Detected | 110 | Not Detected |
| Cyclohexane | 21 | Not Detected | 71 | Not Detected |
| Carbon Tetrachloride | 21 | Not Detected | 130 | Not Detected |
| 2,2,4-Trimethylpentane | 21 | Not Detected | 97 | Not Detected |
| Benzene | 21 | Not Detected | 66 | Not Detected |
| 1,2-Dichloroethane | 21 | Not Detected | 84 | Not Detected |
| Heptane | 21 | Not Detected | 85 | Not Detected |
| Trichloroethene | 21 | 58 | 110 | 310 |
| 1,2-Dichloropropane | 21 | Not Detected | 96 | Not Detected |
| 1,4-Dioxane | 83 | Not Detected | 300 | Not Detected |
| Bromodichloromethane | 21 | Not Detected | 140 | Not Detected |
| cis-1,3-Dichloropropene | 21 | Not Detected | 94 | Not Detected |
| 4-Methyl-2-pentanone | 21 | Not Detected | 85 | Not Detected |
| Toluene | 21 | Not Detected | 78 | Not Detected |
| trans-1,3-Dichloropropene | 21 | Not Detected | 94 | Not Detected |
| 1,1,2-Trichloroethane | 21 | Not Detected | 110 | Not Detected |
| Tetrachloroethene | 21 | 3900 | 140 | 27000 |
| 2-Hexanone | 83 | Not Detected | 340 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-4-22-DUP**

**Lab ID#: 1706492B-08A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062815** | **Date of Collection: 6/20/17 2:48:00 PM** | |
| **Dil. Factor:** | **41.5** | **Date of Analysis: 6/28/17 06:40 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 21 | Not Detected | 180 | Not Detected |
| 1,2-Dibromoethane (EDB) | 21 | Not Detected | 160 | Not Detected |
| Chlorobenzene | 21 | Not Detected | 96 | Not Detected |
| Ethyl Benzene | 21 | Not Detected | 90 | Not Detected |
| m,p-Xylene | 21 | Not Detected | 90 | Not Detected |
| o-Xylene | 21 | Not Detected | 90 | Not Detected |
| Styrene | 21 | Not Detected | 88 | Not Detected |
| Bromoform | 21 | Not Detected | 210 | Not Detected |
| Cumene | 21 | Not Detected | 100 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 21 | Not Detected | 140 | Not Detected |
| Propylbenzene | 21 | Not Detected | 100 | Not Detected |
| 4-Ethyltoluene | 21 | Not Detected | 100 | Not Detected |
| 1,3,5-Trimethylbenzene | 21 | Not Detected | 100 | Not Detected |
| 1,2,4-Trimethylbenzene | 21 | Not Detected | 100 | Not Detected |
| 1,3-Dichlorobenzene | 21 | Not Detected | 120 | Not Detected |
| 1,4-Dichlorobenzene | 21 | Not Detected | 120 | Not Detected |
| alpha-Chlorotoluene | 21 | Not Detected | 110 | Not Detected |
| 1,2-Dichlorobenzene | 21 | Not Detected | 120 | Not Detected |
| 1,2,4-Trichlorobenzene | 83 | Not Detected | 620 | Not Detected |
| Hexachlorobutadiene | 83 | Not Detected | 880 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 92 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-5-59**

**Lab ID#: 1706492B-09A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062812** | **Date of Collection:** | **6/20/17 4:02:00 PM** |
| **Dil. Factor:** | **27.2** | **Date of Analysis:** | **6/28/17 05:30 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 14 | Not Detected | 67 | Not Detected |
| Freon 114 | 14 | Not Detected | 95 | Not Detected |
| Chloromethane | 140 | Not Detected | 280 | Not Detected |
| Vinyl Chloride | 14 | Not Detected | 35 | Not Detected |
| 1,3-Butadiene | 14 | Not Detected | 30 | Not Detected |
| Bromomethane | 140 | Not Detected | 530 | Not Detected |
| Chloroethane | 54 | Not Detected | 140 | Not Detected |
| Freon 11 | 14 | Not Detected | 76 | Not Detected |
| Ethanol | 54 | Not Detected | 100 | Not Detected |
| Freon 113 | 14 | Not Detected | 100 | Not Detected |
| 1,1-Dichloroethene | 14 | Not Detected | 54 | Not Detected |
| Acetone | 140 | Not Detected | 320 | Not Detected |
| 2-Propanol | 54 | Not Detected | 130 | Not Detected |
| Carbon Disulfide | 54 | Not Detected | 170 | Not Detected |
| 3-Chloropropene | 54 | Not Detected | 170 | Not Detected |
| Methylene Chloride | 140 | Not Detected | 470 | Not Detected |
| Methyl tert-butyl ether | 54 | Not Detected | 200 | Not Detected |
| trans-1,2-Dichloroethene | 14 | Not Detected | 54 | Not Detected |
| Hexane | 14 | Not Detected | 48 | Not Detected |
| 1,1-Dichloroethane | 14 | Not Detected | 55 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 54 | Not Detected | 160 | Not Detected |
| cis-1,2-Dichloroethene | 14 | 67 | 54 | 270 |
| Tetrahydrofuran | 14 | Not Detected | 40 | Not Detected |
| Chloroform | 14 | Not Detected | 66 | Not Detected |
| 1,1,1-Trichloroethane | 14 | Not Detected | 74 | Not Detected |
| Cyclohexane | 14 | Not Detected | 47 | Not Detected |
| Carbon Tetrachloride | 14 | Not Detected | 86 | Not Detected |
| 2,2,4-Trimethylpentane | 14 | Not Detected | 64 | Not Detected |
| Benzene | 14 | Not Detected | 43 | Not Detected |
| 1,2-Dichloroethane | 14 | Not Detected | 55 | Not Detected |
| Heptane | 14 | Not Detected | 56 | Not Detected |
| Trichloroethene | 14 | 58 | 73 | 310 |
| 1,2-Dichloropropane | 14 | Not Detected | 63 | Not Detected |
| 1,4-Dioxane | 54 | Not Detected | 200 | Not Detected |
| Bromodichloromethane | 14 | Not Detected | 91 | Not Detected |
| cis-1,3-Dichloropropene | 14 | Not Detected | 62 | Not Detected |
| 4-Methyl-2-pentanone | 14 | Not Detected | 56 | Not Detected |
| Toluene | 14 | Not Detected | 51 | Not Detected |
| trans-1,3-Dichloropropene | 14 | Not Detected | 62 | Not Detected |
| 1,1,2-Trichloroethane | 14 | Not Detected | 74 | Not Detected |
| Tetrachloroethene | 14 | 4100 | 92 | 28000 |
| 2-Hexanone | 54 | Not Detected | 220 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-5-59**

**Lab ID#: 1706492B-09A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062812** | **Date of Collection:** | **6/20/17 4:02:00 PM** |
| **Dil. Factor:** | **27.2** | **Date of Analysis:** | **6/28/17 05:30 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 14 | Not Detected | 120 | Not Detected |
| 1,2-Dibromoethane (EDB) | 14 | Not Detected | 100 | Not Detected |
| Chlorobenzene | 14 | Not Detected | 63 | Not Detected |
| Ethyl Benzene | 14 | Not Detected | 59 | Not Detected |
| m,p-Xylene | 14 | Not Detected | 59 | Not Detected |
| o-Xylene | 14 | Not Detected | 59 | Not Detected |
| Styrene | 14 | Not Detected | 58 | Not Detected |
| Bromoform | 14 | Not Detected | 140 | Not Detected |
| Cumene | 14 | Not Detected | 67 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 14 | Not Detected | 93 | Not Detected |
| Propylbenzene | 14 | Not Detected | 67 | Not Detected |
| 4-Ethyltoluene | 14 | Not Detected | 67 | Not Detected |
| 1,3,5-Trimethylbenzene | 14 | Not Detected | 67 | Not Detected |
| 1,2,4-Trimethylbenzene | 14 | Not Detected | 67 | Not Detected |
| 1,3-Dichlorobenzene | 14 | Not Detected | 82 | Not Detected |
| 1,4-Dichlorobenzene | 14 | Not Detected | 82 | Not Detected |
| alpha-Chlorotoluene | 14 | Not Detected | 70 | Not Detected |
| 1,2-Dichlorobenzene | 14 | Not Detected | 82 | Not Detected |
| 1,2,4-Trichlorobenzene | 54 | Not Detected | 400 | Not Detected |
| Hexachlorobutadiene | 54 | Not Detected | 580 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 1,2-Dichloroethane-d4 | 93 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-1-44**

**Lab ID#: 1706492B-10A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062813** | **Date of Collection:** | **6/19/17 2:50:00 PM** |
| **Dil. Factor:** | **29.2** | **Date of Analysis:** | **6/28/17 05:54 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 15 | Not Detected | 72 | Not Detected |
| Freon 114 | 15 | Not Detected | 100 | Not Detected |
| Chloromethane | 150 | Not Detected | 300 | Not Detected |
| Vinyl Chloride | 15 | Not Detected | 37 | Not Detected |
| 1,3-Butadiene | 15 | Not Detected | 32 | Not Detected |
| Bromomethane | 150 | Not Detected | 570 | Not Detected |
| Chloroethane | 58 | Not Detected | 150 | Not Detected |
| Freon 11 | 15 | Not Detected | 82 | Not Detected |
| Ethanol | 58 | Not Detected | 110 | Not Detected |
| Freon 113 | 15 | Not Detected | 110 | Not Detected |
| 1,1-Dichloroethene | 15 | Not Detected | 58 | Not Detected |
| Acetone | 150 | Not Detected | 350 | Not Detected |
| 2-Propanol | 58 | Not Detected | 140 | Not Detected |
| Carbon Disulfide | 58 | Not Detected | 180 | Not Detected |
| 3-Chloropropene | 58 | Not Detected | 180 | Not Detected |
| Methylene Chloride | 150 | Not Detected | 510 | Not Detected |
| Methyl tert-butyl ether | 58 | Not Detected | 210 | Not Detected |
| trans-1,2-Dichloroethene | 15 | Not Detected | 58 | Not Detected |
| Hexane | 15 | Not Detected | 51 | Not Detected |
| 1,1-Dichloroethane | 15 | Not Detected | 59 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 58 | Not Detected | 170 | Not Detected |
| cis-1,2-Dichloroethene | 15 | 74 | 58 | 290 |
| Tetrahydrofuran | 15 | Not Detected | 43 | Not Detected |
| Chloroform | 15 | Not Detected | 71 | Not Detected |
| 1,1,1-Trichloroethane | 15 | Not Detected | 80 | Not Detected |
| Cyclohexane | 15 | Not Detected | 50 | Not Detected |
| Carbon Tetrachloride | 15 | Not Detected | 92 | Not Detected |
| 2,2,4-Trimethylpentane | 15 | Not Detected | 68 | Not Detected |
| Benzene | 15 | Not Detected | 47 | Not Detected |
| 1,2-Dichloroethane | 15 | Not Detected | 59 | Not Detected |
| Heptane | 15 | Not Detected | 60 | Not Detected |
| Trichloroethene | 15 | 76 | 78 | 410 |
| 1,2-Dichloropropane | 15 | Not Detected | 67 | Not Detected |
| 1,4-Dioxane | 58 | Not Detected | 210 | Not Detected |
| Bromodichloromethane | 15 | Not Detected | 98 | Not Detected |
| cis-1,3-Dichloropropene | 15 | Not Detected | 66 | Not Detected |
| 4-Methyl-2-pentanone | 15 | Not Detected | 60 | Not Detected |
| Toluene | 15 | Not Detected | 55 | Not Detected |
| trans-1,3-Dichloropropene | 15 | Not Detected | 66 | Not Detected |
| 1,1,2-Trichloroethane | 15 | Not Detected | 80 | Not Detected |
| Tetrachloroethene | 15 | 3900 | 99 | 26000 |
| 2-Hexanone | 58 | Not Detected | 240 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062017-SSV-1-44**

**Lab ID#: 1706492B-10A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062813** | **Date of Collection:** | **6/19/17 2:50:00 PM** |
| **Dil. Factor:** | **29.2** | **Date of Analysis:** | **6/28/17 05:54 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 15 | Not Detected | 120 | Not Detected |
| 1,2-Dibromoethane (EDB) | 15 | Not Detected | 110 | Not Detected |
| Chlorobenzene | 15 | Not Detected | 67 | Not Detected |
| Ethyl Benzene | 15 | Not Detected | 63 | Not Detected |
| m,p-Xylene | 15 | Not Detected | 63 | Not Detected |
| o-Xylene | 15 | Not Detected | 63 | Not Detected |
| Styrene | 15 | Not Detected | 62 | Not Detected |
| Bromoform | 15 | Not Detected | 150 | Not Detected |
| Cumene | 15 | Not Detected | 72 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 15 | Not Detected | 100 | Not Detected |
| Propylbenzene | 15 | Not Detected | 72 | Not Detected |
| 4-Ethyltoluene | 15 | Not Detected | 72 | Not Detected |
| 1,3,5-Trimethylbenzene | 15 | Not Detected | 72 | Not Detected |
| 1,2,4-Trimethylbenzene | 15 | Not Detected | 72 | Not Detected |
| 1,3-Dichlorobenzene | 15 | Not Detected | 88 | Not Detected |
| 1,4-Dichlorobenzene | 15 | Not Detected | 88 | Not Detected |
| alpha-Chlorotoluene | 15 | Not Detected | 76 | Not Detected |
| 1,2-Dichlorobenzene | 15 | Not Detected | 88 | Not Detected |
| 1,2,4-Trichlorobenzene | 58 | Not Detected | 430 | Not Detected |
| Hexachlorobutadiene | 58 | Not Detected | 620 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 1,2-Dichloroethane-d4 | 89 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062117-SSV-6-59**

**Lab ID#: 1706492B-11A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062819** | **Date of Collection:** | **6/21/17 9:05:00 AM** |
| **Dil. Factor:** | **28.4** | **Date of Analysis:** | **6/28/17 09:55 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 14 | Not Detected | 70 | Not Detected |
| Freon 114 | 14 | Not Detected | 99 | Not Detected |
| Chloromethane | 140 | Not Detected | 290 | Not Detected |
| Vinyl Chloride | 14 | Not Detected | 36 | Not Detected |
| 1,3-Butadiene | 14 | Not Detected | 31 | Not Detected |
| Bromomethane | 140 | Not Detected | 550 | Not Detected |
| Chloroethane | 57 | Not Detected | 150 | Not Detected |
| Freon 11 | 14 | Not Detected | 80 | Not Detected |
| Ethanol | 57 | Not Detected | 110 | Not Detected |
| Freon 113 | 14 | Not Detected | 110 | Not Detected |
| 1,1-Dichloroethene | 14 | Not Detected | 56 | Not Detected |
| Acetone | 140 | Not Detected | 340 | Not Detected |
| 2-Propanol | 57 | Not Detected | 140 | Not Detected |
| Carbon Disulfide | 57 | Not Detected | 180 | Not Detected |
| 3-Chloropropene | 57 | Not Detected | 180 | Not Detected |
| Methylene Chloride | 140 | Not Detected | 490 | Not Detected |
| Methyl tert-butyl ether | 57 | Not Detected | 200 | Not Detected |
| trans-1,2-Dichloroethene | 14 | Not Detected | 56 | Not Detected |
| Hexane | 14 | Not Detected | 50 | Not Detected |
| 1,1-Dichloroethane | 14 | Not Detected | 57 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 57 | Not Detected | 170 | Not Detected |
| cis-1,2-Dichloroethene | 14 | 44 | 56 | 170 |
| Tetrahydrofuran | 14 | Not Detected | 42 | Not Detected |
| Chloroform | 14 | Not Detected | 69 | Not Detected |
| 1,1,1-Trichloroethane | 14 | Not Detected | 77 | Not Detected |
| Cyclohexane | 14 | Not Detected | 49 | Not Detected |
| Carbon Tetrachloride | 14 | Not Detected | 89 | Not Detected |
| 2,2,4-Trimethylpentane | 14 | Not Detected | 66 | Not Detected |
| Benzene | 14 | Not Detected | 45 | Not Detected |
| 1,2-Dichloroethane | 14 | Not Detected | 57 | Not Detected |
| Heptane | 14 | Not Detected | 58 | Not Detected |
| Trichloroethene | 14 | 41 | 76 | 220 |
| 1,2-Dichloropropane | 14 | Not Detected | 66 | Not Detected |
| 1,4-Dioxane | 57 | Not Detected | 200 | Not Detected |
| Bromodichloromethane | 14 | Not Detected | 95 | Not Detected |
| cis-1,3-Dichloropropene | 14 | Not Detected | 64 | Not Detected |
| 4-Methyl-2-pentanone | 14 | Not Detected | 58 | Not Detected |
| Toluene | 14 | Not Detected | 54 | Not Detected |
| trans-1,3-Dichloropropene | 14 | Not Detected | 64 | Not Detected |
| 1,1,2-Trichloroethane | 14 | Not Detected | 77 | Not Detected |
| Tetrachloroethene | 14 | 3200 | 96 | 21000 |
| 2-Hexanone | 57 | Not Detected | 230 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062117-SSV-6-59**

**Lab ID#: 1706492B-11A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062819** | **Date of Collection:** | **6/21/17 9:05:00 AM** |
| **Dil. Factor:** | **28.4** | **Date of Analysis:** | **6/28/17 09:55 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 14 | Not Detected | 120 | Not Detected |
| 1,2-Dibromoethane (EDB) | 14 | Not Detected | 110 | Not Detected |
| Chlorobenzene | 14 | Not Detected | 65 | Not Detected |
| Ethyl Benzene | 14 | Not Detected | 62 | Not Detected |
| m,p-Xylene | 14 | Not Detected | 62 | Not Detected |
| o-Xylene | 14 | Not Detected | 62 | Not Detected |
| Styrene | 14 | Not Detected | 60 | Not Detected |
| Bromoform | 14 | Not Detected | 150 | Not Detected |
| Cumene | 14 | Not Detected | 70 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 14 | Not Detected | 97 | Not Detected |
| Propylbenzene | 14 | Not Detected | 70 | Not Detected |
| 4-Ethyltoluene | 14 | Not Detected | 70 | Not Detected |
| 1,3,5-Trimethylbenzene | 14 | Not Detected | 70 | Not Detected |
| 1,2,4-Trimethylbenzene | 14 | Not Detected | 70 | Not Detected |
| 1,3-Dichlorobenzene | 14 | Not Detected | 85 | Not Detected |
| 1,4-Dichlorobenzene | 14 | Not Detected | 85 | Not Detected |
| alpha-Chlorotoluene | 14 | Not Detected | 74 | Not Detected |
| 1,2-Dichlorobenzene | 14 | Not Detected | 85 | Not Detected |
| 1,2,4-Trichlorobenzene | 57 | Not Detected | 420 | Not Detected |
| Hexachlorobutadiene | 57 | Not Detected | 600 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 100 | 70-130 |
| 1,2-Dichloroethane-d4 | 89 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062117-SSV-7-65**

**Lab ID#: 1706492B-12A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062820** | **Date of Collection:** | **6/21/17 12:10:00 PM** |
| **Dil. Factor:** | **29.5** | **Date of Analysis:** | **6/28/17 10:20 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 15 | Not Detected | 73 | Not Detected |
| Freon 114 | 15 | Not Detected | 100 | Not Detected |
| Chloromethane | 150 | Not Detected | 300 | Not Detected |
| Vinyl Chloride | 15 | Not Detected | 38 | Not Detected |
| 1,3-Butadiene | 15 | Not Detected | 33 | Not Detected |
| Bromomethane | 150 | Not Detected | 570 | Not Detected |
| Chloroethane | 59 | Not Detected | 160 | Not Detected |
| Freon 11 | 15 | Not Detected | 83 | Not Detected |
| Ethanol | 59 | Not Detected | 110 | Not Detected |
| Freon 113 | 15 | Not Detected | 110 | Not Detected |
| 1,1-Dichloroethene | 15 | Not Detected | 58 | Not Detected |
| Acetone | 150 | Not Detected | 350 | Not Detected |
| 2-Propanol | 59 | Not Detected | 140 | Not Detected |
| Carbon Disulfide | 59 | Not Detected | 180 | Not Detected |
| 3-Chloropropene | 59 | Not Detected | 180 | Not Detected |
| Methylene Chloride | 150 | Not Detected | 510 | Not Detected |
| Methyl tert-butyl ether | 59 | Not Detected | 210 | Not Detected |
| trans-1,2-Dichloroethene | 15 | Not Detected | 58 | Not Detected |
| Hexane | 15 | Not Detected | 52 | Not Detected |
| 1,1-Dichloroethane | 15 | Not Detected | 60 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 59 | Not Detected | 170 | Not Detected |
| cis-1,2-Dichloroethene | 15 | 47 | 58 | 180 |
| Tetrahydrofuran | 15 | Not Detected | 43 | Not Detected |
| Chloroform | 15 | Not Detected | 72 | Not Detected |
| 1,1,1-Trichloroethane | 15 | Not Detected | 80 | Not Detected |
| Cyclohexane | 15 | Not Detected | 51 | Not Detected |
| Carbon Tetrachloride | 15 | Not Detected | 93 | Not Detected |
| 2,2,4-Trimethylpentane | 15 | Not Detected | 69 | Not Detected |
| Benzene | 15 | Not Detected | 47 | Not Detected |
| 1,2-Dichloroethane | 15 | Not Detected | 60 | Not Detected |
| Heptane | 15 | Not Detected | 60 | Not Detected |
| Trichloroethene | 15 | 39 | 79 | 210 |
| 1,2-Dichloropropane | 15 | Not Detected | 68 | Not Detected |
| 1,4-Dioxane | 59 | Not Detected | 210 | Not Detected |
| Bromodichloromethane | 15 | Not Detected | 99 | Not Detected |
| cis-1,3-Dichloropropene | 15 | Not Detected | 67 | Not Detected |
| 4-Methyl-2-pentanone | 15 | Not Detected | 60 | Not Detected |
| Toluene | 15 | Not Detected | 56 | Not Detected |
| trans-1,3-Dichloropropene | 15 | Not Detected | 67 | Not Detected |
| 1,1,2-Trichloroethane | 15 | Not Detected | 80 | Not Detected |
| Tetrachloroethene | 15 | 3100 | 100 | 21000 |
| 2-Hexanone | 59 | Not Detected | 240 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062117-SSV-7-65**

**Lab ID#: 1706492B-12A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062820** | **Date of Collection:** | **6/21/17 12:10:00 PM** |
| **Dil. Factor:** | **29.5** | **Date of Analysis:** | **6/28/17 10:20 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 15 | Not Detected | 120 | Not Detected |
| 1,2-Dibromoethane (EDB) | 15 | Not Detected | 110 | Not Detected |
| Chlorobenzene | 15 | Not Detected | 68 | Not Detected |
| Ethyl Benzene | 15 | Not Detected | 64 | Not Detected |
| m,p-Xylene | 15 | Not Detected | 64 | Not Detected |
| o-Xylene | 15 | Not Detected | 64 | Not Detected |
| Styrene | 15 | Not Detected | 63 | Not Detected |
| Bromoform | 15 | Not Detected | 150 | Not Detected |
| Cumene | 15 | Not Detected | 72 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 15 | Not Detected | 100 | Not Detected |
| Propylbenzene | 15 | Not Detected | 72 | Not Detected |
| 4-Ethyltoluene | 15 | Not Detected | 72 | Not Detected |
| 1,3,5-Trimethylbenzene | 15 | Not Detected | 72 | Not Detected |
| 1,2,4-Trimethylbenzene | 15 | Not Detected | 72 | Not Detected |
| 1,3-Dichlorobenzene | 15 | Not Detected | 89 | Not Detected |
| 1,4-Dichlorobenzene | 15 | Not Detected | 89 | Not Detected |
| alpha-Chlorotoluene | 15 | Not Detected | 76 | Not Detected |
| 1,2-Dichlorobenzene | 15 | Not Detected | 89 | Not Detected |
| 1,2,4-Trichlorobenzene | 59 | Not Detected | 440 | Not Detected |
| Hexachlorobutadiene | 59 | Not Detected | 630 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 100 | 70-130 |
| 1,2-Dichloroethane-d4 | 88 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062117-SSV-8-65**

**Lab ID#: 1706492B-13A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062821** | **Date of Collection:** | **6/21/17 1:35:00 PM** |
| **Dil. Factor:** | **22.3** | **Date of Analysis:** | **6/28/17 10:44 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 11 | Not Detected | 55 | Not Detected |
| Freon 114 | 11 | Not Detected | 78 | Not Detected |
| Chloromethane | 110 | Not Detected | 230 | Not Detected |
| Vinyl Chloride | 11 | Not Detected | 28 | Not Detected |
| 1,3-Butadiene | 11 | Not Detected | 25 | Not Detected |
| Bromomethane | 110 | Not Detected | 430 | Not Detected |
| Chloroethane | 45 | Not Detected | 120 | Not Detected |
| Freon 11 | 11 | Not Detected | 63 | Not Detected |
| Ethanol | 45 | Not Detected | 84 | Not Detected |
| Freon 113 | 11 | Not Detected | 85 | Not Detected |
| 1,1-Dichloroethene | 11 | Not Detected | 44 | Not Detected |
| Acetone | 110 | Not Detected | 260 | Not Detected |
| 2-Propanol | 45 | Not Detected | 110 | Not Detected |
| Carbon Disulfide | 45 | Not Detected | 140 | Not Detected |
| 3-Chloropropene | 45 | Not Detected | 140 | Not Detected |
| Methylene Chloride | 110 | Not Detected | 390 | Not Detected |
| Methyl tert-butyl ether | 45 | Not Detected | 160 | Not Detected |
| trans-1,2-Dichloroethene | 11 | Not Detected | 44 | Not Detected |
| Hexane | 11 | Not Detected | 39 | Not Detected |
| 1,1-Dichloroethane | 11 | Not Detected | 45 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 45 | Not Detected | 130 | Not Detected |
| cis-1,2-Dichloroethene | 11 | 44 | 44 | 170 |
| Tetrahydrofuran | 11 | Not Detected | 33 | Not Detected |
| Chloroform | 11 | Not Detected | 54 | Not Detected |
| 1,1,1-Trichloroethane | 11 | Not Detected | 61 | Not Detected |
| Cyclohexane | 11 | Not Detected | 38 | Not Detected |
| Carbon Tetrachloride | 11 | Not Detected | 70 | Not Detected |
| 2,2,4-Trimethylpentane | 11 | Not Detected | 52 | Not Detected |
| Benzene | 11 | Not Detected | 36 | Not Detected |
| 1,2-Dichloroethane | 11 | Not Detected | 45 | Not Detected |
| Heptane | 11 | Not Detected | 46 | Not Detected |
| Trichloroethene | 11 | 39 | 60 | 210 |
| 1,2-Dichloropropane | 11 | Not Detected | 52 | Not Detected |
| 1,4-Dioxane | 45 | Not Detected | 160 | Not Detected |
| Bromodichloromethane | 11 | Not Detected | 75 | Not Detected |
| cis-1,3-Dichloropropene | 11 | Not Detected | 51 | Not Detected |
| 4-Methyl-2-pentanone | 11 | Not Detected | 46 | Not Detected |
| Toluene | 11 | Not Detected | 42 | Not Detected |
| trans-1,3-Dichloropropene | 11 | Not Detected | 51 | Not Detected |
| 1,1,2-Trichloroethane | 11 | Not Detected | 61 | Not Detected |
| Tetrachloroethene | 11 | 2900 | 76 | 20000 |
| 2-Hexanone | 45 | Not Detected | 180 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062117-SSV-8-65**

**Lab ID#: 1706492B-13A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062821** | **Date of Collection:** | **6/21/17 1:35:00 PM** |
| **Dil. Factor:** | **22.3** | **Date of Analysis:** | **6/28/17 10:44 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 11 | Not Detected | 95 | Not Detected |
| 1,2-Dibromoethane (EDB) | 11 | Not Detected | 86 | Not Detected |
| Chlorobenzene | 11 | Not Detected | 51 | Not Detected |
| Ethyl Benzene | 11 | Not Detected | 48 | Not Detected |
| m,p-Xylene | 11 | Not Detected | 48 | Not Detected |
| o-Xylene | 11 | Not Detected | 48 | Not Detected |
| Styrene | 11 | Not Detected | 47 | Not Detected |
| Bromoform | 11 | Not Detected | 120 | Not Detected |
| Cumene | 11 | Not Detected | 55 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 11 | Not Detected | 76 | Not Detected |
| Propylbenzene | 11 | Not Detected | 55 | Not Detected |
| 4-Ethyltoluene | 11 | Not Detected | 55 | Not Detected |
| 1,3,5-Trimethylbenzene | 11 | Not Detected | 55 | Not Detected |
| 1,2,4-Trimethylbenzene | 11 | Not Detected | 55 | Not Detected |
| 1,3-Dichlorobenzene | 11 | Not Detected | 67 | Not Detected |
| 1,4-Dichlorobenzene | 11 | Not Detected | 67 | Not Detected |
| alpha-Chlorotoluene | 11 | Not Detected | 58 | Not Detected |
| 1,2-Dichlorobenzene | 11 | Not Detected | 67 | Not Detected |
| 1,2,4-Trichlorobenzene | 45 | Not Detected | 330 | Not Detected |
| Hexachlorobutadiene | 45 | Not Detected | 480 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 100 | 70-130 |
| 1,2-Dichloroethane-d4 | 90 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SVP1SS**

**Lab ID#: 1706492B-14A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062822** | **Date of Collection: 6/22/17 12:04:00 PM** | |
| **Dil. Factor:** | **4.40** | **Date of Analysis: 6/28/17 11:07 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 2.2 | Not Detected | 11 | Not Detected |
| Freon 114 | 2.2 | Not Detected | 15 | Not Detected |
| Chloromethane | 22 | Not Detected | 45 | Not Detected |
| Vinyl Chloride | 2.2 | Not Detected | 5.6 | Not Detected |
| 1,3-Butadiene | 2.2 | Not Detected | 4.9 | Not Detected |
| Bromomethane | 22 | Not Detected | 85 | Not Detected |
| Chloroethane | 8.8 | Not Detected | 23 | Not Detected |
| Freon 11 | 2.2 | Not Detected | 12 | Not Detected |
| Ethanol | 8.8 | Not Detected | 16 | Not Detected |
| Freon 113 | 2.2 | Not Detected | 17 | Not Detected |
| 1,1-Dichloroethene | 2.2 | Not Detected | 8.7 | Not Detected |
| Acetone | 22 | Not Detected | 52 | Not Detected |
| 2-Propanol | 8.8 | Not Detected | 22 | Not Detected |
| Carbon Disulfide | 8.8 | Not Detected | 27 | Not Detected |
| 3-Chloropropene | 8.8 | Not Detected | 28 | Not Detected |
| Methylene Chloride | 22 | Not Detected | 76 | Not Detected |
| Methyl tert-butyl ether | 8.8 | Not Detected | 32 | Not Detected |
| trans-1,2-Dichloroethene | 2.2 | Not Detected | 8.7 | Not Detected |
| Hexane | 2.2 | Not Detected | 7.8 | Not Detected |
| 1,1-Dichloroethane | 2.2 | Not Detected | 8.9 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 8.8 | Not Detected | 26 | Not Detected |
| cis-1,2-Dichloroethene | 2.2 | 3.0 | 8.7 | 12 |
| Tetrahydrofuran | 2.2 | Not Detected | 6.5 | Not Detected |
| Chloroform | 2.2 | Not Detected | 11 | Not Detected |
| 1,1,1-Trichloroethane | 2.2 | Not Detected | 12 | Not Detected |
| Cyclohexane | 2.2 | Not Detected | 7.6 | Not Detected |
| Carbon Tetrachloride | 2.2 | Not Detected | 14 | Not Detected |
| 2,2,4-Trimethylpentane | 2.2 | Not Detected | 10 | Not Detected |
| Benzene | 2.2 | Not Detected | 7.0 | Not Detected |
| 1,2-Dichloroethane | 2.2 | Not Detected | 8.9 | Not Detected |
| Heptane | 2.2 | Not Detected | 9.0 | Not Detected |
| Trichloroethene | 2.2 | 15 | 12 | 82 |
| 1,2-Dichloropropane | 2.2 | Not Detected | 10 | Not Detected |
| 1,4-Dioxane | 8.8 | Not Detected | 32 | Not Detected |
| Bromodichloromethane | 2.2 | Not Detected | 15 | Not Detected |
| cis-1,3-Dichloropropene | 2.2 | Not Detected | 10 | Not Detected |
| 4-Methyl-2-pentanone | 2.2 | Not Detected | 9.0 | Not Detected |
| Toluene | 2.2 | Not Detected | 8.3 | Not Detected |
| trans-1,3-Dichloropropene | 2.2 | Not Detected | 10 | Not Detected |
| 1,1,2-Trichloroethane | 2.2 | Not Detected | 12 | Not Detected |
| Tetrachloroethene | 2.2 | 620 | 15 | 4200 |
| 2-Hexanone | 8.8 | Not Detected | 36 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SVP1SS**

**Lab ID#: 1706492B-14A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062822** | **Date of Collection:** | **6/22/17 12:04:00 PM** |
| **Dil. Factor:** | **4.40** | **Date of Analysis:** | **6/28/17 11:07 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 2.2 | Not Detected | 19 | Not Detected |
| 1,2-Dibromoethane (EDB) | 2.2 | Not Detected | 17 | Not Detected |
| Chlorobenzene | 2.2 | Not Detected | 10 | Not Detected |
| Ethyl Benzene | 2.2 | Not Detected | 9.6 | Not Detected |
| m,p-Xylene | 2.2 | Not Detected | 9.6 | Not Detected |
| o-Xylene | 2.2 | Not Detected | 9.6 | Not Detected |
| Styrene | 2.2 | Not Detected | 9.4 | Not Detected |
| Bromoform | 2.2 | Not Detected | 23 | Not Detected |
| Cumene | 2.2 | Not Detected | 11 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 2.2 | Not Detected | 15 | Not Detected |
| Propylbenzene | 2.2 | Not Detected | 11 | Not Detected |
| 4-Ethyltoluene | 2.2 | Not Detected | 11 | Not Detected |
| 1,3,5-Trimethylbenzene | 2.2 | Not Detected | 11 | Not Detected |
| 1,2,4-Trimethylbenzene | 2.2 | Not Detected | 11 | Not Detected |
| 1,3-Dichlorobenzene | 2.2 | Not Detected | 13 | Not Detected |
| 1,4-Dichlorobenzene | 2.2 | Not Detected | 13 | Not Detected |
| alpha-Chlorotoluene | 2.2 | Not Detected | 11 | Not Detected |
| 1,2-Dichlorobenzene | 2.2 | Not Detected | 13 | Not Detected |
| 1,2,4-Trichlorobenzene | 8.8 | Not Detected | 65 | Not Detected |
| Hexachlorobutadiene | 8.8 | Not Detected | 94 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 101 | 70-130 |
| 1,2-Dichloroethane-d4 | 90 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SVP3SS**

**Lab ID#: 1706492B-15A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062911** | **Date of Collection:** | **6/22/17 11:38:00 AM** |
| **Dil. Factor:** | **5.76** | **Date of Analysis:** | **6/29/17 03:53 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 29 | Not Detected | 140 | Not Detected |
| Freon 114 | 29 | Not Detected | 200 | Not Detected |
| Chloromethane | 120 | Not Detected | 240 | Not Detected |
| Vinyl Chloride | 29 | Not Detected | 74 | Not Detected |
| 1,3-Butadiene | 29 | Not Detected | 64 | Not Detected |
| Bromomethane | 120 | Not Detected | 450 | Not Detected |
| Chloroethane | 120 | Not Detected | 300 | Not Detected |
| Freon 11 | 29 | Not Detected | 160 | Not Detected |
| Ethanol | 120 | Not Detected | 220 | Not Detected |
| Freon 113 | 29 | Not Detected | 220 | Not Detected |
| 1,1-Dichloroethene | 29 | Not Detected | 110 | Not Detected |
| Acetone | 120 | Not Detected | 270 | Not Detected |
| 2-Propanol | 120 | Not Detected | 280 | Not Detected |
| Carbon Disulfide | 120 | Not Detected | 360 | Not Detected |
| 3-Chloropropene | 120 | Not Detected | 360 | Not Detected |
| Methylene Chloride | 120 | Not Detected | 400 | Not Detected |
| Methyl tert-butyl ether | 29 | Not Detected | 100 | Not Detected |
| trans-1,2-Dichloroethene | 29 | 290 | 110 | 1200 |
| Hexane | 29 | Not Detected | 100 | Not Detected |
| 1,1-Dichloroethane | 29 | Not Detected | 120 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 120 | Not Detected | 340 | Not Detected |
| cis-1,2-Dichloroethene | 29 | 4700 | 110 | 19000 |
| Tetrahydrofuran | 29 | Not Detected | 85 | Not Detected |
| Chloroform | 29 | Not Detected | 140 | Not Detected |
| 1,1,1-Trichloroethane | 29 | Not Detected | 160 | Not Detected |
| Cyclohexane | 29 | Not Detected | 99 | Not Detected |
| Carbon Tetrachloride | 29 | Not Detected | 180 | Not Detected |
| 2,2,4-Trimethylpentane | 29 | Not Detected | 130 | Not Detected |
| Benzene | 29 | Not Detected | 92 | Not Detected |
| 1,2-Dichloroethane | 29 | Not Detected | 120 | Not Detected |
| Heptane | 29 | Not Detected | 120 | Not Detected |
| Trichloroethene | 29 | 660 | 150 | 3600 |
| 1,2-Dichloropropane | 29 | Not Detected | 130 | Not Detected |
| 1,4-Dioxane | 120 | Not Detected | 420 | Not Detected |
| Bromodichloromethane | 29 | Not Detected | 190 | Not Detected |
| cis-1,3-Dichloropropene | 29 | Not Detected | 130 | Not Detected |
| 4-Methyl-2-pentanone | 29 | Not Detected | 120 | Not Detected |
| Toluene | 29 | Not Detected | 110 | Not Detected |
| trans-1,3-Dichloropropene | 29 | Not Detected | 130 | Not Detected |
| 1,1,2-Trichloroethane | 29 | Not Detected | 160 | Not Detected |
| Tetrachloroethene | 29 | 29000 | 200 | 190000 |
| 2-Hexanone | 120 | Not Detected | 470 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SVP3SS**

**Lab ID#: 1706492B-15A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062911** | **Date of Collection:** | **6/22/17 11:38:00 AM** |
| **Dil. Factor:** | **5.76** | **Date of Analysis:** | **6/29/17 03:53 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 29 | Not Detected | 240 | Not Detected |
| 1,2-Dibromoethane (EDB) | 29 | Not Detected | 220 | Not Detected |
| Chlorobenzene | 29 | Not Detected | 130 | Not Detected |
| Ethyl Benzene | 29 | Not Detected | 120 | Not Detected |
| m,p-Xylene | 29 | Not Detected | 120 | Not Detected |
| o-Xylene | 29 | Not Detected | 120 | Not Detected |
| Styrene | 29 | Not Detected | 120 | Not Detected |
| Bromoform | 29 | Not Detected | 300 | Not Detected |
| Cumene | 29 | Not Detected | 140 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 29 | Not Detected | 200 | Not Detected |
| Propylbenzene | 29 | Not Detected | 140 | Not Detected |
| 4-Ethyltoluene | 29 | Not Detected | 140 | Not Detected |
| 1,3,5-Trimethylbenzene | 29 | Not Detected | 140 | Not Detected |
| 1,2,4-Trimethylbenzene | 29 | Not Detected | 140 | Not Detected |
| 1,3-Dichlorobenzene | 29 | Not Detected | 170 | Not Detected |
| 1,4-Dichlorobenzene | 29 | Not Detected | 170 | Not Detected |
| alpha-Chlorotoluene | 29 | Not Detected | 150 | Not Detected |
| 1,2-Dichlorobenzene | 29 | Not Detected | 170 | Not Detected |
| 1,2,4-Trichlorobenzene | 120 | Not Detected | 850 | Not Detected |
| Hexachlorobutadiene | 120 | Not Detected | 1200 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 95 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 97 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SSPE3**

**Lab ID#: 1706492B-16A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062912** | **Date of Collection:** | **6/22/17 11:47:00 AM** |
| **Dil. Factor:** | **2.55** | **Date of Analysis:** | **6/29/17 04:21 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 13 | Not Detected | 63 | Not Detected |
| Freon 114 | 13 | Not Detected | 89 | Not Detected |
| Chloromethane | 51 | Not Detected | 100 | Not Detected |
| Vinyl Chloride | 13 | Not Detected | 32 | Not Detected |
| 1,3-Butadiene | 13 | Not Detected | 28 | Not Detected |
| Bromomethane | 51 | Not Detected | 200 | Not Detected |
| Chloroethane | 51 | Not Detected | 130 | Not Detected |
| Freon 11 | 13 | Not Detected | 72 | Not Detected |
| Ethanol | 51 | Not Detected | 96 | Not Detected |
| Freon 113 | 13 | Not Detected | 98 | Not Detected |
| 1,1-Dichloroethene | 13 | Not Detected | 50 | Not Detected |
| Acetone | 51 | Not Detected | 120 | Not Detected |
| 2-Propanol | 51 | Not Detected | 120 | Not Detected |
| Carbon Disulfide | 51 | Not Detected | 160 | Not Detected |
| 3-Chloropropene | 51 | Not Detected | 160 | Not Detected |
| Methylene Chloride | 51 | Not Detected | 180 | Not Detected |
| Methyl tert-butyl ether | 13 | Not Detected | 46 | Not Detected |
| trans-1,2-Dichloroethene | 13 | 59 | 50 | 240 |
| Hexane | 13 | Not Detected | 45 | Not Detected |
| 1,1-Dichloroethane | 13 | Not Detected | 52 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 51 | Not Detected | 150 | Not Detected |
| cis-1,2-Dichloroethene | 13 | 850 | 50 | 3400 |
| Tetrahydrofuran | 13 | Not Detected | 38 | Not Detected |
| Chloroform | 13 | Not Detected | 62 | Not Detected |
| 1,1,1-Trichloroethane | 13 | Not Detected | 70 | Not Detected |
| Cyclohexane | 13 | Not Detected | 44 | Not Detected |
| Carbon Tetrachloride | 13 | Not Detected | 80 | Not Detected |
| 2,2,4-Trimethylpentane | 13 | Not Detected | 60 | Not Detected |
| Benzene | 13 | Not Detected | 41 | Not Detected |
| 1,2-Dichloroethane | 13 | Not Detected | 52 | Not Detected |
| Heptane | 13 | Not Detected | 52 | Not Detected |
| Trichloroethene | 13 | 420 | 68 | 2200 |
| 1,2-Dichloropropane | 13 | Not Detected | 59 | Not Detected |
| 1,4-Dioxane | 51 | Not Detected | 180 | Not Detected |
| Bromodichloromethane | 13 | Not Detected | 85 | Not Detected |
| cis-1,3-Dichloropropene | 13 | Not Detected | 58 | Not Detected |
| 4-Methyl-2-pentanone | 13 | Not Detected | 52 | Not Detected |
| Toluene | 13 | Not Detected | 48 | Not Detected |
| trans-1,3-Dichloropropene | 13 | Not Detected | 58 | Not Detected |
| 1,1,2-Trichloroethane | 13 | Not Detected | 70 | Not Detected |
| Tetrachloroethene | 13 | 15000 | 86 | 100000 |
| 2-Hexanone | 51 | Not Detected | 210 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SSPE3**

**Lab ID#: 1706492B-16A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062912** | **Date of Collection: 6/22/17 11:47:00 AM** | |
| **Dil. Factor:** | **2.55** | **Date of Analysis: 6/29/17 04:21 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 13 | Not Detected | 110 | Not Detected |
| 1,2-Dibromoethane (EDB) | 13 | Not Detected | 98 | Not Detected |
| Chlorobenzene | 13 | Not Detected | 59 | Not Detected |
| Ethyl Benzene | 13 | Not Detected | 55 | Not Detected |
| m,p-Xylene | 13 | Not Detected | 55 | Not Detected |
| o-Xylene | 13 | Not Detected | 55 | Not Detected |
| Styrene | 13 | Not Detected | 54 | Not Detected |
| Bromoform | 13 | Not Detected | 130 | Not Detected |
| Cumene | 13 | Not Detected | 63 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 13 | Not Detected | 88 | Not Detected |
| Propylbenzene | 13 | Not Detected | 63 | Not Detected |
| 4-Ethyltoluene | 13 | Not Detected | 63 | Not Detected |
| 1,3,5-Trimethylbenzene | 13 | Not Detected | 63 | Not Detected |
| 1,2,4-Trimethylbenzene | 13 | Not Detected | 63 | Not Detected |
| 1,3-Dichlorobenzene | 13 | Not Detected | 77 | Not Detected |
| 1,4-Dichlorobenzene | 13 | Not Detected | 77 | Not Detected |
| alpha-Chlorotoluene | 13 | Not Detected | 66 | Not Detected |
| 1,2-Dichlorobenzene | 13 | Not Detected | 77 | Not Detected |
| 1,2,4-Trichlorobenzene | 51 | Not Detected | 380 | Not Detected |
| Hexachlorobutadiene | 51 | Not Detected | 540 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 96 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 96 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SVP4SS**

**Lab ID#: 1706492B-17A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062913** | **Date of Collection:** | **6/22/17 10:58:00 AM** |
| **Dil. Factor:** | **12.8** | **Date of Analysis:** | **6/29/17 04:49 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 64 | Not Detected | 320 | Not Detected |
| Freon 114 | 64 | Not Detected | 450 | Not Detected |
| Chloromethane | 260 | Not Detected | 530 | Not Detected |
| Vinyl Chloride | 64 | Not Detected | 160 | Not Detected |
| 1,3-Butadiene | 64 | Not Detected | 140 | Not Detected |
| Bromomethane | 260 | Not Detected | 990 | Not Detected |
| Chloroethane | 260 | Not Detected | 680 | Not Detected |
| Freon 11 | 64 | Not Detected | 360 | Not Detected |
| Ethanol | 260 | Not Detected | 480 | Not Detected |
| Freon 113 | 64 | Not Detected | 490 | Not Detected |
| 1,1-Dichloroethene | 64 | Not Detected | 250 | Not Detected |
| Acetone | 260 | Not Detected | 610 | Not Detected |
| 2-Propanol | 260 | Not Detected | 630 | Not Detected |
| Carbon Disulfide | 260 | Not Detected | 800 | Not Detected |
| 3-Chloropropene | 260 | Not Detected | 800 | Not Detected |
| Methylene Chloride | 260 | Not Detected | 890 | Not Detected |
| Methyl tert-butyl ether | 64 | Not Detected | 230 | Not Detected |
| trans-1,2-Dichloroethene | 64 | Not Detected | 250 | Not Detected |
| Hexane | 64 | Not Detected | 220 | Not Detected |
| 1,1-Dichloroethane | 64 | Not Detected | 260 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 260 | Not Detected | 750 | Not Detected |
| cis-1,2-Dichloroethene | 64 | 650 | 250 | 2600 |
| Tetrahydrofuran | 64 | Not Detected | 190 | Not Detected |
| Chloroform | 64 | Not Detected | 310 | Not Detected |
| 1,1,1-Trichloroethane | 64 | Not Detected | 350 | Not Detected |
| Cyclohexane | 64 | Not Detected | 220 | Not Detected |
| Carbon Tetrachloride | 64 | Not Detected | 400 | Not Detected |
| 2,2,4-Trimethylpentane | 64 | Not Detected | 300 | Not Detected |
| Benzene | 64 | Not Detected | 200 | Not Detected |
| 1,2-Dichloroethane | 64 | Not Detected | 260 | Not Detected |
| Heptane | 64 | Not Detected | 260 | Not Detected |
| Trichloroethene | 64 | 410 | 340 | 2200 |
| 1,2-Dichloropropane | 64 | Not Detected | 300 | Not Detected |
| 1,4-Dioxane | 260 | Not Detected | 920 | Not Detected |
| Bromodichloromethane | 64 | Not Detected | 430 | Not Detected |
| cis-1,3-Dichloropropene | 64 | Not Detected | 290 | Not Detected |
| 4-Methyl-2-pentanone | 64 | Not Detected | 260 | Not Detected |
| Toluene | 64 | Not Detected | 240 | Not Detected |
| trans-1,3-Dichloropropene | 64 | Not Detected | 290 | Not Detected |
| 1,1,2-Trichloroethane | 64 | 390 | 350 | 2100 |
| Tetrachloroethene | 64 | 50000 | 430 | 340000 |
| 2-Hexanone | 260 | Not Detected | 1000 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SVP4SS**

**Lab ID#: 1706492B-17A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062913** | **Date of Collection: 6/22/17 10:58:00 AM** | |
| **Dil. Factor:** | **12.8** | **Date of Analysis: 6/29/17 04:49 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 64 | Not Detected | 540 | Not Detected |
| 1,2-Dibromoethane (EDB) | 64 | Not Detected | 490 | Not Detected |
| Chlorobenzene | 64 | Not Detected | 290 | Not Detected |
| Ethyl Benzene | 64 | Not Detected | 280 | Not Detected |
| m,p-Xylene | 64 | Not Detected | 280 | Not Detected |
| o-Xylene | 64 | Not Detected | 280 | Not Detected |
| Styrene | 64 | Not Detected | 270 | Not Detected |
| Bromoform | 64 | Not Detected | 660 | Not Detected |
| Cumene | 64 | Not Detected | 310 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 64 | Not Detected | 440 | Not Detected |
| Propylbenzene | 64 | Not Detected | 310 | Not Detected |
| 4-Ethyltoluene | 64 | Not Detected | 310 | Not Detected |
| 1,3,5-Trimethylbenzene | 64 | Not Detected | 310 | Not Detected |
| 1,2,4-Trimethylbenzene | 64 | Not Detected | 310 | Not Detected |
| 1,3-Dichlorobenzene | 64 | Not Detected | 380 | Not Detected |
| 1,4-Dichlorobenzene | 64 | Not Detected | 380 | Not Detected |
| alpha-Chlorotoluene | 64 | Not Detected | 330 | Not Detected |
| 1,2-Dichlorobenzene | 64 | Not Detected | 380 | Not Detected |
| 1,2,4-Trichlorobenzene | 260 | Not Detected | 1900 | Not Detected |
| Hexachlorobutadiene | 260 | Not Detected | 2700 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 93 | 70-130 |
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 96 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SSPN2**

**Lab ID#: 1706492B-18A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062825** | **Date of Collection:** | **6/22/17 11:14:00 AM** |
| **Dil. Factor:** | **2.89** | **Date of Analysis:** | **6/29/17 12:22 AM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 1.4 | Not Detected | 7.1 | Not Detected |
| Freon 114 | 1.4 | Not Detected | 10 | Not Detected |
| Chloromethane | 14 | Not Detected | 30 | Not Detected |
| Vinyl Chloride | 1.4 | Not Detected | 3.7 | Not Detected |
| 1,3-Butadiene | 1.4 | Not Detected | 3.2 | Not Detected |
| Bromomethane | 14 | Not Detected | 56 | Not Detected |
| Chloroethane | 5.8 | Not Detected | 15 | Not Detected |
| Freon 11 | 1.4 | Not Detected | 8.1 | Not Detected |
| Ethanol | 5.8 | Not Detected | 11 | Not Detected |
| Freon 113 | 1.4 | Not Detected | 11 | Not Detected |
| 1,1-Dichloroethene | 1.4 | Not Detected | 5.7 | Not Detected |
| Acetone | 14 | Not Detected | 34 | Not Detected |
| 2-Propanol | 5.8 | Not Detected | 14 | Not Detected |
| Carbon Disulfide | 5.8 | Not Detected | 18 | Not Detected |
| 3-Chloropropene | 5.8 | Not Detected | 18 | Not Detected |
| Methylene Chloride | 14 | Not Detected | 50 | Not Detected |
| Methyl tert-butyl ether | 5.8 | Not Detected | 21 | Not Detected |
| trans-1,2-Dichloroethene | 1.4 | Not Detected | 5.7 | Not Detected |
| Hexane | 1.4 | Not Detected | 5.1 | Not Detected |
| 1,1-Dichloroethane | 1.4 | Not Detected | 5.8 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 5.8 | Not Detected | 17 | Not Detected |
| cis-1,2-Dichloroethene | 1.4 | 6.6 | 5.7 | 26 |
| Tetrahydrofuran | 1.4 | Not Detected | 4.3 | Not Detected |
| Chloroform | 1.4 | Not Detected | 7.0 | Not Detected |
| 1,1,1-Trichloroethane | 1.4 | Not Detected | 7.9 | Not Detected |
| Cyclohexane | 1.4 | Not Detected | 5.0 | Not Detected |
| Carbon Tetrachloride | 1.4 | Not Detected | 9.1 | Not Detected |
| 2,2,4-Trimethylpentane | 1.4 | Not Detected | 6.8 | Not Detected |
| Benzene | 1.4 | Not Detected | 4.6 | Not Detected |
| 1,2-Dichloroethane | 1.4 | Not Detected | 5.8 | Not Detected |
| Heptane | 1.4 | Not Detected | 5.9 | Not Detected |
| Trichloroethene | 1.4 | 5.0 | 7.8 | 27 |
| 1,2-Dichloropropane | 1.4 | Not Detected | 6.7 | Not Detected |
| 1,4-Dioxane | 5.8 | Not Detected | 21 | Not Detected |
| Bromodichloromethane | 1.4 | Not Detected | 9.7 | Not Detected |
| cis-1,3-Dichloropropene | 1.4 | Not Detected | 6.6 | Not Detected |
| 4-Methyl-2-pentanone | 1.4 | Not Detected | 5.9 | Not Detected |
| Toluene | 1.4 | Not Detected | 5.4 | Not Detected |
| trans-1,3-Dichloropropene | 1.4 | Not Detected | 6.6 | Not Detected |
| 1,1,2-Trichloroethane | 1.4 | Not Detected | 7.9 | Not Detected |
| Tetrachloroethene | 1.4 | 87 | 9.8 | 590 |
| 2-Hexanone | 5.8 | Not Detected | 24 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SSPN2**

**Lab ID#: 1706492B-18A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062825** | **Date of Collection:** | **6/22/17 11:14:00 AM** |
| **Dil. Factor:** | **2.89** | **Date of Analysis:** | **6/29/17 12:22 AM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 1.4 | Not Detected | 12 | Not Detected |
| 1,2-Dibromoethane (EDB) | 1.4 | Not Detected | 11 | Not Detected |
| Chlorobenzene | 1.4 | Not Detected | 6.6 | Not Detected |
| Ethyl Benzene | 1.4 | Not Detected | 6.3 | Not Detected |
| m,p-Xylene | 1.4 | Not Detected | 6.3 | Not Detected |
| o-Xylene | 1.4 | Not Detected | 6.3 | Not Detected |
| Styrene | 1.4 | Not Detected | 6.2 | Not Detected |
| Bromoform | 1.4 | Not Detected | 15 | Not Detected |
| Cumene | 1.4 | Not Detected | 7.1 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 1.4 | Not Detected | 9.9 | Not Detected |
| Propylbenzene | 1.4 | Not Detected | 7.1 | Not Detected |
| 4-Ethyltoluene | 1.4 | Not Detected | 7.1 | Not Detected |
| 1,3,5-Trimethylbenzene | 1.4 | Not Detected | 7.1 | Not Detected |
| 1,2,4-Trimethylbenzene | 1.4 | Not Detected | 7.1 | Not Detected |
| 1,3-Dichlorobenzene | 1.4 | Not Detected | 8.7 | Not Detected |
| 1,4-Dichlorobenzene | 1.4 | Not Detected | 8.7 | Not Detected |
| alpha-Chlorotoluene | 1.4 | Not Detected | 7.5 | Not Detected |
| 1,2-Dichlorobenzene | 1.4 | Not Detected | 8.7 | Not Detected |
| 1,2,4-Trichlorobenzene | 5.8 | Not Detected | 43 | Not Detected |
| Hexachlorobutadiene | 5.8 | Not Detected | 62 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 100 | 70-130 |
| 1,2-Dichloroethane-d4 | 94 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SVP2SS**

**Lab ID#: 1706492B-19A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062823** | **Date of Collection: 6/22/17 12:11:00 PM** | |
| **Dil. Factor:** | **18.0** | **Date of Analysis: 6/28/17 11:32 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 9.0 | Not Detected | 44 | Not Detected |
| Freon 114 | 9.0 | Not Detected | 63 | Not Detected |
| Chloromethane | 90 | Not Detected | 180 | Not Detected |
| Vinyl Chloride | 9.0 | Not Detected | 23 | Not Detected |
| 1,3-Butadiene | 9.0 | Not Detected | 20 | Not Detected |
| Bromomethane | 90 | Not Detected | 350 | Not Detected |
| Chloroethane | 36 | Not Detected | 95 | Not Detected |
| Freon 11 | 9.0 | Not Detected | 50 | Not Detected |
| Ethanol | 36 | Not Detected | 68 | Not Detected |
| Freon 113 | 9.0 | Not Detected | 69 | Not Detected |
| 1,1-Dichloroethene | 9.0 | Not Detected | 36 | Not Detected |
| Acetone | 90 | Not Detected | 210 | Not Detected |
| 2-Propanol | 36 | Not Detected | 88 | Not Detected |
| Carbon Disulfide | 36 | Not Detected | 110 | Not Detected |
| 3-Chloropropene | 36 | Not Detected | 110 | Not Detected |
| Methylene Chloride | 90 | Not Detected | 310 | Not Detected |
| Methyl tert-butyl ether | 36 | Not Detected | 130 | Not Detected |
| trans-1,2-Dichloroethene | 9.0 | Not Detected | 36 | Not Detected |
| Hexane | 9.0 | Not Detected | 32 | Not Detected |
| 1,1-Dichloroethane | 9.0 | Not Detected | 36 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 36 | Not Detected | 110 | Not Detected |
| cis-1,2-Dichloroethene | 9.0 | Not Detected | 36 | Not Detected |
| Tetrahydrofuran | 9.0 | Not Detected | 26 | Not Detected |
| Chloroform | 9.0 | Not Detected | 44 | Not Detected |
| 1,1,1-Trichloroethane | 9.0 | Not Detected | 49 | Not Detected |
| Cyclohexane | 9.0 | Not Detected | 31 | Not Detected |
| Carbon Tetrachloride | 9.0 | Not Detected | 57 | Not Detected |
| 2,2,4-Trimethylpentane | 9.0 | Not Detected | 42 | Not Detected |
| Benzene | 9.0 | Not Detected | 29 | Not Detected |
| 1,2-Dichloroethane | 9.0 | Not Detected | 36 | Not Detected |
| Heptane | 9.0 | Not Detected | 37 | Not Detected |
| Trichloroethene | 9.0 | Not Detected | 48 | Not Detected |
| 1,2-Dichloropropane | 9.0 | Not Detected | 42 | Not Detected |
| 1,4-Dioxane | 36 | Not Detected | 130 | Not Detected |
| Bromodichloromethane | 9.0 | Not Detected | 60 | Not Detected |
| cis-1,3-Dichloropropene | 9.0 | Not Detected | 41 | Not Detected |
| 4-Methyl-2-pentanone | 9.0 | Not Detected | 37 | Not Detected |
| Toluene | 9.0 | Not Detected | 34 | Not Detected |
| trans-1,3-Dichloropropene | 9.0 | Not Detected | 41 | Not Detected |
| 1,1,2-Trichloroethane | 9.0 | Not Detected | 49 | Not Detected |
| Tetrachloroethene | 9.0 | 1800 | 61 | 12000 |
| 2-Hexanone | 36 | Not Detected | 150 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062217-SVP2SS**

**Lab ID#: 1706492B-19A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062823** | **Date of Collection:** | **6/22/17 12:11:00 PM** |
| **Dil. Factor:** | **18.0** | **Date of Analysis:** | **6/28/17 11:32 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 9.0 | Not Detected | 77 | Not Detected |
| 1,2-Dibromoethane (EDB) | 9.0 | Not Detected | 69 | Not Detected |
| Chlorobenzene | 9.0 | Not Detected | 41 | Not Detected |
| Ethyl Benzene | 9.0 | Not Detected | 39 | Not Detected |
| m,p-Xylene | 9.0 | Not Detected | 39 | Not Detected |
| o-Xylene | 9.0 | Not Detected | 39 | Not Detected |
| Styrene | 9.0 | Not Detected | 38 | Not Detected |
| Bromoform | 9.0 | Not Detected | 93 | Not Detected |
| Cumene | 9.0 | Not Detected | 44 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 9.0 | Not Detected | 62 | Not Detected |
| Propylbenzene | 9.0 | Not Detected | 44 | Not Detected |
| 4-Ethyltoluene | 9.0 | Not Detected | 44 | Not Detected |
| 1,3,5-Trimethylbenzene | 9.0 | Not Detected | 44 | Not Detected |
| 1,2,4-Trimethylbenzene | 9.0 | Not Detected | 44 | Not Detected |
| 1,3-Dichlorobenzene | 9.0 | Not Detected | 54 | Not Detected |
| 1,4-Dichlorobenzene | 9.0 | Not Detected | 54 | Not Detected |
| alpha-Chlorotoluene | 9.0 | Not Detected | 46 | Not Detected |
| 1,2-Dichlorobenzene | 9.0 | Not Detected | 54 | Not Detected |
| 1,2,4-Trichlorobenzene | 36 | Not Detected | 270 | Not Detected |
| Hexachlorobutadiene | 36 | Not Detected | 380 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 1,2-Dichloroethane-d4 | 89 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: B11193-062117-SSV-9-58**

**Lab ID#: 1706492B-23A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062824** | **Date of Collection:** | **6/21/17 5:59:00 PM** |
| **Dil. Factor:** | **22.4** | **Date of Analysis:** | **6/28/17 11:56 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 11 | Not Detected | 55 | Not Detected |
| Freon 114 | 11 | Not Detected | 78 | Not Detected |
| Chloromethane | 110 | Not Detected | 230 | Not Detected |
| Vinyl Chloride | 11 | Not Detected | 29 | Not Detected |
| 1,3-Butadiene | 11 | Not Detected | 25 | Not Detected |
| Bromomethane | 110 | Not Detected | 430 | Not Detected |
| Chloroethane | 45 | Not Detected | 120 | Not Detected |
| Freon 11 | 11 | Not Detected | 63 | Not Detected |
| Ethanol | 45 | Not Detected | 84 | Not Detected |
| Freon 113 | 11 | Not Detected | 86 | Not Detected |
| 1,1-Dichloroethene | 11 | Not Detected | 44 | Not Detected |
| Acetone | 110 | Not Detected | 270 | Not Detected |
| 2-Propanol | 45 | Not Detected | 110 | Not Detected |
| Carbon Disulfide | 45 | Not Detected | 140 | Not Detected |
| 3-Chloropropene | 45 | Not Detected | 140 | Not Detected |
| Methylene Chloride | 110 | Not Detected | 390 | Not Detected |
| Methyl tert-butyl ether | 45 | Not Detected | 160 | Not Detected |
| trans-1,2-Dichloroethene | 11 | Not Detected | 44 | Not Detected |
| Hexane | 11 | Not Detected | 39 | Not Detected |
| 1,1-Dichloroethane | 11 | Not Detected | 45 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 45 | Not Detected | 130 | Not Detected |
| cis-1,2-Dichloroethene | 11 | 40 | 44 | 160 |
| Tetrahydrofuran | 11 | Not Detected | 33 | Not Detected |
| Chloroform | 11 | Not Detected | 55 | Not Detected |
| 1,1,1-Trichloroethane | 11 | Not Detected | 61 | Not Detected |
| Cyclohexane | 11 | Not Detected | 38 | Not Detected |
| Carbon Tetrachloride | 11 | Not Detected | 70 | Not Detected |
| 2,2,4-Trimethylpentane | 11 | Not Detected | 52 | Not Detected |
| Benzene | 11 | Not Detected | 36 | Not Detected |
| 1,2-Dichloroethane | 11 | Not Detected | 45 | Not Detected |
| Heptane | 11 | Not Detected | 46 | Not Detected |
| Trichloroethene | 11 | 33 | 60 | 180 |
| 1,2-Dichloropropane | 11 | Not Detected | 52 | Not Detected |
| 1,4-Dioxane | 45 | Not Detected | 160 | Not Detected |
| Bromodichloromethane | 11 | Not Detected | 75 | Not Detected |
| cis-1,3-Dichloropropene | 11 | Not Detected | 51 | Not Detected |
| 4-Methyl-2-pentanone | 11 | Not Detected | 46 | Not Detected |
| Toluene | 11 | Not Detected | 42 | Not Detected |
| trans-1,3-Dichloropropene | 11 | Not Detected | 51 | Not Detected |
| 1,1,2-Trichloroethane | 11 | Not Detected | 61 | Not Detected |
| Tetrachloroethene | 11 | 2400 | 76 | 16000 |
| 2-Hexanone | 45 | Not Detected | 180 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: B11193-062117-SSV-9-58**

**Lab ID#: 1706492B-23A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062824** | **Date of Collection:** | **6/21/17 5:59:00 PM** |
| **Dil. Factor:** | **22.4** | **Date of Analysis:** | **6/28/17 11:56 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 11 | Not Detected | 95 | Not Detected |
| 1,2-Dibromoethane (EDB) | 11 | Not Detected | 86 | Not Detected |
| Chlorobenzene | 11 | Not Detected | 52 | Not Detected |
| Ethyl Benzene | 11 | Not Detected | 49 | Not Detected |
| m,p-Xylene | 11 | Not Detected | 49 | Not Detected |
| o-Xylene | 11 | Not Detected | 49 | Not Detected |
| Styrene | 11 | Not Detected | 48 | Not Detected |
| Bromoform | 11 | Not Detected | 120 | Not Detected |
| Cumene | 11 | Not Detected | 55 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 11 | Not Detected | 77 | Not Detected |
| Propylbenzene | 11 | Not Detected | 55 | Not Detected |
| 4-Ethyltoluene | 11 | Not Detected | 55 | Not Detected |
| 1,3,5-Trimethylbenzene | 11 | Not Detected | 55 | Not Detected |
| 1,2,4-Trimethylbenzene | 11 | Not Detected | 55 | Not Detected |
| 1,3-Dichlorobenzene | 11 | Not Detected | 67 | Not Detected |
| 1,4-Dichlorobenzene | 11 | Not Detected | 67 | Not Detected |
| alpha-Chlorotoluene | 11 | Not Detected | 58 | Not Detected |
| 1,2-Dichlorobenzene | 11 | Not Detected | 67 | Not Detected |
| 1,2,4-Trichlorobenzene | 45 | Not Detected | 330 | Not Detected |
| Hexachlorobutadiene | 45 | Not Detected | 480 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 100 | 70-130 |
| 1,2-Dichloroethane-d4 | 90 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1706492B-24A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062805** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/28/17 11:53 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.50 | Not Detected | 2.5 | Not Detected |
| Freon 114 | 0.50 | Not Detected | 3.5 | Not Detected |
| Chloromethane | 5.0 | Not Detected | 10 | Not Detected |
| Vinyl Chloride | 0.50 | Not Detected | 1.3 | Not Detected |
| 1,3-Butadiene | 0.50 | Not Detected | 1.1 | Not Detected |
| Bromomethane | 5.0 | Not Detected | 19 | Not Detected |
| Chloroethane | 2.0 | Not Detected | 5.3 | Not Detected |
| Freon 11 | 0.50 | Not Detected | 2.8 | Not Detected |
| Ethanol | 2.0 | Not Detected | 3.8 | Not Detected |
| Freon 113 | 0.50 | Not Detected | 3.8 | Not Detected |
| 1,1-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Acetone | 5.0 | Not Detected | 12 | Not Detected |
| 2-Propanol | 2.0 | Not Detected | 4.9 | Not Detected |
| Carbon Disulfide | 2.0 | Not Detected | 6.2 | Not Detected |
| 3-Chloropropene | 2.0 | Not Detected | 6.3 | Not Detected |
| Methylene Chloride | 5.0 | Not Detected | 17 | Not Detected |
| Methyl tert-butyl ether | 2.0 | Not Detected | 7.2 | Not Detected |
| trans-1,2-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Hexane | 0.50 | Not Detected | 1.8 | Not Detected |
| 1,1-Dichloroethane | 0.50 | Not Detected | 2.0 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 2.0 | Not Detected | 5.9 | Not Detected |
| cis-1,2-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Tetrahydrofuran | 0.50 | Not Detected | 1.5 | Not Detected |
| Chloroform | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,1,1-Trichloroethane | 0.50 | Not Detected | 2.7 | Not Detected |
| Cyclohexane | 0.50 | Not Detected | 1.7 | Not Detected |
| Carbon Tetrachloride | 0.50 | Not Detected | 3.1 | Not Detected |
| 2,2,4-Trimethylpentane | 0.50 | Not Detected | 2.3 | Not Detected |
| Benzene | 0.50 | Not Detected | 1.6 | Not Detected |
| 1,2-Dichloroethane | 0.50 | Not Detected | 2.0 | Not Detected |
| Heptane | 0.50 | Not Detected | 2.0 | Not Detected |
| Trichloroethene | 0.50 | Not Detected | 2.7 | Not Detected |
| 1,2-Dichloropropane | 0.50 | Not Detected | 2.3 | Not Detected |
| 1,4-Dioxane | 2.0 | Not Detected | 7.2 | Not Detected |
| Bromodichloromethane | 0.50 | Not Detected | 3.4 | Not Detected |
| cis-1,3-Dichloropropene | 0.50 | Not Detected | 2.3 | Not Detected |
| 4-Methyl-2-pentanone | 0.50 | Not Detected | 2.0 | Not Detected |
| Toluene | 0.50 | Not Detected | 1.9 | Not Detected |
| trans-1,3-Dichloropropene | 0.50 | Not Detected | 2.3 | Not Detected |
| 1,1,2-Trichloroethane | 0.50 | Not Detected | 2.7 | Not Detected |
| Tetrachloroethene | 0.50 | Not Detected | 3.4 | Not Detected |
| 2-Hexanone | 2.0 | Not Detected | 8.2 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1706492B-24A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062805** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/28/17 11:53 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 0.50 | Not Detected | 4.2 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.50 | Not Detected | 3.8 | Not Detected |
| Chlorobenzene | 0.50 | Not Detected | 2.3 | Not Detected |
| Ethyl Benzene | 0.50 | Not Detected | 2.2 | Not Detected |
| m,p-Xylene | 0.50 | Not Detected | 2.2 | Not Detected |
| o-Xylene | 0.50 | Not Detected | 2.2 | Not Detected |
| Styrene | 0.50 | Not Detected | 2.1 | Not Detected |
| Bromoform | 0.50 | Not Detected | 5.2 | Not Detected |
| Cumene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.50 | Not Detected | 3.4 | Not Detected |
| Propylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 4-Ethyltoluene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,3,5-Trimethylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,2,4-Trimethylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,3-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| 1,4-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| alpha-Chlorotoluene | 0.50 | Not Detected | 2.6 | Not Detected |
| 1,2-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| 1,2,4-Trichlorobenzene | 2.0 | Not Detected | 15 | Not Detected |
| Hexachlorobutadiene | 2.0 | Not Detected | 21 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 100 | 70-130 |
| 1,2-Dichloroethane-d4 | 92 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1706492B-24B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062909** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 01:20 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 5.0 | Not Detected | 25 | Not Detected |
| Freon 114 | 5.0 | Not Detected | 35 | Not Detected |
| Chloromethane | 20 | Not Detected | 41 | Not Detected |
| Vinyl Chloride | 5.0 | Not Detected | 13 | Not Detected |
| 1,3-Butadiene | 5.0 | Not Detected | 11 | Not Detected |
| Bromomethane | 20 | Not Detected | 78 | Not Detected |
| Chloroethane | 20 | Not Detected | 53 | Not Detected |
| Freon 11 | 5.0 | Not Detected | 28 | Not Detected |
| Ethanol | 20 | Not Detected | 38 | Not Detected |
| Freon 113 | 5.0 | Not Detected | 38 | Not Detected |
| 1,1-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Acetone | 20 | Not Detected | 48 | Not Detected |
| 2-Propanol | 20 | Not Detected | 49 | Not Detected |
| Carbon Disulfide | 20 | Not Detected | 62 | Not Detected |
| 3-Chloropropene | 20 | Not Detected | 63 | Not Detected |
| Methylene Chloride | 20 | Not Detected | 69 | Not Detected |
| Methyl tert-butyl ether | 5.0 | Not Detected | 18 | Not Detected |
| trans-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Hexane | 5.0 | Not Detected | 18 | Not Detected |
| 1,1-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 20 | Not Detected | 59 | Not Detected |
| cis-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Tetrahydrofuran | 5.0 | Not Detected | 15 | Not Detected |
| Chloroform | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,1-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Cyclohexane | 5.0 | Not Detected | 17 | Not Detected |
| Carbon Tetrachloride | 5.0 | Not Detected | 31 | Not Detected |
| 2,2,4-Trimethylpentane | 5.0 | Not Detected | 23 | Not Detected |
| Benzene | 5.0 | Not Detected | 16 | Not Detected |
| 1,2-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| Heptane | 5.0 | Not Detected | 20 | Not Detected |
| Trichloroethene | 5.0 | Not Detected | 27 | Not Detected |
| 1,2-Dichloropropane | 5.0 | Not Detected | 23 | Not Detected |
| 1,4-Dioxane | 20 | Not Detected | 72 | Not Detected |
| Bromodichloromethane | 5.0 | Not Detected | 34 | Not Detected |
| cis-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 4-Methyl-2-pentanone | 5.0 | Not Detected | 20 | Not Detected |
| Toluene | 5.0 | Not Detected | 19 | Not Detected |
| trans-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 1,1,2-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Tetrachloroethene | 5.0 | Not Detected | 34 | Not Detected |
| 2-Hexanone | 20 | Not Detected | 82 | Not Detected |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1706492B-24B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062909** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 01:20 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 5.0 | Not Detected | 42 | Not Detected |
| 1,2-Dibromoethane (EDB) | 5.0 | Not Detected | 38 | Not Detected |
| Chlorobenzene | 5.0 | Not Detected | 23 | Not Detected |
| Ethyl Benzene | 5.0 | Not Detected | 22 | Not Detected |
| m,p-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| o-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| Styrene | 5.0 | Not Detected | 21 | Not Detected |
| Bromoform | 5.0 | Not Detected | 52 | Not Detected |
| Cumene | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 5.0 | Not Detected | 34 | Not Detected |
| Propylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 4-Ethyltoluene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3,5-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,2,4-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,4-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| alpha-Chlorotoluene | 5.0 | Not Detected | 26 | Not Detected |
| 1,2-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,2,4-Trichlorobenzene | 20 | Not Detected | 150 | Not Detected |
| Hexachlorobutadiene | 20 | Not Detected | 210 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 98 | 70-130 |
| Toluene-d8 | 102 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706492B-25A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062802** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/28/17 10:27 AM** | |

| Compound | %Recovery |
|---|---|
| Freon 12 | 99 |
| Freon 114 | 107 |
| Chloromethane | 100 |
| Vinyl Chloride | 101 |
| 1,3-Butadiene | 94 |
| Bromomethane | 104 |
| Chloroethane | 101 |
| Freon 11 | 99 |
| Ethanol | 91 |
| Freon 113 | 105 |
| 1,1-Dichloroethene | 98 |
| Acetone | 87 |
| 2-Propanol | 88 |
| Carbon Disulfide | 92 |
| 3-Chloropropene | 96 |
| Methylene Chloride | 91 |
| Methyl tert-butyl ether | 92 |
| trans-1,2-Dichloroethene | 106 |
| Hexane | 95 |
| 1,1-Dichloroethane | 98 |
| 2-Butanone (Methyl Ethyl Ketone) | 99 |
| cis-1,2-Dichloroethene | 98 |
| Tetrahydrofuran | 86 |
| Chloroform | 100 |
| 1,1,1-Trichloroethane | 99 |
| Cyclohexane | 97 |
| Carbon Tetrachloride | 103 |
| 2,2,4-Trimethylpentane | 93 |
| Benzene | 106 |
| 1,2-Dichloroethane | 99 |
| Heptane | 103 |
| Trichloroethene | 105 |
| 1,2-Dichloropropane | 104 |
| 1,4-Dioxane | 102 |
| Bromodichloromethane | 105 |
| cis-1,3-Dichloropropene | 101 |
| 4-Methyl-2-pentanone | 90 |
| Toluene | 106 |
| trans-1,3-Dichloropropene | 100 |
| 1,1,2-Trichloroethane | 106 |
| Tetrachloroethene | 108 |
| 2-Hexanone | 98 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1706492B-25A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062802** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/28/17 10:27 AM** | |

| Compound | %Recovery |
|---|---|
| Dibromochloromethane | 108 |
| 1,2-Dibromoethane (EDB) | 108 |
| Chlorobenzene | 106 |
| Ethyl Benzene | 104 |
| m,p-Xylene | 104 |
| o-Xylene | 103 |
| Styrene | 114 |
| Bromoform | 109 |
| Cumene | 104 |
| 1,1,2,2-Tetrachloroethane | 103 |
| Propylbenzene | 102 |
| 4-Ethyltoluene | 107 |
| 1,3,5-Trimethylbenzene | 108 |
| 1,2,4-Trimethylbenzene | 103 |
| 1,3-Dichlorobenzene | 108 |
| 1,4-Dichlorobenzene | 108 |
| alpha-Chlorotoluene | 102 |
| 1,2-Dichlorobenzene | 109 |
| 1,2,4-Trichlorobenzene | 113 |
| Hexachlorobutadiene | 113 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 101 | 70-130 |
| 1,2-Dichloroethane-d4 | 93 | 70-130 |
| 4-Bromofluorobenzene | 104 | 70-130 |

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**Client Sample ID: CCV**

**Lab ID#: 1706492B-25B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062906** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 11:59 AM** | |

| Compound | %Recovery |
|---|---|
| Freon 12 | 95 |
| Freon 114 | 96 |
| Chloromethane | 87 |
| Vinyl Chloride | 93 |
| 1,3-Butadiene | 88 |
| Bromomethane | 93 |
| Chloroethane | 94 |
| Freon 11 | 114 |
| Ethanol | 97 |
| Freon 113 | 113 |
| 1,1-Dichloroethene | 110 |
| Acetone | 104 |
| 2-Propanol | 99 |
| Carbon Disulfide | 98 |
| 3-Chloropropene | 99 |
| Methylene Chloride | 120 |
| Methyl tert-butyl ether | 96 |
| trans-1,2-Dichloroethene | 106 |
| Hexane | 106 |
| 1,1-Dichloroethane | 110 |
| 2-Butanone (Methyl Ethyl Ketone) | 100 |
| cis-1,2-Dichloroethene | 103 |
| Tetrahydrofuran | 94 |
| Chloroform | 106 |
| 1,1,1-Trichloroethane | 106 |
| Cyclohexane | 108 |
| Carbon Tetrachloride | 110 |
| 2,2,4-Trimethylpentane | 104 |
| Benzene | 103 |
| 1,2-Dichloroethane | 96 |
| Heptane | 95 |
| Trichloroethene | 106 |
| 1,2-Dichloropropane | 99 |
| 1,4-Dioxane | 98 |
| Bromodichloromethane | 97 |
| cis-1,3-Dichloropropene | 100 |
| 4-Methyl-2-pentanone | 91 |
| Toluene | 103 |
| trans-1,3-Dichloropropene | 99 |
| 1,1,2-Trichloroethane | 105 |
| Tetrachloroethene | 112 |
| 2-Hexanone | 100 |

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**Client Sample ID: CCV**

**Lab ID#: 1706492B-25B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062906** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 11:59 AM** | |

| Compound | %Recovery |
|---|---|
| Dibromochloromethane | 103 |
| 1,2-Dibromoethane (EDB) | 104 |
| Chlorobenzene | 103 |
| Ethyl Benzene | 101 |
| m,p-Xylene | 104 |
| o-Xylene | 102 |
| Styrene | 101 |
| Bromoform | 102 |
| Cumene | 100 |
| 1,1,2,2-Tetrachloroethane | 102 |
| Propylbenzene | 103 |
| 4-Ethyltoluene | 104 |
| 1,3,5-Trimethylbenzene | 99 |
| 1,2,4-Trimethylbenzene | 98 |
| 1,3-Dichlorobenzene | 103 |
| 1,4-Dichlorobenzene | 98 |
| alpha-Chlorotoluene | 97 |
| 1,2-Dichlorobenzene | 100 |
| 1,2,4-Trichlorobenzene | 92 |
| Hexachlorobutadiene | 94 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 96 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1706492B-26A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062803** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/28/17 11:01 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 103 | 70-130 |
| Freon 114 | 110 | 70-130 |
| Chloromethane | 106 | 70-130 |
| Vinyl Chloride | 107 | 70-130 |
| 1,3-Butadiene | 94 | 70-130 |
| Bromomethane | 106 | 70-130 |
| Chloroethane | 104 | 70-130 |
| Freon 11 | 103 | 70-130 |
| Ethanol | 84 | 70-130 |
| Freon 113 | 106 | 70-130 |
| 1,1-Dichloroethene | 101 | 70-130 |
| Acetone | 90 | 70-130 |
| 2-Propanol | 89 | 70-130 |
| Carbon Disulfide | 97 | 70-130 |
| 3-Chloropropene | 103 | 70-130 |
| Methylene Chloride | 94 | 70-130 |
| Methyl tert-butyl ether | 95 | 70-130 |
| trans-1,2-Dichloroethene | 117 | 70-130 |
| Hexane | 98 | 70-130 |
| 1,1-Dichloroethane | 100 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 103 | 70-130 |
| cis-1,2-Dichloroethene | 93 | 70-130 |
| Tetrahydrofuran | 90 | 70-130 |
| Chloroform | 102 | 70-130 |
| 1,1,1-Trichloroethane | 101 | 70-130 |
| Cyclohexane | 100 | 70-130 |
| Carbon Tetrachloride | 104 | 70-130 |
| 2,2,4-Trimethylpentane | 97 | 70-130 |
| Benzene | 106 | 70-130 |
| 1,2-Dichloroethane | 99 | 70-130 |
| Heptane | 106 | 70-130 |
| Trichloroethene | 108 | 70-130 |
| 1,2-Dichloropropane | 105 | 70-130 |
| 1,4-Dioxane | 96 | 70-130 |
| Bromodichloromethane | 110 | 70-130 |
| cis-1,3-Dichloropropene | 108 | 70-130 |
| 4-Methyl-2-pentanone | 91 | 70-130 |
| Toluene | 107 | 70-130 |
| trans-1,3-Dichloropropene | 101 | 70-130 |
| 1,1,2-Trichloroethane | 108 | 70-130 |
| Tetrachloroethene | 109 | 70-130 |
| 2-Hexanone | 98 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1706492B-26A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062803** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/28/17 11:01 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 109 | 70-130 |
| 1,2-Dibromoethane (EDB) | 107 | 70-130 |
| Chlorobenzene | 106 | 70-130 |
| Ethyl Benzene | 106 | 70-130 |
| m,p-Xylene | 106 | 70-130 |
| o-Xylene | 104 | 70-130 |
| Styrene | 109 | 70-130 |
| Bromoform | 114 | 70-130 |
| Cumene | 104 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 104 | 70-130 |
| Propylbenzene | 103 | 70-130 |
| 4-Ethyltoluene | 108 | 70-130 |
| 1,3,5-Trimethylbenzene | 108 | 70-130 |
| 1,2,4-Trimethylbenzene | 104 | 70-130 |
| 1,3-Dichlorobenzene | 108 | 70-130 |
| 1,4-Dichlorobenzene | 109 | 70-130 |
| alpha-Chlorotoluene | 103 | 70-130 |
| 1,2-Dichlorobenzene | 108 | 70-130 |
| 1,2,4-Trichlorobenzene | 108 | 70-130 |
| Hexachlorobutadiene | 108 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 101 | 70-130 |
| 1,2-Dichloroethane-d4 | 90 | 70-130 |
| 4-Bromofluorobenzene | 104 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706492B-26AA**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062804** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/28/17 11:27 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 101 | 70-130 |
| Freon 114 | 108 | 70-130 |
| Chloromethane | 104 | 70-130 |
| Vinyl Chloride | 105 | 70-130 |
| 1,3-Butadiene | 94 | 70-130 |
| Bromomethane | 105 | 70-130 |
| Chloroethane | 103 | 70-130 |
| Freon 11 | 101 | 70-130 |
| Ethanol | 83 | 70-130 |
| Freon 113 | 105 | 70-130 |
| 1,1-Dichloroethene | 101 | 70-130 |
| Acetone | 91 | 70-130 |
| 2-Propanol | 89 | 70-130 |
| Carbon Disulfide | 96 | 70-130 |
| 3-Chloropropene | 103 | 70-130 |
| Methylene Chloride | 92 | 70-130 |
| Methyl tert-butyl ether | 92 | 70-130 |
| trans-1,2-Dichloroethene | 117 | 70-130 |
| Hexane | 98 | 70-130 |
| 1,1-Dichloroethane | 98 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 100 | 70-130 |
| cis-1,2-Dichloroethene | 92 | 70-130 |
| Tetrahydrofuran | 89 | 70-130 |
| Chloroform | 101 | 70-130 |
| 1,1,1-Trichloroethane | 101 | 70-130 |
| Cyclohexane | 100 | 70-130 |
| Carbon Tetrachloride | 102 | 70-130 |
| 2,2,4-Trimethylpentane | 95 | 70-130 |
| Benzene | 104 | 70-130 |
| 1,2-Dichloroethane | 98 | 70-130 |
| Heptane | 103 | 70-130 |
| Trichloroethene | 105 | 70-130 |
| 1,2-Dichloropropane | 102 | 70-130 |
| 1,4-Dioxane | 95 | 70-130 |
| Bromodichloromethane | 107 | 70-130 |
| cis-1,3-Dichloropropene | 107 | 70-130 |
| 4-Methyl-2-pentanone | 90 | 70-130 |
| Toluene | 105 | 70-130 |
| trans-1,3-Dichloropropene | 100 | 70-130 |
| 1,1,2-Trichloroethane | 107 | 70-130 |
| Tetrachloroethene | 109 | 70-130 |
| 2-Hexanone | 97 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706492B-26AA**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **3062804** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/28/17 11:27 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 110 | 70-130 |
| 1,2-Dibromoethane (EDB) | 106 | 70-130 |
| Chlorobenzene | 106 | 70-130 |
| Ethyl Benzene | 106 | 70-130 |
| m,p-Xylene | 106 | 70-130 |
| o-Xylene | 105 | 70-130 |
| Styrene | 108 | 70-130 |
| Bromoform | 114 | 70-130 |
| Cumene | 105 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 104 | 70-130 |
| Propylbenzene | 103 | 70-130 |
| 4-Ethyltoluene | 108 | 70-130 |
| 1,3,5-Trimethylbenzene | 108 | 70-130 |
| 1,2,4-Trimethylbenzene | 104 | 70-130 |
| 1,3-Dichlorobenzene | 109 | 70-130 |
| 1,4-Dichlorobenzene | 111 | 70-130 |
| alpha-Chlorotoluene | 105 | 70-130 |
| 1,2-Dichlorobenzene | 109 | 70-130 |
| 1,2,4-Trichlorobenzene | 113 | 70-130 |
| Hexachlorobutadiene | 113 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 100 | 70-130 |
| 1,2-Dichloroethane-d4 | 89 | 70-130 |
| 4-Bromofluorobenzene | 104 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1706492B-26B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062907** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 12:26 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 91 | 70-130 |
| Freon 114 | 93 | 70-130 |
| Chloromethane | 82 | 70-130 |
| Vinyl Chloride | 92 | 70-130 |
| 1,3-Butadiene | 84 | 70-130 |
| Bromomethane | 91 | 70-130 |
| Chloroethane | 94 | 70-130 |
| Freon 11 | 109 | 70-130 |
| Ethanol | 83 | 70-130 |
| Freon 113 | 107 | 70-130 |
| 1,1-Dichloroethene | 105 | 70-130 |
| Acetone | 102 | 70-130 |
| 2-Propanol | 97 | 70-130 |
| Carbon Disulfide | 94 | 70-130 |
| 3-Chloropropene | 94 | 70-130 |
| Methylene Chloride | 112 | 70-130 |
| Methyl tert-butyl ether | 90 | 70-130 |
| trans-1,2-Dichloroethene | 100 | 70-130 |
| Hexane | 104 | 70-130 |
| 1,1-Dichloroethane | 103 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 97 | 70-130 |
| cis-1,2-Dichloroethene | 97 | 70-130 |
| Tetrahydrofuran | 89 | 70-130 |
| Chloroform | 100 | 70-130 |
| 1,1,1-Trichloroethane | 101 | 70-130 |
| Cyclohexane | 104 | 70-130 |
| Carbon Tetrachloride | 103 | 70-130 |
| 2,2,4-Trimethylpentane | 98 | 70-130 |
| Benzene | 102 | 70-130 |
| 1,2-Dichloroethane | 96 | 70-130 |
| Heptane | 95 | 70-130 |
| Trichloroethene | 108 | 70-130 |
| 1,2-Dichloropropane | 100 | 70-130 |
| 1,4-Dioxane | 98 | 70-130 |
| Bromodichloromethane | 99 | 70-130 |
| cis-1,3-Dichloropropene | 101 | 70-130 |
| 4-Methyl-2-pentanone | 94 | 70-130 |
| Toluene | 103 | 70-130 |
| trans-1,3-Dichloropropene | 96 | 70-130 |
| 1,1,2-Trichloroethane | 99 | 70-130 |
| Tetrachloroethene | 107 | 70-130 |
| 2-Hexanone | 97 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1706492B-26B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062907** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 12:26 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 101 | 70-130 |
| 1,2-Dibromoethane (EDB) | 101 | 70-130 |
| Chlorobenzene | 98 | 70-130 |
| Ethyl Benzene | 97 | 70-130 |
| m,p-Xylene | 98 | 70-130 |
| o-Xylene | 99 | 70-130 |
| Styrene | 97 | 70-130 |
| Bromoform | 99 | 70-130 |
| Cumene | 96 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 95 | 70-130 |
| Propylbenzene | 97 | 70-130 |
| 4-Ethyltoluene | 100 | 70-130 |
| 1,3,5-Trimethylbenzene | 95 | 70-130 |
| 1,2,4-Trimethylbenzene | 93 | 70-130 |
| 1,3-Dichlorobenzene | 96 | 70-130 |
| 1,4-Dichlorobenzene | 96 | 70-130 |
| alpha-Chlorotoluene | 96 | 70-130 |
| 1,2-Dichlorobenzene | 96 | 70-130 |
| 1,2,4-Trichlorobenzene | 92 | 70-130 |
| Hexachlorobutadiene | 90 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 94 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706492B-26BB**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062908** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 12:53 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 93 | 70-130 |
| Freon 114 | 94 | 70-130 |
| Chloromethane | 82 | 70-130 |
| Vinyl Chloride | 93 | 70-130 |
| 1,3-Butadiene | 83 | 70-130 |
| Bromomethane | 91 | 70-130 |
| Chloroethane | 94 | 70-130 |
| Freon 11 | 110 | 70-130 |
| Ethanol | 83 | 70-130 |
| Freon 113 | 107 | 70-130 |
| 1,1-Dichloroethene | 105 | 70-130 |
| Acetone | 103 | 70-130 |
| 2-Propanol | 95 | 70-130 |
| Carbon Disulfide | 95 | 70-130 |
| 3-Chloropropene | 94 | 70-130 |
| Methylene Chloride | 111 | 70-130 |
| Methyl tert-butyl ether | 92 | 70-130 |
| trans-1,2-Dichloroethene | 101 | 70-130 |
| Hexane | 104 | 70-130 |
| 1,1-Dichloroethane | 103 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 96 | 70-130 |
| cis-1,2-Dichloroethene | 97 | 70-130 |
| Tetrahydrofuran | 90 | 70-130 |
| Chloroform | 100 | 70-130 |
| 1,1,1-Trichloroethane | 101 | 70-130 |
| Cyclohexane | 105 | 70-130 |
| Carbon Tetrachloride | 102 | 70-130 |
| 2,2,4-Trimethylpentane | 98 | 70-130 |
| Benzene | 102 | 70-130 |
| 1,2-Dichloroethane | 95 | 70-130 |
| Heptane | 95 | 70-130 |
| Trichloroethene | 106 | 70-130 |
| 1,2-Dichloropropane | 99 | 70-130 |
| 1,4-Dioxane | 97 | 70-130 |
| Bromodichloromethane | 97 | 70-130 |
| cis-1,3-Dichloropropene | 98 | 70-130 |
| 4-Methyl-2-pentanone | 92 | 70-130 |
| Toluene | 101 | 70-130 |
| trans-1,3-Dichloropropene | 95 | 70-130 |
| 1,1,2-Trichloroethane | 99 | 70-130 |
| Tetrachloroethene | 106 | 70-130 |
| 2-Hexanone | 98 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1706492B-26BB**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **j062908** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 6/29/17 12:53 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 100 | 70-130 |
| 1,2-Dibromoethane (EDB) | 98 | 70-130 |
| Chlorobenzene | 99 | 70-130 |
| Ethyl Benzene | 98 | 70-130 |
| m,p-Xylene | 99 | 70-130 |
| o-Xylene | 99 | 70-130 |
| Styrene | 98 | 70-130 |
| Bromoform | 99 | 70-130 |
| Cumene | 95 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 96 | 70-130 |
| Propylbenzene | 97 | 70-130 |
| 4-Ethyltoluene | 99 | 70-130 |
| 1,3,5-Trimethylbenzene | 95 | 70-130 |
| 1,2,4-Trimethylbenzene | 94 | 70-130 |
| 1,3-Dichlorobenzene | 97 | 70-130 |
| 1,4-Dichlorobenzene | 96 | 70-130 |
| alpha-Chlorotoluene | 94 | 70-130 |
| 1,2-Dichlorobenzene | 96 | 70-130 |
| 1,2,4-Trichlorobenzene | 92 | 70-130 |
| Hexachlorobutadiene | 93 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 94 | 70-130 |
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

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7/27/2017
Mr. William Wertz
GeoSyntec Consultants
26 Century Hill Drive
Suite 205
Latham NY 12110

Project Name: Vandenberg 11193
Project #:
Workorder #: 1707242A

Dear Mr. William Wertz

The following report includes the data for the above referenced project for sample(s) received on 7/17/2017 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Ausha Scott

Project Manager

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# WORK ORDER #: 1707242A

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. William Wertz<br>GeoSyntec Consultants<br>26 Century Hill Drive<br>Suite 205<br>Latham, NY 12110 | **BILL TO:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Stone Road West<br>Guelph, Ontario N1G3Z2 |
| **PHONE:** | 518-779-3582 | **P.O. #** | |
| **FAX:** | | **PROJECT #** | Vandenberg 11193 |
| **DATE RECEIVED:** | 07/17/2017 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 07/25/2017 | | |

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. | FINAL PRESSURE |
|---|---|---|---|---|
| 01A | 6L Walking Indoor Comp 07132017 | Modified TO-15 | 0.8 "Hg | 4.8 psi |
| 01B | 6L Walking Indoor Comp 07132017 | Modified TO-15 | 0.8 "Hg | 4.8 psi |
| 04A | GC4 07132017 | Modified TO-15 | 1.4 "Hg | 5 psi |
| 04B | GC4 07132017 | Modified TO-15 | 1.4 "Hg | 5 psi |
| 05A | Lab Blank | Modified TO-15 | NA | NA |
| 05B | Lab Blank | Modified TO-15 | NA | NA |
| 06A | CCV | Modified TO-15 | NA | NA |
| 06B | CCV | Modified TO-15 | NA | NA |
| 07A | LCS | Modified TO-15 | NA | NA |
| 07AA | LCSD | Modified TO-15 | NA | NA |
| 07B | LCS | Modified TO-15 | NA | NA |
| 07BB | LCSD | Modified TO-15 | NA | NA |

CERTIFIED BY: Heidi Hayes DATE: 07/26/17

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

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**LABORATORY NARRATIVE**
**Modified TO-15 Full Scan/SIM**
**GeoSyntec Consultants**
**Workorder# 1707242A**

Two 6 Liter Summa Canister (SIM Certified) samples were received on July 17, 2017. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the Full Scan and SIM acquisition modes. The method involves concentrating up to 1.0 liters of air. The concentrated aliquot is then flash vaporized and swept through a water management system to remove water vapor. Following dehumidification, the sample passes directly into the GC/MS for analysis.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

| ***Requirement*** | ***TO-15*** | ***ATL Modifications*** |
|---|---|---|
| ICAL %RSD acceptance criteria | </=30% RSD with 2 compounds allowed out to < 40% RSD | For Full Scan:<br>30% RSD with 4 compounds allowed out to < 40% RSD<br><br>For SIM:<br>Project specific; default criteria is </=30% RSD with 10% of compounds allowed out to < 40% RSD |
| Daily Calibration | +- 30% Difference | For Full Scan:<br></= 30% Difference with four allowed out up to </=40%.; flag and narrate outliers<br><br>For SIM:<br>Project specific; default criteria is </= 30% Difference with 10% of compounds allowed out up to </=40%.; flag and narrate outliers |
| Blank and standards | Zero air | Nitrogen |
| Method Detection Limit | Follow 40CFR Pt.136 App. B | The MDL met all relevant requirements in Method TO-15 (statistical MDL less than the LOQ). The concentration of the spiked replicate may have exceeded 10X the calculated MDL in some cases |

**Receiving Notes**

The Chain of Custody (COC) was not relinquished properly. A time was not provided by the field sampler.

The Chain of Custody was missing method information. EATL proceeded with the analysis as per the original contract or verbal agreement.

**Analytical Notes**

The results for each sample in this report were acquired from two separate data files originating from

the same analytical run. The two data files have the same base file name and are differentiated with a "sim" extension on the SIM data file.

**Definition of Data Qualifying Flags**

Nine qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

CN - See case narrative explanation

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN

**Client Sample ID: 6L Walking Indoor Comp 07132017**

**Lab ID#: 1707242A-01A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 11 | 0.14 | 0.22 | 0.76 | 1.2 |
| Ethanol | 0.68 | 6.2 | 1.3 | 12 |
| Acetone | 0.68 | 9.0 | 1.6 | 21 |
| 2-Butanone (Methyl Ethyl Ketone) | 0.68 | 1.0 | 2.0 | 3.1 |
| Tetrahydrofuran | 0.68 | 1.4 | 2.0 | 4.1 |

**Client Sample ID: 6L Walking Indoor Comp 07132017**

**Lab ID#: 1707242A-01B**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.027 | 0.43 | 0.13 | 2.1 |
| cis-1,2-Dichloroethene | 0.027 | 0.036 | 0.11 | 0.14 |
| Carbon Tetrachloride | 0.027 | 0.038 | 0.17 | 0.24 |
| 1,2-Dichloroethane | 0.027 | 0.056 | 0.11 | 0.23 |
| Trichloroethene | 0.027 | 0.039 | 0.15 | 0.21 |
| Toluene | 0.027 | 0.054 | 0.10 | 0.20 |
| Tetrachloroethene | 0.027 | 1.1 | 0.18 | 7.5 |

**Client Sample ID: GC4 07132017**

**Lab ID#: 1707242A-04A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 11 | 0.14 | 0.21 | 0.79 | 1.2 |
| Ethanol | 0.70 | 4.4 | 1.3 | 8.2 |
| Acetone | 0.70 | 9.2 | 1.7 | 22 |
| 2-Butanone (Methyl Ethyl Ketone) | 0.70 | 1.0 | 2.1 | 3.0 |
| Tetrahydrofuran | 0.70 | 1.7 | 2.1 | 5.0 |

**Client Sample ID: GC4 07132017**

**Lab ID#: 1707242A-04B**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|

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# Summary of Detected Compounds
# MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN

**Client Sample ID: GC4 07132017**

**Lab ID#: 1707242A-04B**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.028 | 0.44 | 0.14 | 2.2 |
| cis-1,2-Dichloroethene | 0.028 | 0.031 | 0.11 | 0.12 |
| Carbon Tetrachloride | 0.028 | 0.035 | 0.18 | 0.22 |
| 1,2-Dichloroethane | 0.028 | 0.032 | 0.11 | 0.13 |
| Trichloroethene | 0.028 | 0.029 | 0.15 | 0.15 |
| Toluene | 0.028 | 0.038 | 0.11 | 0.14 |
| Tetrachloroethene | 0.028 | 1.0 | 0.19 | 6.8 |

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**Client Sample ID: 6L Walking Indoor Comp 07132017**

**Lab ID#: 1707242A-01A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071912** | **Date of Collection: 7/13/17 2:12:00 PM** | |
| **Dil. Factor:** | **1.36** | **Date of Analysis: 7/19/17 03:08 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| 1,3-Butadiene | 0.14 | Not Detected | 0.30 | Not Detected |
| Bromomethane | 0.68 | Not Detected | 2.6 | Not Detected |
| Freon 11 | 0.14 | 0.22 | 0.76 | 1.2 |
| Ethanol | 0.68 | 6.2 | 1.3 | 12 |
| Freon 113 | 0.14 | Not Detected | 1.0 | Not Detected |
| Acetone | 0.68 | 9.0 | 1.6 | 21 |
| 2-Propanol | 0.68 | Not Detected | 1.7 | Not Detected |
| Carbon Disulfide | 0.68 | Not Detected | 2.1 | Not Detected |
| 3-Chloropropene | 0.68 | Not Detected | 2.1 | Not Detected |
| Methylene Chloride | 0.27 | Not Detected | 0.94 | Not Detected |
| Hexane | 0.14 | Not Detected | 0.48 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.68 | 1.0 | 2.0 | 3.1 |
| Tetrahydrofuran | 0.68 | 1.4 | 2.0 | 4.1 |
| Cyclohexane | 0.14 | Not Detected | 0.47 | Not Detected |
| 2,2,4-Trimethylpentane | 0.68 | Not Detected | 3.2 | Not Detected |
| Heptane | 0.14 | Not Detected | 0.56 | Not Detected |
| 1,2-Dichloropropane | 0.14 | Not Detected | 0.63 | Not Detected |
| 1,4-Dioxane | 0.14 | Not Detected | 0.49 | Not Detected |
| Bromodichloromethane | 0.14 | Not Detected | 0.91 | Not Detected |
| cis-1,3-Dichloropropene | 0.14 | Not Detected | 0.62 | Not Detected |
| 4-Methyl-2-pentanone | 0.14 | Not Detected | 0.56 | Not Detected |
| trans-1,3-Dichloropropene | 0.14 | Not Detected | 0.62 | Not Detected |
| 2-Hexanone | 0.68 | Not Detected | 2.8 | Not Detected |
| Dibromochloromethane | 0.14 | Not Detected | 1.2 | Not Detected |
| Chlorobenzene | 0.14 | Not Detected | 0.63 | Not Detected |
| Styrene | 0.14 | Not Detected | 0.58 | Not Detected |
| Bromoform | 0.14 | Not Detected | 1.4 | Not Detected |
| Cumene | 0.14 | Not Detected | 0.67 | Not Detected |
| Propylbenzene | 0.14 | Not Detected | 0.67 | Not Detected |
| 4-Ethyltoluene | 0.14 | Not Detected | 0.67 | Not Detected |
| 1,3,5-Trimethylbenzene | 0.14 | Not Detected | 0.67 | Not Detected |
| 1,2,4-Trimethylbenzene | 0.14 | Not Detected | 0.67 | Not Detected |
| 1,3-Dichlorobenzene | 0.14 | Not Detected | 0.82 | Not Detected |
| alpha-Chlorotoluene | 0.14 | Not Detected | 0.70 | Not Detected |
| 1,2-Dichlorobenzene | 0.14 | Not Detected | 0.82 | Not Detected |
| 1,2,4-Trichlorobenzene | 0.68 | Not Detected | 5.0 | Not Detected |
| Hexachlorobutadiene | 0.68 | Not Detected | 7.2 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 118 | 70-130 |

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**Client Sample ID: 6L Walking Indoor Comp 07132017**

**Lab ID#: 1707242A-01A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071912** | **Date of Collection: 7/13/17 2:12:00 PM** | |
| **Dil. Factor:** | **1.36** | **Date of Analysis: 7/19/17 03:08 PM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 90 | 70-130 |

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**Client Sample ID: 6L Walking Indoor Comp 07132017**

**Lab ID#: 1707242A-01B**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071912sim** | **Date of Collection:** | **7/13/17 2:12:00 PM** |
| **Dil. Factor:** | **1.36** | **Date of Analysis:** | **7/19/17 03:08 PM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.027 | 0.43 | 0.13 | 2.1 |
| Freon 114 | 0.027 | Not Detected | 0.19 | Not Detected |
| Chloromethane | 0.68 | Not Detected | 1.4 | Not Detected |
| Vinyl Chloride | 0.014 | Not Detected | 0.035 | Not Detected |
| Chloroethane | 0.068 | Not Detected | 0.18 | Not Detected |
| 1,1-Dichloroethene | 0.014 | Not Detected | 0.054 | Not Detected |
| trans-1,2-Dichloroethene | 0.14 | Not Detected | 0.54 | Not Detected |
| Methyl tert-butyl ether | 0.14 | Not Detected | 0.49 | Not Detected |
| 1,1-Dichloroethane | 0.027 | Not Detected | 0.11 | Not Detected |
| cis-1,2-Dichloroethene | 0.027 | 0.036 | 0.11 | 0.14 |
| Chloroform | 0.027 | Not Detected | 0.13 | Not Detected |
| 1,1,1-Trichloroethane | 0.027 | Not Detected | 0.15 | Not Detected |
| Carbon Tetrachloride | 0.027 | 0.038 | 0.17 | 0.24 |
| Benzene | 0.068 | Not Detected | 0.22 | Not Detected |
| 1,2-Dichloroethane | 0.027 | 0.056 | 0.11 | 0.23 |
| Trichloroethene | 0.027 | 0.039 | 0.15 | 0.21 |
| Toluene | 0.027 | 0.054 | 0.10 | 0.20 |
| 1,1,2-Trichloroethane | 0.027 | Not Detected | 0.15 | Not Detected |
| Tetrachloroethene | 0.027 | 1.1 | 0.18 | 7.5 |
| 1,2-Dibromoethane (EDB) | 0.027 | Not Detected | 0.21 | Not Detected |
| Ethyl Benzene | 0.027 | Not Detected | 0.12 | Not Detected |
| m,p-Xylene | 0.054 | Not Detected | 0.24 | Not Detected |
| o-Xylene | 0.027 | Not Detected | 0.12 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.027 | Not Detected | 0.19 | Not Detected |
| 1,4-Dichlorobenzene | 0.027 | Not Detected | 0.16 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 116 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 92 | 70-130 |

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**Client Sample ID: GC4 07132017**

**Lab ID#: 1707242A-04A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071911** | **Date of Collection: 7/13/17 4:21:00 PM** | |
| **Dil. Factor:** | **1.41** | **Date of Analysis: 7/19/17 02:36 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| 1,3-Butadiene | 0.14 | Not Detected | 0.31 | Not Detected |
| Bromomethane | 0.70 | Not Detected | 2.7 | Not Detected |
| Freon 11 | 0.14 | 0.21 | 0.79 | 1.2 |
| Ethanol | 0.70 | 4.4 | 1.3 | 8.2 |
| Freon 113 | 0.14 | Not Detected | 1.1 | Not Detected |
| Acetone | 0.70 | 9.2 | 1.7 | 22 |
| 2-Propanol | 0.70 | Not Detected | 1.7 | Not Detected |
| Carbon Disulfide | 0.70 | Not Detected | 2.2 | Not Detected |
| 3-Chloropropene | 0.70 | Not Detected | 2.2 | Not Detected |
| Methylene Chloride | 0.28 | Not Detected | 0.98 | Not Detected |
| Hexane | 0.14 | Not Detected | 0.50 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.70 | 1.0 | 2.1 | 3.0 |
| Tetrahydrofuran | 0.70 | 1.7 | 2.1 | 5.0 |
| Cyclohexane | 0.14 | Not Detected | 0.48 | Not Detected |
| 2,2,4-Trimethylpentane | 0.70 | Not Detected | 3.3 | Not Detected |
| Heptane | 0.14 | Not Detected | 0.58 | Not Detected |
| 1,2-Dichloropropane | 0.14 | Not Detected | 0.65 | Not Detected |
| 1,4-Dioxane | 0.14 | Not Detected | 0.51 | Not Detected |
| Bromodichloromethane | 0.14 | Not Detected | 0.94 | Not Detected |
| cis-1,3-Dichloropropene | 0.14 | Not Detected | 0.64 | Not Detected |
| 4-Methyl-2-pentanone | 0.14 | Not Detected | 0.58 | Not Detected |
| trans-1,3-Dichloropropene | 0.14 | Not Detected | 0.64 | Not Detected |
| 2-Hexanone | 0.70 | Not Detected | 2.9 | Not Detected |
| Dibromochloromethane | 0.14 | Not Detected | 1.2 | Not Detected |
| Chlorobenzene | 0.14 | Not Detected | 0.65 | Not Detected |
| Styrene | 0.14 | Not Detected | 0.60 | Not Detected |
| Bromoform | 0.14 | Not Detected | 1.4 | Not Detected |
| Cumene | 0.14 | Not Detected | 0.69 | Not Detected |
| Propylbenzene | 0.14 | Not Detected | 0.69 | Not Detected |
| 4-Ethyltoluene | 0.14 | Not Detected | 0.69 | Not Detected |
| 1,3,5-Trimethylbenzene | 0.14 | Not Detected | 0.69 | Not Detected |
| 1,2,4-Trimethylbenzene | 0.14 | Not Detected | 0.69 | Not Detected |
| 1,3-Dichlorobenzene | 0.14 | Not Detected | 0.85 | Not Detected |
| alpha-Chlorotoluene | 0.14 | Not Detected | 0.73 | Not Detected |
| 1,2-Dichlorobenzene | 0.14 | Not Detected | 0.85 | Not Detected |
| 1,2,4-Trichlorobenzene | 0.70 | Not Detected | 5.2 | Not Detected |
| Hexachlorobutadiene | 0.70 | Not Detected | 7.5 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 117 | 70-130 |

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**Client Sample ID: GC4 07132017**

**Lab ID#: 1707242A-04A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071911** | **Date of Collection: 7/13/17 4:21:00 PM** | |
| **Dil. Factor:** | **1.41** | **Date of Analysis: 7/19/17 02:36 PM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 90 | 70-130 |

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**Client Sample ID: GC4 07132017**

**Lab ID#: 1707242A-04B**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071911sim** | **Date of Collection: 7/13/17 4:21:00 PM** | |
| **Dil. Factor:** | **1.41** | **Date of Analysis: 7/19/17 02:36 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.028 | 0.44 | 0.14 | 2.2 |
| Freon 114 | 0.028 | Not Detected | 0.20 | Not Detected |
| Chloromethane | 0.70 | Not Detected | 1.4 | Not Detected |
| Vinyl Chloride | 0.014 | Not Detected | 0.036 | Not Detected |
| Chloroethane | 0.070 | Not Detected | 0.19 | Not Detected |
| 1,1-Dichloroethene | 0.014 | Not Detected | 0.056 | Not Detected |
| trans-1,2-Dichloroethene | 0.14 | Not Detected | 0.56 | Not Detected |
| Methyl tert-butyl ether | 0.14 | Not Detected | 0.51 | Not Detected |
| 1,1-Dichloroethane | 0.028 | Not Detected | 0.11 | Not Detected |
| cis-1,2-Dichloroethene | 0.028 | 0.031 | 0.11 | 0.12 |
| Chloroform | 0.028 | Not Detected | 0.14 | Not Detected |
| 1,1,1-Trichloroethane | 0.028 | Not Detected | 0.15 | Not Detected |
| Carbon Tetrachloride | 0.028 | 0.035 | 0.18 | 0.22 |
| Benzene | 0.070 | Not Detected | 0.22 | Not Detected |
| 1,2-Dichloroethane | 0.028 | 0.032 | 0.11 | 0.13 |
| Trichloroethene | 0.028 | 0.029 | 0.15 | 0.15 |
| Toluene | 0.028 | 0.038 | 0.11 | 0.14 |
| 1,1,2-Trichloroethane | 0.028 | Not Detected | 0.15 | Not Detected |
| Tetrachloroethene | 0.028 | 1.0 | 0.19 | 6.8 |
| 1,2-Dibromoethane (EDB) | 0.028 | Not Detected | 0.22 | Not Detected |
| Ethyl Benzene | 0.028 | Not Detected | 0.12 | Not Detected |
| m,p-Xylene | 0.056 | Not Detected | 0.24 | Not Detected |
| o-Xylene | 0.028 | Not Detected | 0.12 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.028 | Not Detected | 0.19 | Not Detected |
| 1,4-Dichlorobenzene | 0.028 | Not Detected | 0.17 | Not Detected |

**Container Type: 6 Liter Summa Canister (SIM Certified)**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 114 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 91 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1707242A-05A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071909** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 01:18 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| 1,3-Butadiene | 0.10 | Not Detected | 0.22 | Not Detected |
| Bromomethane | 0.50 | Not Detected | 1.9 | Not Detected |
| Freon 11 | 0.10 | Not Detected | 0.56 | Not Detected |
| Ethanol | 0.50 | Not Detected | 0.94 | Not Detected |
| Freon 113 | 0.10 | Not Detected | 0.77 | Not Detected |
| Acetone | 0.50 | Not Detected | 1.2 | Not Detected |
| 2-Propanol | 0.50 | Not Detected | 1.2 | Not Detected |
| Carbon Disulfide | 0.50 | Not Detected | 1.6 | Not Detected |
| 3-Chloropropene | 0.50 | Not Detected | 1.6 | Not Detected |
| Methylene Chloride | 0.20 | Not Detected | 0.69 | Not Detected |
| Hexane | 0.10 | Not Detected | 0.35 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 0.50 | Not Detected | 1.5 | Not Detected |
| Tetrahydrofuran | 0.50 | Not Detected | 1.5 | Not Detected |
| Cyclohexane | 0.10 | Not Detected | 0.34 | Not Detected |
| 2,2,4-Trimethylpentane | 0.50 | Not Detected | 2.3 | Not Detected |
| Heptane | 0.10 | Not Detected | 0.41 | Not Detected |
| 1,2-Dichloropropane | 0.10 | Not Detected | 0.46 | Not Detected |
| 1,4-Dioxane | 0.10 | Not Detected | 0.36 | Not Detected |
| Bromodichloromethane | 0.10 | Not Detected | 0.67 | Not Detected |
| cis-1,3-Dichloropropene | 0.10 | Not Detected | 0.45 | Not Detected |
| 4-Methyl-2-pentanone | 0.10 | Not Detected | 0.41 | Not Detected |
| trans-1,3-Dichloropropene | 0.10 | Not Detected | 0.45 | Not Detected |
| 2-Hexanone | 0.50 | Not Detected | 2.0 | Not Detected |
| Dibromochloromethane | 0.10 | Not Detected | 0.85 | Not Detected |
| Chlorobenzene | 0.10 | Not Detected | 0.46 | Not Detected |
| Styrene | 0.10 | Not Detected | 0.42 | Not Detected |
| Bromoform | 0.10 | Not Detected | 1.0 | Not Detected |
| Cumene | 0.10 | Not Detected | 0.49 | Not Detected |
| Propylbenzene | 0.10 | Not Detected | 0.49 | Not Detected |
| 4-Ethyltoluene | 0.10 | Not Detected | 0.49 | Not Detected |
| 1,3,5-Trimethylbenzene | 0.10 | Not Detected | 0.49 | Not Detected |
| 1,2,4-Trimethylbenzene | 0.10 | Not Detected | 0.49 | Not Detected |
| 1,3-Dichlorobenzene | 0.10 | Not Detected | 0.60 | Not Detected |
| alpha-Chlorotoluene | 0.10 | Not Detected | 0.52 | Not Detected |
| 1,2-Dichlorobenzene | 0.10 | Not Detected | 0.60 | Not Detected |
| 1,2,4-Trichlorobenzene | 0.50 | Not Detected | 3.7 | Not Detected |
| Hexachlorobutadiene | 0.50 | Not Detected | 5.3 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 110 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1707242A-05A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071909** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 01:18 PM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 88 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1707242A-05B**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071909sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 01:18 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.020 | Not Detected | 0.099 | Not Detected |
| Freon 114 | 0.020 | Not Detected | 0.14 | Not Detected |
| Chloromethane | 0.50 | Not Detected | 1.0 | Not Detected |
| Vinyl Chloride | 0.010 | Not Detected | 0.026 | Not Detected |
| Chloroethane | 0.050 | Not Detected | 0.13 | Not Detected |
| 1,1-Dichloroethene | 0.010 | Not Detected | 0.040 | Not Detected |
| trans-1,2-Dichloroethene | 0.10 | Not Detected | 0.40 | Not Detected |
| Methyl tert-butyl ether | 0.10 | Not Detected | 0.36 | Not Detected |
| 1,1-Dichloroethane | 0.020 | Not Detected | 0.081 | Not Detected |
| cis-1,2-Dichloroethene | 0.020 | Not Detected | 0.079 | Not Detected |
| Chloroform | 0.020 | Not Detected | 0.098 | Not Detected |
| 1,1,1-Trichloroethane | 0.020 | Not Detected | 0.11 | Not Detected |
| Carbon Tetrachloride | 0.020 | Not Detected | 0.12 | Not Detected |
| Benzene | 0.050 | Not Detected | 0.16 | Not Detected |
| 1,2-Dichloroethane | 0.020 | Not Detected | 0.081 | Not Detected |
| Trichloroethene | 0.020 | Not Detected | 0.11 | Not Detected |
| Toluene | 0.020 | Not Detected | 0.075 | Not Detected |
| 1,1,2-Trichloroethane | 0.020 | Not Detected | 0.11 | Not Detected |
| Tetrachloroethene | 0.020 | Not Detected | 0.14 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.020 | Not Detected | 0.15 | Not Detected |
| Ethyl Benzene | 0.020 | Not Detected | 0.087 | Not Detected |
| m,p-Xylene | 0.040 | Not Detected | 0.17 | Not Detected |
| o-Xylene | 0.020 | Not Detected | 0.087 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.020 | Not Detected | 0.14 | Not Detected |
| 1,4-Dichlorobenzene | 0.020 | Not Detected | 0.12 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 102 | 70-130 |
| 4-Bromofluorobenzene | 88 | 70-130 |

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**Client Sample ID: CCV**

**Lab ID#: 1707242A-06A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071902** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 07:36 AM** | |

| Compound | %Recovery |
|---|---|
| 1,3-Butadiene | 91 |
| Bromomethane | 110 |
| Freon 11 | 89 |
| Ethanol | 90 |
| Freon 113 | 88 |
| Acetone | 91 |
| 2-Propanol | 86 |
| Carbon Disulfide | 96 |
| 3-Chloropropene | 112 |
| Methylene Chloride | 82 |
| Hexane | 98 |
| 2-Butanone (Methyl Ethyl Ketone) | 95 |
| Tetrahydrofuran | 97 |
| Cyclohexane | 99 |
| 2,2,4-Trimethylpentane | 105 |
| Heptane | 98 |
| 1,2-Dichloropropane | 92 |
| 1,4-Dioxane | 99 |
| Bromodichloromethane | 95 |
| cis-1,3-Dichloropropene | 98 |
| 4-Methyl-2-pentanone | 101 |
| trans-1,3-Dichloropropene | 95 |
| 2-Hexanone | 100 |
| Dibromochloromethane | 98 |
| Chlorobenzene | 92 |
| Styrene | 99 |
| Bromoform | 106 |
| Cumene | 99 |
| Propylbenzene | 97 |
| 4-Ethyltoluene | 103 |
| 1,3,5-Trimethylbenzene | 104 |
| 1,2,4-Trimethylbenzene | 108 |
| 1,3-Dichlorobenzene | 92 |
| alpha-Chlorotoluene | 98 |
| 1,2-Dichlorobenzene | 90 |
| 1,2,4-Trichlorobenzene | 109 |
| Hexachlorobutadiene | 97 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 94 | 70-130 |

**Client Sample ID: CCV**

**Lab ID#: 1707242A-06A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071902** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 07:36 AM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 98 | 70-130 |

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**Client Sample ID: CCV**

**Lab ID#: 1707242A-06B**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071902sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 07:36 AM** | |

| Compound | %Recovery |
|---|---|
| Freon 12 | 86 |
| Freon 114 | 84 |
| Chloromethane | 76 |
| Vinyl Chloride | 79 |
| Chloroethane | 90 |
| 1,1-Dichloroethene | 84 |
| trans-1,2-Dichloroethene | 85 |
| Methyl tert-butyl ether | 98 |
| 1,1-Dichloroethane | 87 |
| cis-1,2-Dichloroethene | 89 |
| Chloroform | 76 |
| 1,1,1-Trichloroethane | 85 |
| Carbon Tetrachloride | 117 |
| Benzene | 80 |
| 1,2-Dichloroethane | 80 |
| Trichloroethene | 87 |
| Toluene | 84 |
| 1,1,2-Trichloroethane | 92 |
| Tetrachloroethene | 84 |
| 1,2-Dibromoethane (EDB) | 97 |
| Ethyl Benzene | 96 |
| m,p-Xylene | 98 |
| o-Xylene | 102 |
| 1,1,2,2-Tetrachloroethane | 94 |
| 1,4-Dichlorobenzene | 87 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 89 | 70-130 |
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1707242A-07A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071903** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 08:30 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| 1,3-Butadiene | 104 | 70-130 |
| Bromomethane | 122 | 70-130 |
| Freon 11 | 103 | 70-130 |
| Ethanol | 104 | 70-130 |
| Freon 113 | 98 | 70-130 |
| Acetone | 103 | 70-130 |
| 2-Propanol | 106 | 70-130 |
| Carbon Disulfide | 93 | 70-130 |
| 3-Chloropropene | 110 | 70-130 |
| Methylene Chloride | 93 | 70-130 |
| Hexane | 114 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 109 | 70-130 |
| Tetrahydrofuran | 108 | 70-130 |
| Cyclohexane | 114 | 70-130 |
| 2,2,4-Trimethylpentane | 122 | 70-130 |
| Heptane | 114 | 70-130 |
| 1,2-Dichloropropane | 107 | 70-130 |
| 1,4-Dioxane | 111 | 70-130 |
| Bromodichloromethane | 109 | 70-130 |
| cis-1,3-Dichloropropene | 107 | 70-130 |
| 4-Methyl-2-pentanone | 122 | 70-130 |
| trans-1,3-Dichloropropene | 109 | 70-130 |
| 2-Hexanone | 122 | 70-130 |
| Dibromochloromethane | 107 | 70-130 |
| Chlorobenzene | 104 | 70-130 |
| Styrene | 125 | 70-130 |
| Bromoform | 114 | 70-130 |
| Cumene | 121 | 70-130 |
| Propylbenzene | 121 | 70-130 |
| 4-Ethyltoluene | 126 | 70-130 |
| 1,3,5-Trimethylbenzene | 126 | 70-130 |
| 1,2,4-Trimethylbenzene | 128 | 70-130 |
| 1,3-Dichlorobenzene | 109 | 70-130 |
| alpha-Chlorotoluene | 125 | 70-130 |
| 1,2-Dichlorobenzene | 108 | 70-130 |
| 1,2,4-Trichlorobenzene | 120 | 70-130 |
| Hexachlorobutadiene | 118 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 96 | 70-130 |

**Client Sample ID: LCS**

**Lab ID#: 1707242A-07A**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071903** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 08:30 AM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 104 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1707242A-07AA**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071904** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 09:23 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| 1,3-Butadiene | 101 | 70-130 |
| Bromomethane | 121 | 70-130 |
| Freon 11 | 102 | 70-130 |
| Ethanol | 106 | 70-130 |
| Freon 113 | 95 | 70-130 |
| Acetone | 101 | 70-130 |
| 2-Propanol | 107 | 70-130 |
| Carbon Disulfide | 92 | 70-130 |
| 3-Chloropropene | 111 | 70-130 |
| Methylene Chloride | 90 | 70-130 |
| Hexane | 110 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 107 | 70-130 |
| Tetrahydrofuran | 107 | 70-130 |
| Cyclohexane | 110 | 70-130 |
| 2,2,4-Trimethylpentane | 116 | 70-130 |
| Heptane | 110 | 70-130 |
| 1,2-Dichloropropane | 108 | 70-130 |
| 1,4-Dioxane | 111 | 70-130 |
| Bromodichloromethane | 114 | 70-130 |
| cis-1,3-Dichloropropene | 108 | 70-130 |
| 4-Methyl-2-pentanone | 122 | 70-130 |
| trans-1,3-Dichloropropene | 112 | 70-130 |
| 2-Hexanone | 125 | 70-130 |
| Dibromochloromethane | 112 | 70-130 |
| Chlorobenzene | 101 | 70-130 |
| Styrene | 119 | 70-130 |
| Bromoform | 118 | 70-130 |
| Cumene | 115 | 70-130 |
| Propylbenzene | 112 | 70-130 |
| 4-Ethyltoluene | 115 | 70-130 |
| 1,3,5-Trimethylbenzene | 116 | 70-130 |
| 1,2,4-Trimethylbenzene | 114 | 70-130 |
| 1,3-Dichlorobenzene | 101 | 70-130 |
| alpha-Chlorotoluene | 119 | 70-130 |
| 1,2-Dichlorobenzene | 100 | 70-130 |
| 1,2,4-Trichlorobenzene | 106 | 70-130 |
| Hexachlorobutadiene | 100 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 98 | 70-130 |

**Client Sample ID: LCSD**

**Lab ID#: 1707242A-07AA**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071904** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 09:23 AM** | |

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 101 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

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**Client Sample ID: LCS**

**Lab ID#: 1707242A-07B**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071903sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 08:30 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 98 | 70-130 |
| Freon 114 | 99 | 70-130 |
| Chloromethane | 91 | 70-130 |
| Vinyl Chloride | 92 | 70-130 |
| Chloroethane | 103 | 70-130 |
| 1,1-Dichloroethene | 95 | 70-130 |
| trans-1,2-Dichloroethene | 84 | 70-130 |
| Methyl tert-butyl ether | 109 | 70-130 |
| 1,1-Dichloroethane | 98 | 70-130 |
| cis-1,2-Dichloroethene | 110 | 70-130 |
| Chloroform | 85 | 70-130 |
| 1,1,1-Trichloroethane | 97 | 70-130 |
| Carbon Tetrachloride | 74 | 60-140 |
| Benzene | 89 | 70-130 |
| 1,2-Dichloroethane | 90 | 70-130 |
| Trichloroethene | 97 | 70-130 |
| Toluene | 94 | 70-130 |
| 1,1,2-Trichloroethane | 102 | 70-130 |
| Tetrachloroethene | 96 | 70-130 |
| 1,2-Dibromoethane (EDB) | 110 | 70-130 |
| Ethyl Benzene | 111 | 70-130 |
| m,p-Xylene | 118 | 70-130 |
| o-Xylene | 124 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 106 | 70-130 |
| 1,4-Dichlorobenzene | 105 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 92 | 70-130 |
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 105 | 70-130 |

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**Client Sample ID: LCSD**

**Lab ID#: 1707242A-07BB**

**MODIFIED EPA METHOD TO-15 GC/MS SIM/FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **21071904sim** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 09:23 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 93 | 70-130 |
| Freon 114 | 96 | 70-130 |
| Chloromethane | 89 | 70-130 |
| Vinyl Chloride | 90 | 70-130 |
| Chloroethane | 101 | 70-130 |
| 1,1-Dichloroethene | 93 | 70-130 |
| trans-1,2-Dichloroethene | 81 | 70-130 |
| Methyl tert-butyl ether | 108 | 70-130 |
| 1,1-Dichloroethane | 97 | 70-130 |
| cis-1,2-Dichloroethene | 106 | 70-130 |
| Chloroform | 84 | 70-130 |
| 1,1,1-Trichloroethane | 96 | 70-130 |
| Carbon Tetrachloride | 73 | 60-140 |
| Benzene | 88 | 70-130 |
| 1,2-Dichloroethane | 91 | 70-130 |
| Trichloroethene | 96 | 70-130 |
| Toluene | 90 | 70-130 |
| 1,1,2-Trichloroethane | 105 | 70-130 |
| Tetrachloroethene | 95 | 70-130 |
| 1,2-Dibromoethane (EDB) | 114 | 70-130 |
| Ethyl Benzene | 107 | 70-130 |
| m,p-Xylene | 111 | 70-130 |
| o-Xylene | 117 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 108 | 70-130 |
| 1,4-Dichlorobenzene | 97 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 92 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

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7/26/2017
Mr. William Wertz
GeoSyntec Consultants
26 Century Hill Drive
Suite 205
Latham NY 12110

Project Name: Vandenberg 11193
Project #:
Workorder #: 1707242B

Dear Mr. William Wertz

The following report includes the data for the above referenced project for sample(s) received on 7/17/2017 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Ausha Scott at 916-985-1000 if you have any questions regarding the data in this report.

Regards,



Ausha Scott

Project Manager

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# WORK ORDER #: 1707242B

Work Order Summary

| | | | |
|---|---|---|---|
| **CLIENT:** | Mr. William Wertz<br>GeoSyntec Consultants<br>26 Century Hill Drive<br>Suite 205<br>Latham, NY 12110 | **BILL TO:** | Mr. Paul Nicholson<br>GeoSyntec Consultants<br>130 Stone Road West<br>Guelph, Ontario N1G3Z2 |
| **PHONE:** | 518-779-3582 | **P.O. #** | |
| **FAX:** | | **PROJECT #** | Vandenberg 11193 |
| **DATE RECEIVED:** | 07/17/2017 | **CONTACT:** | Ausha Scott |
| **DATE COMPLETED:** | 07/26/2017 | | |

| FRACTION # | NAME | TEST | RECEIPT VAC./PRES. | FINAL PRESSURE |
|---|---|---|---|---|
| 02A | SVP-3SS 07132017 | TO-15 | 2 "Hg | 15.2 psi |
| 03A | SSV 07132017 | TO-15 | 1 "Hg | 14.5 psi |
| 04A | Lab Blank | TO-15 | NA | NA |
| 04B | Lab Blank | TO-15 | NA | NA |
| 05A | CCV | TO-15 | NA | NA |
| 05B | CCV | TO-15 | NA | NA |
| 06A | LCS | TO-15 | NA | NA |
| 06AA | LCSD | TO-15 | NA | NA |
| 06B | LCS | TO-15 | NA | NA |
| 06BB | LCSD | TO-15 | NA | NA |

CERTIFIED BY: Heidi Hayes DATE: 07/26/17

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-16-11, UT NELAP CA0093332016-7, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2016, Expiration date: 10/17/2017.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

**LABORATORY NARRATIVE**
**EPA Method TO-15**
**GeoSyntec Consultants**
**Workorder# 1707242B**

Two 1 Liter Summa Canister samples were received on July 17, 2017. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

## Receiving Notes

The Chain of Custody (COC) was not relinquished properly. A time was not provided by the field sampler.

The Chain of Custody was missing method information. EATL proceeded with the analysis as per the original contract or verbal agreement.

## Analytical Notes

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page. Target compound non-detects in the samples that are associated with high bias in QC analyses have not been flagged (analytical batch from 07/25/17).

Dilution was performed on samples SVP-3SS 07132017 and SSV 07132017 due to the presence of high level target species.

## Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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# Summary of Detected Compounds
# EPA METHOD TO-15 GC/MS

**Client Sample ID: SVP-3SS 07132017**

**Lab ID#: 1707242B-02A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Trichloroethene | 11 | 150 | 58 | 790 |
| Tetrachloroethene | 11 | 7400 | 74 | 50000 |

**Client Sample ID: SSV 07132017**

**Lab ID#: 1707242B-03A**

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| cis-1,2-Dichloroethene | 2.0 | 26 | 8.1 | 100 |
| Trichloroethene | 2.0 | 21 | 11 | 110 |
| Tetrachloroethene | 2.0 | 650 | 14 | 4400 |
| Ethyl Benzene | 2.0 | 4.8 | 8.9 | 21 |
| m,p-Xylene | 2.0 | 2.9 | 8.9 | 13 |
| Cumene | 2.0 | 2.5 | 10 | 12 |
| Propylbenzene | 2.0 | 2.9 | 10 | 14 |
| 1,3,5-Trimethylbenzene | 2.0 | 3.2 | 10 | 16 |
| 1,2,4-Trimethylbenzene | 2.0 | 8.4 | 10 | 41 |

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**Client Sample ID: SVP-3SS 07132017**

**Lab ID#: 1707242B-02A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072531** | **Date of Collection:** | **7/13/17 3:23:00 PM** |
| **Dil. Factor:** | **2.18** | **Date of Analysis:** | **7/26/17 09:11 AM** |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 11 | Not Detected | 54 | Not Detected |
| Freon 114 | 11 | Not Detected | 76 | Not Detected |
| Chloromethane | 44 | Not Detected | 90 | Not Detected |
| Vinyl Chloride | 11 | Not Detected | 28 | Not Detected |
| 1,3-Butadiene | 11 | Not Detected | 24 | Not Detected |
| Bromomethane | 44 | Not Detected | 170 | Not Detected |
| Chloroethane | 44 | Not Detected | 120 | Not Detected |
| Freon 11 | 11 | Not Detected | 61 | Not Detected |
| Ethanol | 44 | Not Detected | 82 | Not Detected |
| Freon 113 | 11 | Not Detected | 84 | Not Detected |
| 1,1-Dichloroethene | 11 | Not Detected | 43 | Not Detected |
| Acetone | 44 | Not Detected | 100 | Not Detected |
| 2-Propanol | 44 | Not Detected | 110 | Not Detected |
| Carbon Disulfide | 44 | Not Detected | 140 | Not Detected |
| 3-Chloropropene | 44 | Not Detected | 140 | Not Detected |
| Methylene Chloride | 44 | Not Detected | 150 | Not Detected |
| Methyl tert-butyl ether | 11 | Not Detected | 39 | Not Detected |
| trans-1,2-Dichloroethene | 11 | Not Detected | 43 | Not Detected |
| Hexane | 11 | Not Detected | 38 | Not Detected |
| 1,1-Dichloroethane | 11 | Not Detected | 44 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 44 | Not Detected | 130 | Not Detected |
| cis-1,2-Dichloroethene | 11 | Not Detected | 43 | Not Detected |
| Tetrahydrofuran | 11 | Not Detected | 32 | Not Detected |
| Chloroform | 11 | Not Detected | 53 | Not Detected |
| 1,1,1-Trichloroethane | 11 | Not Detected | 59 | Not Detected |
| Cyclohexane | 11 | Not Detected | 38 | Not Detected |
| Carbon Tetrachloride | 11 | Not Detected | 68 | Not Detected |
| 2,2,4-Trimethylpentane | 11 | Not Detected | 51 | Not Detected |
| Benzene | 11 | Not Detected | 35 | Not Detected |
| 1,2-Dichloroethane | 11 | Not Detected | 44 | Not Detected |
| Heptane | 11 | Not Detected | 45 | Not Detected |
| Trichloroethene | 11 | 150 | 58 | 790 |
| 1,2-Dichloropropane | 11 | Not Detected | 50 | Not Detected |
| 1,4-Dioxane | 44 | Not Detected UJ | 160 | Not Detected UJ |
| Bromodichloromethane | 11 | Not Detected | 73 | Not Detected |
| cis-1,3-Dichloropropene | 11 | Not Detected | 49 | Not Detected |
| 4-Methyl-2-pentanone | 11 | Not Detected | 45 | Not Detected |
| Toluene | 11 | Not Detected | 41 | Not Detected |
| trans-1,3-Dichloropropene | 11 | Not Detected | 49 | Not Detected |
| 1,1,2-Trichloroethane | 11 | Not Detected | 59 | Not Detected |
| Tetrachloroethene | 11 | 7400 | 74 | 50000 |
| 2-Hexanone | 44 | Not Detected | 180 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: SVP-3SS 07132017**

**Lab ID#: 1707242B-02A**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072531** | **Date of Collection: 7/13/17 3:23:00 PM** | |
| **Dil. Factor:** | **2.18** | **Date of Analysis: 7/26/17 09:11 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 11 | Not Detected | 93 | Not Detected |
| 1,2-Dibromoethane (EDB) | 11 | Not Detected | 84 | Not Detected |
| Chlorobenzene | 11 | Not Detected | 50 | Not Detected |
| Ethyl Benzene | 11 | Not Detected | 47 | Not Detected |
| m,p-Xylene | 11 | Not Detected | 47 | Not Detected |
| o-Xylene | 11 | Not Detected | 47 | Not Detected |
| Styrene | 11 | Not Detected | 46 | Not Detected |
| Bromoform | 11 | Not Detected | 110 | Not Detected |
| Cumene | 11 | Not Detected | 54 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 11 | Not Detected | 75 | Not Detected |
| Propylbenzene | 11 | Not Detected | 54 | Not Detected |
| 4-Ethyltoluene | 11 | Not Detected | 54 | Not Detected |
| 1,3,5-Trimethylbenzene | 11 | Not Detected | 54 | Not Detected |
| 1,2,4-Trimethylbenzene | 11 | Not Detected | 54 | Not Detected |
| 1,3-Dichlorobenzene | 11 | Not Detected | 66 | Not Detected |
| 1,4-Dichlorobenzene | 11 | Not Detected | 66 | Not Detected |
| alpha-Chlorotoluene | 11 | Not Detected | 56 | Not Detected |
| 1,2-Dichlorobenzene | 11 | Not Detected | 66 | Not Detected |
| 1,2,4-Trichlorobenzene | 44 | Not Detected | 320 | Not Detected |
| Hexachlorobutadiene | 44 | Not Detected | 460 | Not Detected |

UJ = Analyte associated with low bias in the CCV.

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 107 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 101 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: SSV 07132017**

**Lab ID#: 1707242B-03A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071928** | **Date of Collection: 7/13/17 3:44:00 PM** | |
| **Dil. Factor:** | **4.11** | **Date of Analysis: 7/20/17 08:16 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 2.0 | Not Detected | 10 | Not Detected |
| Freon 114 | 2.0 | Not Detected | 14 | Not Detected |
| Chloromethane | 20 | Not Detected | 42 | Not Detected |
| Vinyl Chloride | 2.0 | Not Detected | 5.2 | Not Detected |
| 1,3-Butadiene | 2.0 | Not Detected | 4.5 | Not Detected |
| Bromomethane | 20 | Not Detected | 80 | Not Detected |
| Chloroethane | 8.2 | Not Detected | 22 | Not Detected |
| Freon 11 | 2.0 | Not Detected | 12 | Not Detected |
| Ethanol | 8.2 | Not Detected | 15 | Not Detected |
| Freon 113 | 2.0 | Not Detected | 16 | Not Detected |
| 1,1-Dichloroethene | 2.0 | Not Detected | 8.1 | Not Detected |
| Acetone | 20 | Not Detected | 49 | Not Detected |
| 2-Propanol | 8.2 | Not Detected | 20 | Not Detected |
| Carbon Disulfide | 8.2 | Not Detected | 26 | Not Detected |
| 3-Chloropropene | 8.2 | Not Detected | 26 | Not Detected |
| Methylene Chloride | 20 | Not Detected | 71 | Not Detected |
| Methyl tert-butyl ether | 8.2 | Not Detected | 30 | Not Detected |
| trans-1,2-Dichloroethene | 2.0 | Not Detected | 8.1 | Not Detected |
| Hexane | 2.0 | Not Detected | 7.2 | Not Detected |
| 1,1-Dichloroethane | 2.0 | Not Detected | 8.3 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 8.2 | Not Detected | 24 | Not Detected |
| cis-1,2-Dichloroethene | 2.0 | 26 | 8.1 | 100 |
| Tetrahydrofuran | 2.0 | Not Detected | 6.0 | Not Detected |
| Chloroform | 2.0 | Not Detected | 10 | Not Detected |
| 1,1,1-Trichloroethane | 2.0 | Not Detected | 11 | Not Detected |
| Cyclohexane | 2.0 | Not Detected | 7.1 | Not Detected |
| Carbon Tetrachloride | 2.0 | Not Detected | 13 | Not Detected |
| 2,2,4-Trimethylpentane | 2.0 | Not Detected | 9.6 | Not Detected |
| Benzene | 2.0 | Not Detected | 6.6 | Not Detected |
| 1,2-Dichloroethane | 2.0 | Not Detected | 8.3 | Not Detected |
| Heptane | 2.0 | Not Detected | 8.4 | Not Detected |
| Trichloroethene | 2.0 | 21 | 11 | 110 |
| 1,2-Dichloropropane | 2.0 | Not Detected | 9.5 | Not Detected |
| 1,4-Dioxane | 8.2 | Not Detected | 30 | Not Detected |
| Bromodichloromethane | 2.0 | Not Detected | 14 | Not Detected |
| cis-1,3-Dichloropropene | 2.0 | Not Detected | 9.3 | Not Detected |
| 4-Methyl-2-pentanone | 2.0 | Not Detected | 8.4 | Not Detected |
| Toluene | 2.0 | Not Detected | 7.7 | Not Detected |
| trans-1,3-Dichloropropene | 2.0 | Not Detected | 9.3 | Not Detected |
| 1,1,2-Trichloroethane | 2.0 | Not Detected | 11 | Not Detected |
| Tetrachloroethene | 2.0 | 650 | 14 | 4400 |
| 2-Hexanone | 8.2 | Not Detected | 34 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: SSV 07132017**

**Lab ID#: 1707242B-03A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071928** | **Date of Collection: 7/13/17 3:44:00 PM** | |
| **Dil. Factor:** | **4.11** | **Date of Analysis: 7/20/17 08:16 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 2.0 | Not Detected | 18 | Not Detected |
| 1,2-Dibromoethane (EDB) | 2.0 | Not Detected | 16 | Not Detected |
| Chlorobenzene | 2.0 | Not Detected | 9.5 | Not Detected |
| Ethyl Benzene | 2.0 | 4.8 | 8.9 | 21 |
| m,p-Xylene | 2.0 | 2.9 | 8.9 | 13 |
| o-Xylene | 2.0 | Not Detected | 8.9 | Not Detected |
| Styrene | 2.0 | Not Detected | 8.8 | Not Detected |
| Bromoform | 2.0 | Not Detected | 21 | Not Detected |
| Cumene | 2.0 | 2.5 | 10 | 12 |
| 1,1,2,2-Tetrachloroethane | 2.0 | Not Detected | 14 | Not Detected |
| Propylbenzene | 2.0 | 2.9 | 10 | 14 |
| 4-Ethyltoluene | 2.0 | Not Detected | 10 | Not Detected |
| 1,3,5-Trimethylbenzene | 2.0 | 3.2 | 10 | 16 |
| 1,2,4-Trimethylbenzene | 2.0 | 8.4 | 10 | 41 |
| 1,3-Dichlorobenzene | 2.0 | Not Detected | 12 | Not Detected |
| 1,4-Dichlorobenzene | 2.0 | Not Detected | 12 | Not Detected |
| alpha-Chlorotoluene | 2.0 | Not Detected | 11 | Not Detected |
| 1,2-Dichlorobenzene | 2.0 | Not Detected | 12 | Not Detected |
| 1,2,4-Trichlorobenzene | 8.2 | Not Detected | 61 | Not Detected |
| Hexachlorobutadiene | 8.2 | Not Detected | 88 | Not Detected |

**Container Type: 1 Liter Summa Canister**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 104 | 70-130 |
| 1,2-Dichloroethane-d4 | 99 | 70-130 |
| 4-Bromofluorobenzene | 98 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1707242B-04A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071906** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 11:24 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 0.50 | Not Detected | 2.5 | Not Detected |
| Freon 114 | 0.50 | Not Detected | 3.5 | Not Detected |
| Chloromethane | 5.0 | Not Detected | 10 | Not Detected |
| Vinyl Chloride | 0.50 | Not Detected | 1.3 | Not Detected |
| 1,3-Butadiene | 0.50 | Not Detected | 1.1 | Not Detected |
| Bromomethane | 5.0 | Not Detected | 19 | Not Detected |
| Chloroethane | 2.0 | Not Detected | 5.3 | Not Detected |
| Freon 11 | 0.50 | Not Detected | 2.8 | Not Detected |
| Ethanol | 2.0 | Not Detected | 3.8 | Not Detected |
| Freon 113 | 0.50 | Not Detected | 3.8 | Not Detected |
| 1,1-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Acetone | 5.0 | Not Detected | 12 | Not Detected |
| 2-Propanol | 2.0 | Not Detected | 4.9 | Not Detected |
| Carbon Disulfide | 2.0 | Not Detected | 6.2 | Not Detected |
| 3-Chloropropene | 2.0 | Not Detected | 6.3 | Not Detected |
| Methylene Chloride | 5.0 | Not Detected | 17 | Not Detected |
| Methyl tert-butyl ether | 2.0 | Not Detected | 7.2 | Not Detected |
| trans-1,2-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Hexane | 0.50 | Not Detected | 1.8 | Not Detected |
| 1,1-Dichloroethane | 0.50 | Not Detected | 2.0 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 2.0 | Not Detected | 5.9 | Not Detected |
| cis-1,2-Dichloroethene | 0.50 | Not Detected | 2.0 | Not Detected |
| Tetrahydrofuran | 0.50 | Not Detected | 1.5 | Not Detected |
| Chloroform | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,1,1-Trichloroethane | 0.50 | Not Detected | 2.7 | Not Detected |
| Cyclohexane | 0.50 | Not Detected | 1.7 | Not Detected |
| Carbon Tetrachloride | 0.50 | Not Detected | 3.1 | Not Detected |
| 2,2,4-Trimethylpentane | 0.50 | Not Detected | 2.3 | Not Detected |
| Benzene | 0.50 | Not Detected | 1.6 | Not Detected |
| 1,2-Dichloroethane | 0.50 | Not Detected | 2.0 | Not Detected |
| Heptane | 0.50 | Not Detected | 2.0 | Not Detected |
| Trichloroethene | 0.50 | Not Detected | 2.7 | Not Detected |
| 1,2-Dichloropropane | 0.50 | Not Detected | 2.3 | Not Detected |
| 1,4-Dioxane | 2.0 | Not Detected | 7.2 | Not Detected |
| Bromodichloromethane | 0.50 | Not Detected | 3.4 | Not Detected |
| cis-1,3-Dichloropropene | 0.50 | Not Detected | 2.3 | Not Detected |
| 4-Methyl-2-pentanone | 0.50 | Not Detected | 2.0 | Not Detected |
| Toluene | 0.50 | Not Detected | 1.9 | Not Detected |
| trans-1,3-Dichloropropene | 0.50 | Not Detected | 2.3 | Not Detected |
| 1,1,2-Trichloroethane | 0.50 | Not Detected | 2.7 | Not Detected |
| Tetrachloroethene | 0.50 | Not Detected | 3.4 | Not Detected |
| 2-Hexanone | 2.0 | Not Detected | 8.2 | Not Detected |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1707242B-04A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071906** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 11:24 AM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 0.50 | Not Detected | 4.2 | Not Detected |
| 1,2-Dibromoethane (EDB) | 0.50 | Not Detected | 3.8 | Not Detected |
| Chlorobenzene | 0.50 | Not Detected | 2.3 | Not Detected |
| Ethyl Benzene | 0.50 | Not Detected | 2.2 | Not Detected |
| m,p-Xylene | 0.50 | Not Detected | 2.2 | Not Detected |
| o-Xylene | 0.50 | Not Detected | 2.2 | Not Detected |
| Styrene | 0.50 | Not Detected | 2.1 | Not Detected |
| Bromoform | 0.50 | Not Detected | 5.2 | Not Detected |
| Cumene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 0.50 | Not Detected | 3.4 | Not Detected |
| Propylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 4-Ethyltoluene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,3,5-Trimethylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,2,4-Trimethylbenzene | 0.50 | Not Detected | 2.4 | Not Detected |
| 1,3-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| 1,4-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| alpha-Chlorotoluene | 0.50 | Not Detected | 2.6 | Not Detected |
| 1,2-Dichlorobenzene | 0.50 | Not Detected | 3.0 | Not Detected |
| 1,2,4-Trichlorobenzene | 2.0 | Not Detected | 15 | Not Detected |
| Hexachlorobutadiene | 2.0 | Not Detected | 21 | Not Detected |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 103 | 70-130 |
| 1,2-Dichloroethane-d4 | 100 | 70-130 |
| 4-Bromofluorobenzene | 96 | 70-130 |

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**Client Sample ID: Lab Blank**

**Lab ID#: 1707242B-04B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072509** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/25/17 03:01 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Freon 12 | 5.0 | Not Detected | 25 | Not Detected |
| Freon 114 | 5.0 | Not Detected | 35 | Not Detected |
| Chloromethane | 20 | Not Detected | 41 | Not Detected |
| Vinyl Chloride | 5.0 | Not Detected | 13 | Not Detected |
| 1,3-Butadiene | 5.0 | Not Detected | 11 | Not Detected |
| Bromomethane | 20 | Not Detected | 78 | Not Detected |
| Chloroethane | 20 | Not Detected | 53 | Not Detected |
| Freon 11 | 5.0 | Not Detected | 28 | Not Detected |
| Ethanol | 20 | Not Detected | 38 | Not Detected |
| Freon 113 | 5.0 | Not Detected | 38 | Not Detected |
| 1,1-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Acetone | 20 | Not Detected | 48 | Not Detected |
| 2-Propanol | 20 | Not Detected | 49 | Not Detected |
| Carbon Disulfide | 20 | Not Detected | 62 | Not Detected |
| 3-Chloropropene | 20 | Not Detected | 63 | Not Detected |
| Methylene Chloride | 20 | Not Detected | 69 | Not Detected |
| Methyl tert-butyl ether | 5.0 | Not Detected | 18 | Not Detected |
| trans-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Hexane | 5.0 | Not Detected | 18 | Not Detected |
| 1,1-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| 2-Butanone (Methyl Ethyl Ketone) | 20 | Not Detected | 59 | Not Detected |
| cis-1,2-Dichloroethene | 5.0 | Not Detected | 20 | Not Detected |
| Tetrahydrofuran | 5.0 | Not Detected | 15 | Not Detected |
| Chloroform | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,1-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Cyclohexane | 5.0 | Not Detected | 17 | Not Detected |
| Carbon Tetrachloride | 5.0 | Not Detected | 31 | Not Detected |
| 2,2,4-Trimethylpentane | 5.0 | Not Detected | 23 | Not Detected |
| Benzene | 5.0 | Not Detected | 16 | Not Detected |
| 1,2-Dichloroethane | 5.0 | Not Detected | 20 | Not Detected |
| Heptane | 5.0 | Not Detected | 20 | Not Detected |
| Trichloroethene | 5.0 | Not Detected | 27 | Not Detected |
| 1,2-Dichloropropane | 5.0 | Not Detected | 23 | Not Detected |
| 1,4-Dioxane | 20 | Not Detected UJ | 72 | Not Detected UJ |
| Bromodichloromethane | 5.0 | Not Detected | 34 | Not Detected |
| cis-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 4-Methyl-2-pentanone | 5.0 | Not Detected | 20 | Not Detected |
| Toluene | 5.0 | Not Detected | 19 | Not Detected |
| trans-1,3-Dichloropropene | 5.0 | Not Detected | 23 | Not Detected |
| 1,1,2-Trichloroethane | 5.0 | Not Detected | 27 | Not Detected |
| Tetrachloroethene | 5.0 | Not Detected | 34 | Not Detected |
| 2-Hexanone | 20 | Not Detected | 82 | Not Detected |

eurofins | Air Toxics

**Client Sample ID: Lab Blank**

**Lab ID#: 1707242B-04B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072509** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/25/17 03:01 PM** | |

| Compound | Rpt. Limit (ppbv) | Amount (ppbv) | Rpt. Limit (ug/m3) | Amount (ug/m3) |
|---|---|---|---|---|
| Dibromochloromethane | 5.0 | Not Detected | 42 | Not Detected |
| 1,2-Dibromoethane (EDB) | 5.0 | Not Detected | 38 | Not Detected |
| Chlorobenzene | 5.0 | Not Detected | 23 | Not Detected |
| Ethyl Benzene | 5.0 | Not Detected | 22 | Not Detected |
| m,p-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| o-Xylene | 5.0 | Not Detected | 22 | Not Detected |
| Styrene | 5.0 | Not Detected | 21 | Not Detected |
| Bromoform | 5.0 | Not Detected | 52 | Not Detected |
| Cumene | 5.0 | Not Detected | 24 | Not Detected |
| 1,1,2,2-Tetrachloroethane | 5.0 | Not Detected | 34 | Not Detected |
| Propylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 4-Ethyltoluene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3,5-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,2,4-Trimethylbenzene | 5.0 | Not Detected | 24 | Not Detected |
| 1,3-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,4-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| alpha-Chlorotoluene | 5.0 | Not Detected | 26 | Not Detected |
| 1,2-Dichlorobenzene | 5.0 | Not Detected | 30 | Not Detected |
| 1,2,4-Trichlorobenzene | 20 | Not Detected | 150 | Not Detected |
| Hexachlorobutadiene | 20 | Not Detected | 210 | Not Detected |

UJ = Analyte associated with low bias in the CCV.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 105 | 70-130 |
| Toluene-d8 | 103 | 70-130 |
| 4-Bromofluorobenzene | 100 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1707242B-05A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071902** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 09:22 AM** | |

| Compound | %Recovery |
|---|---|
| Freon 12 | 92 |
| Freon 114 | 89 |
| Chloromethane | 108 |
| Vinyl Chloride | 98 |
| 1,3-Butadiene | 96 |
| Bromomethane | 92 |
| Chloroethane | 97 |
| Freon 11 | 92 |
| Ethanol | 95 |
| Freon 113 | 89 |
| 1,1-Dichloroethene | 92 |
| Acetone | 96 |
| 2-Propanol | 106 |
| Carbon Disulfide | 100 |
| 3-Chloropropene | 96 |
| Methylene Chloride | 104 |
| Methyl tert-butyl ether | 92 |
| trans-1,2-Dichloroethene | 108 |
| Hexane | 99 |
| 1,1-Dichloroethane | 96 |
| 2-Butanone (Methyl Ethyl Ketone) | 99 |
| cis-1,2-Dichloroethene | 96 |
| Tetrahydrofuran | 105 |
| Chloroform | 93 |
| 1,1,1-Trichloroethane | 89 |
| Cyclohexane | 97 |
| Carbon Tetrachloride | 92 |
| 2,2,4-Trimethylpentane | 100 |
| Benzene | 93 |
| 1,2-Dichloroethane | 96 |
| Heptane | 96 |
| Trichloroethene | 91 |
| 1,2-Dichloropropane | 98 |
| 1,4-Dioxane | 100 |
| Bromodichloromethane | 96 |
| cis-1,3-Dichloropropene | 105 |
| 4-Methyl-2-pentanone | 96 |
| Toluene | 94 |
| trans-1,3-Dichloropropene | 99 |
| 1,1,2-Trichloroethane | 96 |
| Tetrachloroethene | 90 |
| 2-Hexanone | 104 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1707242B-05A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071902** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 09:22 AM** | |

| Compound | %Recovery |
|---|---|
| Dibromochloromethane | 94 |
| 1,2-Dibromoethane (EDB) | 93 |
| Chlorobenzene | 95 |
| Ethyl Benzene | 96 |
| m,p-Xylene | 101 |
| o-Xylene | 102 |
| Styrene | 100 |
| Bromoform | 96 |
| Cumene | 95 |
| 1,1,2,2-Tetrachloroethane | 103 |
| Propylbenzene | 98 |
| 4-Ethyltoluene | 92 |
| 1,3,5-Trimethylbenzene | 100 |
| 1,2,4-Trimethylbenzene | 94 |
| 1,3-Dichlorobenzene | 93 |
| 1,4-Dichlorobenzene | 93 |
| alpha-Chlorotoluene | 98 |
| 1,2-Dichlorobenzene | 90 |
| 1,2,4-Trichlorobenzene | 86 |
| Hexachlorobutadiene | 85 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 102 | 70-130 |
| 1,2-Dichloroethane-d4 | 103 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1707242B-05B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072502** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/25/17 10:49 AM** | |

| Compound | %Recovery |
|---|---|
| Freon 12 | 102 |
| Freon 114 | 97 |
| Chloromethane | 98 |
| Vinyl Chloride | 102 |
| 1,3-Butadiene | 100 |
| Bromomethane | 94 |
| Chloroethane | 103 |
| Freon 11 | 110 |
| Ethanol | 107 |
| Freon 113 | 100 |
| 1,1-Dichloroethene | 102 |
| Acetone | 115 |
| 2-Propanol | 138 Q |
| Carbon Disulfide | 97 |
| 3-Chloropropene | 90 |
| Methylene Chloride | 109 |
| Methyl tert-butyl ether | 103 |
| trans-1,2-Dichloroethene | 99 |
| Hexane | 101 |
| 1,1-Dichloroethane | 101 |
| 2-Butanone (Methyl Ethyl Ketone) | 106 |
| cis-1,2-Dichloroethene | 102 |
| Tetrahydrofuran | 105 |
| Chloroform | 105 |
| 1,1,1-Trichloroethane | 108 |
| Cyclohexane | 96 |
| Carbon Tetrachloride | 102 |
| 2,2,4-Trimethylpentane | 100 |
| Benzene | 92 |
| 1,2-Dichloroethane | 104 |
| Heptane | 98 |
| Trichloroethene | 95 |
| 1,2-Dichloropropane | 97 |
| 1,4-Dioxane | 69 Q |
| Bromodichloromethane | 106 |
| cis-1,3-Dichloropropene | 102 |
| 4-Methyl-2-pentanone | 117 |
| Toluene | 92 |
| trans-1,3-Dichloropropene | 99 |
| 1,1,2-Trichloroethane | 92 |
| Tetrachloroethene | 98 |
| 2-Hexanone | 104 |

eurofins | Air Toxics

**Client Sample ID: CCV**

**Lab ID#: 1707242B-05B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072502** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/25/17 10:49 AM** | |

| Compound | %Recovery |
|---|---|
| Dibromochloromethane | 103 |
| 1,2-Dibromoethane (EDB) | 98 |
| Chlorobenzene | 94 |
| Ethyl Benzene | 102 |
| m,p-Xylene | 96 |
| o-Xylene | 95 |
| Styrene | 100 |
| Bromoform | 103 |
| Cumene | 108 |
| 1,1,2,2-Tetrachloroethane | 98 |
| Propylbenzene | 102 |
| 4-Ethyltoluene | 104 |
| 1,3,5-Trimethylbenzene | 103 |
| 1,2,4-Trimethylbenzene | 94 |
| 1,3-Dichlorobenzene | 108 |
| 1,4-Dichlorobenzene | 106 |
| alpha-Chlorotoluene | 111 |
| 1,2-Dichlorobenzene | 109 |
| 1,2,4-Trichlorobenzene | 96 |
| Hexachlorobutadiene | 110 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 105 | 70-130 |
| Toluene-d8 | 100 | 70-130 |
| 4-Bromofluorobenzene | 103 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1707242B-06A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071903** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 09:47 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 96 | 70-130 |
| Freon 114 | 95 | 70-130 |
| Chloromethane | 112 | 70-130 |
| Vinyl Chloride | 102 | 70-130 |
| 1,3-Butadiene | 97 | 70-130 |
| Bromomethane | 97 | 70-130 |
| Chloroethane | 105 | 70-130 |
| Freon 11 | 98 | 70-130 |
| Ethanol | 112 | 70-130 |
| Freon 113 | 90 | 70-130 |
| 1,1-Dichloroethene | 99 | 70-130 |
| Acetone | 96 | 70-130 |
| 2-Propanol | 109 | 70-130 |
| Carbon Disulfide | 91 | 70-130 |
| 3-Chloropropene | 92 | 70-130 |
| Methylene Chloride | 109 | 70-130 |
| Methyl tert-butyl ether | 94 | 70-130 |
| trans-1,2-Dichloroethene | 94 | 70-130 |
| Hexane | 98 | 70-130 |
| 1,1-Dichloroethane | 101 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 106 | 70-130 |
| cis-1,2-Dichloroethene | 121 | 70-130 |
| Tetrahydrofuran | 105 | 70-130 |
| Chloroform | 94 | 70-130 |
| 1,1,1-Trichloroethane | 91 | 70-130 |
| Cyclohexane | 98 | 70-130 |
| Carbon Tetrachloride | 94 | 70-130 |
| 2,2,4-Trimethylpentane | 104 | 70-130 |
| Benzene | 97 | 70-130 |
| 1,2-Dichloroethane | 96 | 70-130 |
| Heptane | 102 | 70-130 |
| Trichloroethene | 94 | 70-130 |
| 1,2-Dichloropropane | 101 | 70-130 |
| 1,4-Dioxane | 97 | 70-130 |
| Bromodichloromethane | 99 | 70-130 |
| cis-1,3-Dichloropropene | 99 | 70-130 |
| 4-Methyl-2-pentanone | 99 | 70-130 |
| Toluene | 94 | 70-130 |
| trans-1,3-Dichloropropene | 103 | 70-130 |
| 1,1,2-Trichloroethane | 102 | 70-130 |
| Tetrachloroethene | 96 | 70-130 |
| 2-Hexanone | 107 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1707242B-06A**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071903** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 09:47 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 98 | 70-130 |
| 1,2-Dibromoethane (EDB) | 98 | 70-130 |
| Chlorobenzene | 97 | 70-130 |
| Ethyl Benzene | 101 | 70-130 |
| m,p-Xylene | 105 | 70-130 |
| o-Xylene | 106 | 70-130 |
| Styrene | 104 | 70-130 |
| Bromoform | 102 | 70-130 |
| Cumene | 98 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 107 | 70-130 |
| Propylbenzene | 103 | 70-130 |
| 4-Ethyltoluene | 101 | 70-130 |
| 1,3,5-Trimethylbenzene | 101 | 70-130 |
| 1,2,4-Trimethylbenzene | 98 | 70-130 |
| 1,3-Dichlorobenzene | 97 | 70-130 |
| 1,4-Dichlorobenzene | 96 | 70-130 |
| alpha-Chlorotoluene | 106 | 70-130 |
| 1,2-Dichlorobenzene | 95 | 70-130 |
| 1,2,4-Trichlorobenzene | 94 | 70-130 |
| Hexachlorobutadiene | 91 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 99 | 70-130 |
| 1,2-Dichloroethane-d4 | 105 | 70-130 |
| 4-Bromofluorobenzene | 99 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1707242B-06AA**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071904** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 10:12 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 94 | 70-130 |
| Freon 114 | 94 | 70-130 |
| Chloromethane | 106 | 70-130 |
| Vinyl Chloride | 101 | 70-130 |
| 1,3-Butadiene | 97 | 70-130 |
| Bromomethane | 96 | 70-130 |
| Chloroethane | 100 | 70-130 |
| Freon 11 | 96 | 70-130 |
| Ethanol | 112 | 70-130 |
| Freon 113 | 90 | 70-130 |
| 1,1-Dichloroethene | 98 | 70-130 |
| Acetone | 94 | 70-130 |
| 2-Propanol | 106 | 70-130 |
| Carbon Disulfide | 90 | 70-130 |
| 3-Chloropropene | 89 | 70-130 |
| Methylene Chloride | 105 | 70-130 |
| Methyl tert-butyl ether | 93 | 70-130 |
| trans-1,2-Dichloroethene | 93 | 70-130 |
| Hexane | 98 | 70-130 |
| 1,1-Dichloroethane | 96 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 100 | 70-130 |
| cis-1,2-Dichloroethene | 120 | 70-130 |
| Tetrahydrofuran | 102 | 70-130 |
| Chloroform | 93 | 70-130 |
| 1,1,1-Trichloroethane | 89 | 70-130 |
| Cyclohexane | 98 | 70-130 |
| Carbon Tetrachloride | 91 | 70-130 |
| 2,2,4-Trimethylpentane | 100 | 70-130 |
| Benzene | 95 | 70-130 |
| 1,2-Dichloroethane | 95 | 70-130 |
| Heptane | 100 | 70-130 |
| Trichloroethene | 92 | 70-130 |
| 1,2-Dichloropropane | 100 | 70-130 |
| 1,4-Dioxane | 98 | 70-130 |
| Bromodichloromethane | 98 | 70-130 |
| cis-1,3-Dichloropropene | 100 | 70-130 |
| 4-Methyl-2-pentanone | 99 | 70-130 |
| Toluene | 94 | 70-130 |
| trans-1,3-Dichloropropene | 97 | 70-130 |
| 1,1,2-Trichloroethane | 97 | 70-130 |
| Tetrachloroethene | 91 | 70-130 |
| 2-Hexanone | 102 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1707242B-06AA**

**EPA METHOD TO-15 GC/MS FULL SCAN**

| | | | |
|---|---|---|---|
| **File Name:** | **a071904** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/19/17 10:12 AM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 93 | 70-130 |
| 1,2-Dibromoethane (EDB) | 91 | 70-130 |
| Chlorobenzene | 92 | 70-130 |
| Ethyl Benzene | 95 | 70-130 |
| m,p-Xylene | 100 | 70-130 |
| o-Xylene | 104 | 70-130 |
| Styrene | 100 | 70-130 |
| Bromoform | 96 | 70-130 |
| Cumene | 94 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 102 | 70-130 |
| Propylbenzene | 98 | 70-130 |
| 4-Ethyltoluene | 97 | 70-130 |
| 1,3,5-Trimethylbenzene | 95 | 70-130 |
| 1,2,4-Trimethylbenzene | 94 | 70-130 |
| 1,3-Dichlorobenzene | 93 | 70-130 |
| 1,4-Dichlorobenzene | 91 | 70-130 |
| alpha-Chlorotoluene | 100 | 70-130 |
| 1,2-Dichlorobenzene | 92 | 70-130 |
| 1,2,4-Trichlorobenzene | 90 | 70-130 |
| Hexachlorobutadiene | 88 | 70-130 |

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| Toluene-d8 | 102 | 70-130 |
| 1,2-Dichloroethane-d4 | 101 | 70-130 |
| 4-Bromofluorobenzene | 96 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1707242B-06B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072503** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/25/17 12:04 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 106 | 70-130 |
| Freon 114 | 101 | 70-130 |
| Chloromethane | 95 | 70-130 |
| Vinyl Chloride | 105 | 70-130 |
| 1,3-Butadiene | 100 | 70-130 |
| Bromomethane | 96 | 70-130 |
| Chloroethane | 105 | 70-130 |
| Freon 11 | 111 | 70-130 |
| Ethanol | 120 | 70-130 |
| Freon 113 | 100 | 70-130 |
| 1,1-Dichloroethene | 107 | 70-130 |
| Acetone | 112 | 70-130 |
| 2-Propanol | 112 | 70-130 |
| Carbon Disulfide | 86 | 70-130 |
| 3-Chloropropene | 88 | 70-130 |
| Methylene Chloride | 108 | 70-130 |
| Methyl tert-butyl ether | 100 | 70-130 |
| trans-1,2-Dichloroethene | 85 | 70-130 |
| Hexane | 102 | 70-130 |
| 1,1-Dichloroethane | 104 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 94 | 70-130 |
| cis-1,2-Dichloroethene | 118 | 70-130 |
| Tetrahydrofuran | 102 | 70-130 |
| Chloroform | 106 | 70-130 |
| 1,1,1-Trichloroethane | 105 | 70-130 |
| Cyclohexane | 102 | 70-130 |
| Carbon Tetrachloride | 104 | 70-130 |
| 2,2,4-Trimethylpentane | 102 | 70-130 |
| Benzene | 96 | 70-130 |
| 1,2-Dichloroethane | 102 | 70-130 |
| Heptane | 96 | 70-130 |
| Trichloroethene | 100 | 70-130 |
| 1,2-Dichloropropane | 93 | 70-130 |
| 1,4-Dioxane | 55 Q | 70-130 |
| Bromodichloromethane | 104 | 70-130 |
| cis-1,3-Dichloropropene | 91 | 70-130 |
| 4-Methyl-2-pentanone | 112 | 70-130 |
| Toluene | 97 | 70-130 |
| trans-1,3-Dichloropropene | 101 | 70-130 |
| 1,1,2-Trichloroethane | 93 | 70-130 |
| Tetrachloroethene | 99 | 70-130 |
| 2-Hexanone | 96 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCS**

**Lab ID#: 1707242B-06B**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072503** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/25/17 12:04 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 100 | 70-130 |
| 1,2-Dibromoethane (EDB) | 96 | 70-130 |
| Chlorobenzene | 95 | 70-130 |
| Ethyl Benzene | 97 | 70-130 |
| m,p-Xylene | 99 | 70-130 |
| o-Xylene | 97 | 70-130 |
| Styrene | 101 | 70-130 |
| Bromoform | 103 | 70-130 |
| Cumene | 106 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 94 | 70-130 |
| Propylbenzene | 104 | 70-130 |
| 4-Ethyltoluene | 102 | 70-130 |
| 1,3,5-Trimethylbenzene | 103 | 70-130 |
| 1,2,4-Trimethylbenzene | 91 | 70-130 |
| 1,3-Dichlorobenzene | 108 | 70-130 |
| 1,4-Dichlorobenzene | 105 | 70-130 |
| alpha-Chlorotoluene | 113 | 70-130 |
| 1,2-Dichlorobenzene | 109 | 70-130 |
| 1,2,4-Trichlorobenzene | 101 | 70-130 |
| Hexachlorobutadiene | 116 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 106 | 70-130 |
| Toluene-d8 | 99 | 70-130 |
| 4-Bromofluorobenzene | 104 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1707242B-06BB**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072504** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/25/17 12:28 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Freon 12 | 107 | 70-130 |
| Freon 114 | 100 | 70-130 |
| Chloromethane | 97 | 70-130 |
| Vinyl Chloride | 104 | 70-130 |
| 1,3-Butadiene | 100 | 70-130 |
| Bromomethane | 94 | 70-130 |
| Chloroethane | 98 | 70-130 |
| Freon 11 | 109 | 70-130 |
| Ethanol | 124 | 70-130 |
| Freon 113 | 102 | 70-130 |
| 1,1-Dichloroethene | 108 | 70-130 |
| Acetone | 112 | 70-130 |
| 2-Propanol | 115 | 70-130 |
| Carbon Disulfide | 85 | 70-130 |
| 3-Chloropropene | 96 | 70-130 |
| Methylene Chloride | 107 | 70-130 |
| Methyl tert-butyl ether | 99 | 70-130 |
| trans-1,2-Dichloroethene | 86 | 70-130 |
| Hexane | 101 | 70-130 |
| 1,1-Dichloroethane | 103 | 70-130 |
| 2-Butanone (Methyl Ethyl Ketone) | 96 | 70-130 |
| cis-1,2-Dichloroethene | 114 | 70-130 |
| Tetrahydrofuran | 104 | 70-130 |
| Chloroform | 103 | 70-130 |
| 1,1,1-Trichloroethane | 106 | 70-130 |
| Cyclohexane | 97 | 70-130 |
| Carbon Tetrachloride | 105 | 70-130 |
| 2,2,4-Trimethylpentane | 102 | 70-130 |
| Benzene | 93 | 70-130 |
| 1,2-Dichloroethane | 101 | 70-130 |
| Heptane | 98 | 70-130 |
| Trichloroethene | 96 | 70-130 |
| 1,2-Dichloropropane | 91 | 70-130 |
| 1,4-Dioxane | 67 Q | 70-130 |
| Bromodichloromethane | 103 | 70-130 |
| cis-1,3-Dichloropropene | 94 | 70-130 |
| 4-Methyl-2-pentanone | 110 | 70-130 |
| Toluene | 93 | 70-130 |
| trans-1,3-Dichloropropene | 102 | 70-130 |
| 1,1,2-Trichloroethane | 95 | 70-130 |
| Tetrachloroethene | 98 | 70-130 |
| 2-Hexanone | 93 | 70-130 |

eurofins | Air Toxics

**Client Sample ID: LCSD**

**Lab ID#: 1707242B-06BB**

**EPA METHOD TO-15 GC/MS**

| | | | |
|---|---|---|---|
| **File Name:** | **14072504** | **Date of Collection: NA** | |
| **Dil. Factor:** | **1.00** | **Date of Analysis: 7/25/17 12:28 PM** | |

| Compound | %Recovery | Method Limits |
|---|---|---|
| Dibromochloromethane | 103 | 70-130 |
| 1,2-Dibromoethane (EDB) | 96 | 70-130 |
| Chlorobenzene | 94 | 70-130 |
| Ethyl Benzene | 95 | 70-130 |
| m,p-Xylene | 97 | 70-130 |
| o-Xylene | 100 | 70-130 |
| Styrene | 99 | 70-130 |
| Bromoform | 108 | 70-130 |
| Cumene | 108 | 70-130 |
| 1,1,2,2-Tetrachloroethane | 97 | 70-130 |
| Propylbenzene | 105 | 70-130 |
| 4-Ethyltoluene | 106 | 70-130 |
| 1,3,5-Trimethylbenzene | 104 | 70-130 |
| 1,2,4-Trimethylbenzene | 97 | 70-130 |
| 1,3-Dichlorobenzene | 114 | 70-130 |
| 1,4-Dichlorobenzene | 111 | 70-130 |
| alpha-Chlorotoluene | 119 | 70-130 |
| 1,2-Dichlorobenzene | 112 | 70-130 |
| 1,2,4-Trichlorobenzene | 112 | 70-130 |
| Hexachlorobutadiene | 128 | 70-130 |

Q = Exceeds Quality Control limits.

**Container Type: NA - Not Applicable**

| Surrogates | %Recovery | Method Limits |
|---|---|---|
| 1,2-Dichloroethane-d4 | 104 | 70-130 |
| Toluene-d8 | 98 | 70-130 |
| 4-Bromofluorobenzene | 106 | 70-130 |

ENTAGLEMENT DATA

| Sample # | data file | collection time | sample volume [L] | TCE [ug/m3] | MDL [ug/m3] | cisDCE [ug/m3] | fitter notes | comments |
|---|---|---|---|---|---|---|---|---|
| 1 | field blank | 7:30 | 0.005 | 7.7 | 10.0 | 39.7 | cisDCE bad fit | measured with van air |
| 2 | building indoor air | 7:50 | 0.005 | 8.8 | 10.0 | 43.5 | cisDCE bad fit | measurement of indoor air and initial tubing backgrounds |
| 3 | building indoor air | 8:05 | 0.005 | 6.3 | 10.0 | 18.9 | cisDCE bad fit | indoor air, prior to connecting to vent tube |
| 4 | subslab ventilator sample | 8:24 | 0.005 | 734.9 | 10.0 | 556.3 | | static line, prior to start of venting fan |
| 5 | subslab ventilator sample | 8:37 | 0.005 | 960.8 | 10.0 | 682.1 | | vent started, ~8:30, approx 30in vacuum |
| 6 | subslab ventilator sample | 8:51 | 0.005 | 956.7 | 10.0 | 892.8 | | |
| 7 | subslab ventilator sample | 9:05 | 0.005 | 1027.7 | 10.0 | 955.7 | | |
| 8 | subslab ventilator sample | 9:25 | 0.005 | 1043.7 | 10.0 | 878.1 | | |
| 9 | subslab ventilator sample | 9:40 | 0.005 | 954.5 | 10.0 | 935.1 | | |
| 10 | subslab ventilator sample | 9:55 | 0.005 | 963.4 | 10.0 | 848.7 | | |
| 11 | subslab ventilator sample | 10:09 | 0.005 | 920.2 | 10.0 | 949.7 | | co-sampled with TO-15 #101635 |
| 12 | subslab ventilator sample | 10:22 | 0.005 | 898.8 | 10.0 | 1018.7 | | |
| 13 | subslab ventilator sample | 10:36 | 0.005 | 878.1 | 10.0 | 946.2 | | |
| 14 | subslab ventilator sample | 10:50 | 0.005 | 839.1 | 10.0 | 939.8 | | |
| 15 | subslab ventilator sample | 11:04 | 0.005 | 854.8 | 10.0 | 991.8 | | |
| 16 | subslab ventilator sample | 11:17 | 0.005 | 834.3 | 10.0 | 957.5 | | |
| 17 | subslab ventilator sample | 11:31 | 0.005 | 835.8 | 10.0 | 892.5 | | |
| 18 | subslab ventilator sample | 11:45 | 0.005 | 849.8 | 10.0 | 923.1 | | |
| 19 | subslab ventilator sample | 11:59 | 0.005 | 845.4 | 10.0 | 907.1 | | |
| 20 | subslab ventilator sample | 12:12 | 0.005 | 851.2 | 10.0 | 880.2 | | |
| 21 | subslab ventilator sample | 12:26 | 0.005 | 840.5 | 10.0 | 868.5 | | |
| 22 | subslab ventilator sample | 12:40 | 0.005 | 821.8 | 10.0 | 872.3 | | |
| 23 | subslab ventilator sample | 12:54 | 0.005 | 826.2 | 10.0 | 885.2 | | |
| 24 | subslab ventilator sample | 13:07 | 0.005 | 816.1 | 10.0 | 871.1 | | |
| 25 | subslab ventilator sample | 13:21 | 0.005 | 824.0 | 10.0 | 982.2 | | |
| 26 | subslab ventilator sample | 13:35 | 0.005 | 808.0 | 10.0 | 849.3 | | |
| 27 | subslab ventilator sample | 13:48 | 0.005 | 817.0 | 10.0 | 888.2 | | |
| 28 | subslab ventilator sample | 14:02 | 0.005 | 787.6 | 10.0 | 884.0 | | |
| 29 | subslab ventilator sample | 14:16 | 0.005 | 779.0 | 10.0 | 836.3 | | |
| 30 | subslab ventilator sample | 14:30 | 0.005 | 771.1 | 10.0 | 816.2 | | |
| 31 | subslab ventilator sample | 14:43 | 0.005 | 759.3 | 10.0 | 804.5 | | |
| 32 | subslab ventilator sample | 14:57 | 0.005 | 768.7 | 10.0 | 801.2 | | |
| 33 | subslab ventilator sample | 15:11 | 0.005 | 820.0 | 10.0 | 866.8 | | pressure transient testing, started ~15:00 |
| 34 | subslab ventilator sample | 15:25 | 0.005 | 889.8 | 10.0 | 911.0 | | |
| 35 | subslab ventilator sample | 15:38 | 0.005 | 733.7 | 10.0 | 757.9 | | changed vent flow for 10in vacuum |
| 36 | subslab ventilator sample | 15:52 | 0.005 | 805.9 | 10.0 | 835.0 | | |
| 37 | subslab ventilator sample | 16:06 | 0.005 | 833.1 | 10.0 | 820.3 | | |
| 38 | subslab ventilator sample | 16:20 | 0.005 | 858.9 | 10.0 | 819.4 | | |
| 39 | subslab ventilator sample | 16:33 | 0.005 | 831.2 | 10.0 | 808.5 | | |
| 40 | subslab ventilator sample | 16:47 | 0.005 | 844.7 | 10.0 | 797.6 | | |
| 41 | subslab ventilator sample | 17:01 | 0.005 | 838.5 | 10.0 | 807.8 | | |
| 42 | subslab ventilator sample | 17:15 | 0.005 | 867.7 | 10.0 | 812.3 | | |
| 43 | aa ccv | 17:49 | 0.005 | 248.4 | 10.0 | 255.6 | | aa calibration standard, cal factor = 0.92 |
| 44 | field blank | 18:08 | 0.005 | 3.8 | 10.0 | 50.1 | cisDCE bad fit | field blank |

EMLab P&K
A TestAmerica Company

Report for:

**Darius Mali**
**Geosyntec Consultants, Inc.**
130 Research Lane Suite 2
Guelph, ON  N1G5A5 Canada

Regarding: Project: TRO479.02C; ESTCP
EML ID: 1749206

Approved by:



Certified Radon Analyst
Theo Golubic

Dates of Analysis:
Radon in Air: 06-27-2017

Service SOPs: Radon in Air (EM-BC-S-1201)
AARST-NRPP Certified ID: RT-106267 & AL-102969

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the items tested.

EMLab P&K ("the Company") shall have no liability to the client or the client's customer with respect to decisions or recommendations made, actions taken or courses of conduct implemented by either the client or the client's customer as a result of or based upon the Test Results. In no event shall the Company be liable to the client with respect to the Test Results except for the Company's own willful misconduct or gross negligence nor shall the Company be liable for incidental or consequential damages or lost profits or revenues to the fullest extent such liability may be disclaimed by law, even if the Company has been advised of the possibility of such damages, lost profits or lost revenues. In no event shall the Company's liability with respect to the Test Results exceed the amount paid to the Company by the client therefor.

**EMLab P&K**
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 Fax (623) 780-7695 www.emlab.com

Client: Geosyntec Consultants, Inc.
C/O: Darius Mali
Re: TRO479.02C; ESTCP

Date of Receipt: 06-26-2017
Date of Report: 06-27-2017

## RADON: S CHAMBER E-PERM® SYSTEM

| Location: | 1: B11193-061917-SVP4-Dup | 2: B11193-061917-SVP4 | 3: B11193-061917-SVP2 | 4: B11193-061917-SVP1 | 5: B11193-061917-SVP3 |
|---|---|---|---|---|---|
| Comments (see below) | None | None | None | None | None |
| Lab ID-Version‡: | 8167544-1 | 8167545-1 | 8167546-1 | 8167547-1 | 8167548-1 |
| Analysis Date: | 06/27/2017 | 06/27/2017 | 06/27/2017 | 06/27/2017 | 06/27/2017 |
| Sample type | Radon Canister | Radon Canister | Radon Canister | Radon Canister | Radon Canister |
| Elevation | 512 ft | 512 ft | 512 ft | 512 ft | 512 ft |
| Electret Serial Number | SJF405 | SJF993 | SIQ580 | SIQ565 | SJF891 |
| Electret Type | Short Term (SST) | Short Term (SST) | Short Term (SST) | Short Term (SST) | Short Term (SST) |
| Start Test | 6/16/2017 04:35 PM | 6/16/2017 04:35 PM | 6/16/2017 04:47 PM | 6/16/2017 04:40 PM | 6/16/2017 04:50 PM |
| End Test | 6/19/2017 09:00 AM | 6/19/2017 09:00 AM | 6/19/2017 09:00 AM | 6/19/2017 09:00 AM | 6/19/2017 09:00 AM |
| SPER-1 Electret Reader S/N | 00702 | 00702 | 00702 | 00702 | 00702 |
| Test State | California | California | California | California | California |
| Background Gamma | 6.6 µR/Hr | 6.6 µR/Hr | 6.6 µR/Hr | 6.6 µR/Hr | 6.6 µR/Hr |
| **§ Radon Concentration** | 1.42 ± 0.22 pCi/L | 1.20 ± 0.20 pCi/L | 1.38 ± 0.23 pCi/L | 1.28 ± 0.22 pCi/L | 1.54 ± 0.22 pCi/L |

pCi/L = Picocuries per Liter µR/Hr = Microroentgen per Hour

**Comments:**

§ Radon Concentration and measurement uncertainty has been rounded to the nearest 0.01 pCi/L to reflect analytical precision. Measurement uncertainty cannot be calculated when the Radon Concentration is below the detection limit. A measurement uncertainty value that is greater than the actual Radon Concentration can sometimes occur when the Radon Concentration is very low. The Limit of Detection is the lowest Radon Concentration that can be calculated relative to the unique parameters of each sample (i.e. short term vs. long term, difference in voltage, duration of sampling, elevation and background gamma). For more information on calculating Limit of Detection or Analytical Sensitivity please contact the laboratory Quality Assurance Department.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

For the United States Environmental Protection Agency recommendations regarding Radon Concentration, please refer to www.epa.gov/radon

# Radon Analysis (EPA Method GS: Grab Sample/Scintillation Cell counting)

**For Geosyntec**

Client Project Number: TR0479.02C

Samples Collected by: Darius Mali

Sample Dates: 6/19/17-6/21/17

Sample containers: Tedlar bags

Location: Vandenberg AFB

Assumed Site Pressure **1.00** atm

Analysts: Doug Hammond

based on an estimated elevation of 369 ft

Phone: 310-490-7896

Time Zone adjustment: add to decay time

email: dhammond@usc.edu

**0** hours

Collect (PDT)

Run (PDT)

**Summary**

| | | Collection | | Analysis | | | | | Lab Duplicates | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Date | time (PDT) | Date | time (PDT) | Vol run (cc) | Conc. pCi/L | ±1 sig pCi/L | mean pCi/L | ±1ssd pCi/L | Notes | |
| Received 6/23/17 | | | | | | | | | | | | |
| 1 | B11193-0619-SSV-1-44-0 (ba | 6/19/17 | 15:00 | 6/23/17 | 12:57 | 40 | 31.1 | 1.6 | | | | |
| 2 | B11193-0620-SSV-2-22-0 (ba | 6/20/17 | 7:30 | 6/23/17 | 12:59 | 40 | 30.2 | 1.6 | | | | |
| 3 | B11193-0621-SSV-3-54-10 (b | 6/21/17 | 8:34 | 6/23/17 | 13:19 | 40 | 18.3 | 1.2 | 18.3 | 0.0 | | |
| | Lab dupe | 6/21/17 | 8:34 | 6/26/17 | 16:31 | 40 | 18.3 | 1.0 | | | | |
| 4 | B11193-0621-SSV-4-65-10 (b | 6/21/17 | 12:20 | 6/24/17 | 18:10 | 40 | 18.4 | 0.9 | | | | |
| 5 | B11193-0621-SSV-5-65-5 (ba | 6/21/17 | 13:40 | 6/24/17 | 18:13 | 40 | 18.5 | 0.9 | | | | |
| 6 | B11193-0621-SSV-6-58-5 (ba | 6/21/17 | 17:34 | 6/24/17 | 18:16 | 40 | 16.5 | 0.8 | | | | |

Uncertainty given in pCi/liter is based on counting statistics for low activity samples. For high activity samples uncertainty is ±5%.

The Lower Limit of Detection for Rn (95% confidence level as recommended by EPA 402-R-95-012, Oct. 97) is 0.14 pCi/liter.

Results are reported based on standardization with NIST-traceable radon sources.

These results are for application of naturally-occurring radon as a tracer of soil vapor intrusion, but are not intended for evaluation of radon hazards.

Results corrected to in situ pressure as noted above

## Raw Data, Calculation factors, and Analytical Details

| | | Collection | | Analysis | | | | | | | | | | | | | count | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Sample ID** | Date | Time (PDT) | Date | Time (PDT) | Count in cell/ch | He eff | Air/He eff | Vol run (cc) | Press factor | obs dpm | sig dpm | Decay T (hours) | Decay factor | Concentration dpm/liter | pCi/liter | stats pCi/liter ±1 sig | Notes |
| Received 6/23/17 | | | | | | | | | | | | | | | | | | |
| 1 | B11193-0619-SSV-1-44-0 (bag 1) | 6/19/17 | 15:00 | 6/23/17 | 12:57 | 77/32 | 0.915 | 0.99 | 40 | 1.00 | 1.23 | 0.01 | 94.0 | 2.033 | 69 | 31.1 | 0.2 | |
| 2 | B11193-0620-SSV-2-22-0 (bag 2) | 6/20/17 | 7:30 | 6/23/17 | 12:59 | 58/31 | 0.900 | 0.99 | 40 | 1.00 | 1.33 | 0.07 | 77.5 | 1.796 | 67 | 30.2 | 1.6 | |
| 3 | B11193-0621-SSV-3-54-10 (bag 3) | 6/21/17 | 8:34 | 6/23/17 | 13:19 | 61/33 | 0.822 | 0.99 | 40 | 1.00 | 0.89 | 0.06 | 52.8 | 1.490 | 41 | 18.3 | 1.2 | |
| | Lab dupe | 6/21/17 | 8:34 | 6/26/17 | 16:31 | 77/32 | 0.915 | 0.99 | 40 | 1.00 | 0.56 | 0.03 | 128.0 | 2.629 | 41 | 18.3 | 1.0 | |
| 4 | B11193-0621-SSV-4-65-10 (bag 4) | 6/21/17 | 12:20 | 6/24/17 | 18:10 | 72/22 | 0.937 | 0.99 | 40 | 1.00 | 0.84 | 0.02 | 77.8 | 1.800 | 41 | 18.4 | 0.4 | |
| 5 | B11193-0621-SSV-5-65-5 (bag 5) | 6/21/17 | 13:40 | 6/24/17 | 18:13 | 81/31 | 0.788 | 0.99 | 40 | 1.00 | 0.72 | 0.02 | 76.6 | 1.783 | 41 | 18.5 | 0.5 | |
| 6 | B11193-0621-SSV-6-58-5 (bag 6) | 6/21/17 | 17:34 | 6/24/17 | 18:16 | 61/33 | 0.822 | 0.99 | 40 | 1.00 | 0.69 | 0.02 | 72.7 | 1.732 | 37 | 16.5 | 0.5 | |

Decay corrections based on Rn decay constant of 0.1813 per day

Conversion from dpm based on 0.4504 pCi/dpm

Blanks are negligible.

Radon Conc = [(0.4504)(1000)(obs dpm)(decay factor)(Press factor)]/[(cc used)(He eff)(Air/He)] (in pCi/liter)

**Definitions:**

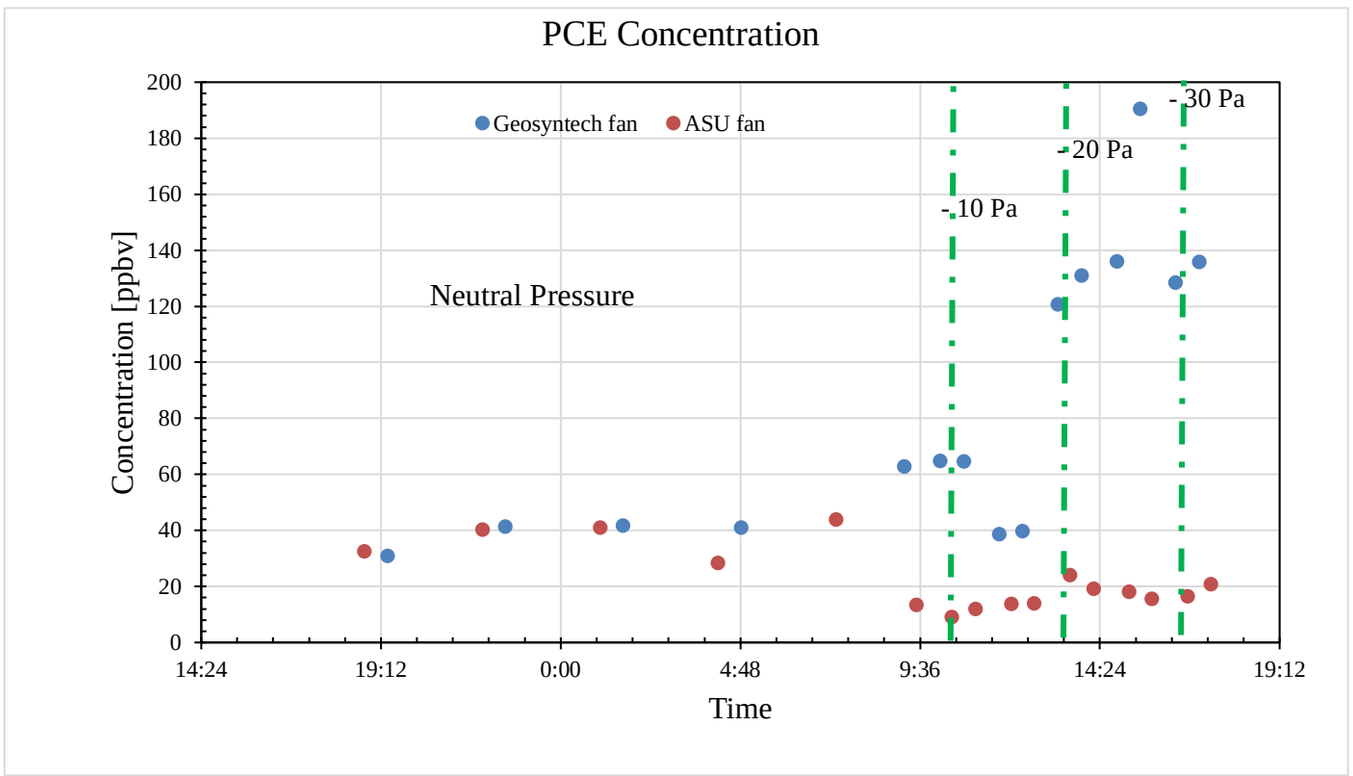
| | | | |
|---|---|---|---|
| Cell/ch: | Counting cell and channel used | sig dpm | uncertainty (± 1 sig) in dpm based on counting statistics |
| He eff: | Cell and counter efficiency using helium matrix | Decay T: | time elapsed from sampling to analysis |
| Air/He: | Correction for matrix counting gas density | Decay factor: | Correction factor for decay from collection to analysis |
| Sample vol: | Volume analyzed (cc) | dpm/liter: | Radon concentration in disintigrations per minute per liter of sample |
| Press factor: | Correction to in situ pressure based on collection altitude | piC/liter: | Radon concentration in picoCuries per liter |
| obs dpm: | observed radon activity (disintigrations per minute) when analyzed | count stats: | uncertainty in observed radon based on counting statistics |

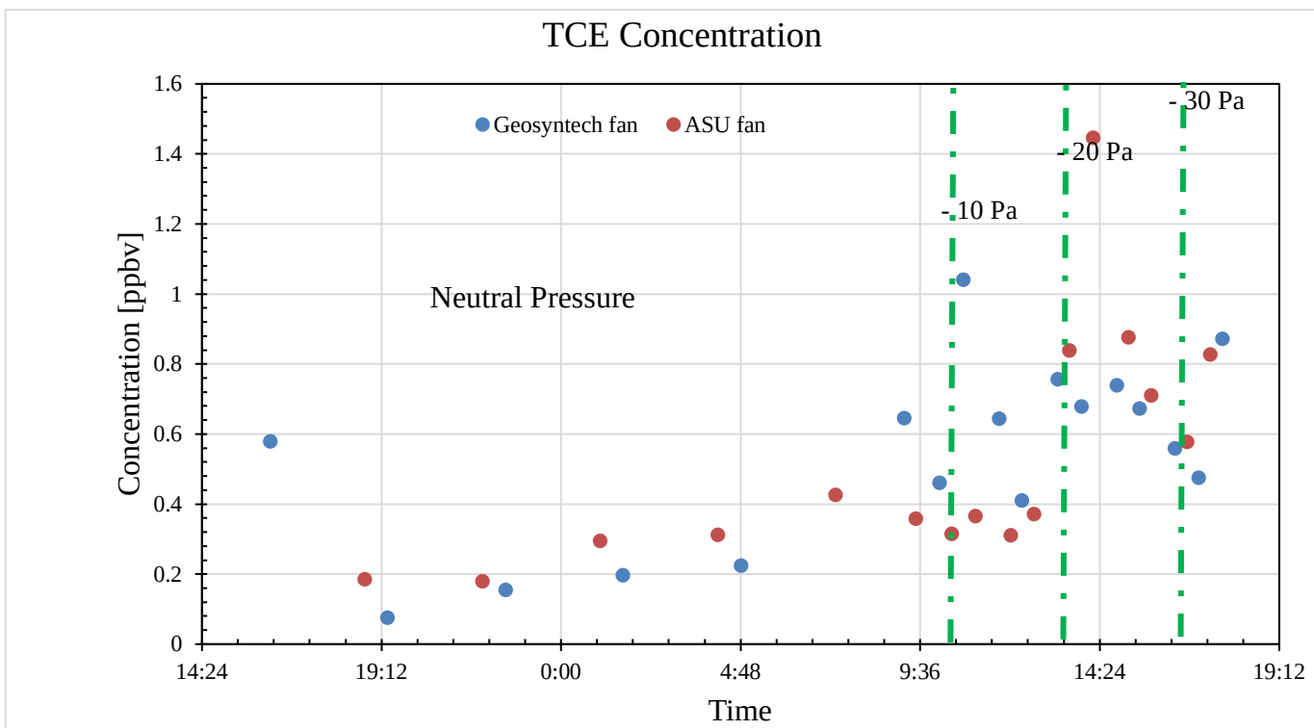
# Summary of pressure step test

Results shows the summary of two analyticals (ECD and DELCD)
GC-ECD results are used for Concentrations less than 10 ppbv; and GC-DELCD results are used for Concentrations greater than 10 ppbv.

| dP Setting | Start Time |
|---|---|
| - 10 Pa | 6/13/2017 9:50 |
| - 20 Pa | 6/13/2017 13:05 |
| - 30 Pa | 6/13/2017 16:41 |

| Location | Geosyntech fan | | | | Location | ASU fan | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE |
| 6/12/2017 16:14 | Port1-ECD-01 | 0.579092 | Port1-DELCD-01 | | 6/12/2017 18:45 | Port9-ECD-01 | 0.18463 | Port9-DELCD-01 | 32.33004 |
| 6/12/2017 19:22 | Port1-ECD-02 | 0.075164 | Port1-DELCD-02 | 30.71253 | 6/12/2017 21:54 | Port9-ECD-02 | 0.179502 | Port9-DELCD-02 | 40.07745 |
| 6/12/2017 22:31 | Port1-ECD-03 | 0.154792 | Port1-DELCD-03 | 41.152 | 6/13/2017 1:03 | Port9-ECD-03 | 0.295172 | Port9-DELCD-03 | 40.89037 |
| 6/13/2017 1:40 | Port1-ECD-04 | 0.196563 | Port1-DELCD-04 | 41.51655 | 6/13/2017 4:12 | Port9-ECD-04 | 0.311965 | Port9-DELCD-04 | 28.2198 |
| 6/13/2017 4:49 | Port1-ECD-05 | 0.224329 | Port1-DELCD-05 | 40.87461 | 6/13/2017 7:21 | Port9-ECD-05 | 0.426103 | Port9-DELCD-05 | 43.76827 |
| 6/13/2017 9:11 | Port1-ECD-01 | 0.645357 | Port1-DELCD-01 | 62.62672 | 6/13/2017 9:30 | Port2-ECD-01 | 0.357663 | Port2-DELCD-01 | 13.33715 |
| 6/13/2017 10:08 | Port1-ECD-02 | 0.460986 | Port4-DELCD-01 | 64.72989 | 6/13/2017 10:27 | Port5-ECD-01 | 0.315362 | Port5-ECD-01 | 8.882322 |
| 6/13/2017 10:46 | Port1-ECD-03 | 1.040863 | Port6-DELCD-01 | 64.48577 | 6/13/2017 11:05 | Port7-ECD-01 | 0.365091 | Port7-DELCD-01 | 11.82324 |
| 6/13/2017 11:43 | Port4-ECD-01 | 0.644359 | Port9-DELCD-01 | 38.45221 | 6/13/2017 12:02 | Port10-ECD-01 | 0.310561 | Port10-DELCD-01 | 13.56452 |
| 6/13/2017 12:20 | Port4-ECD-02 | 0.410654 | Port1-DELCD-02 | 39.52737 | 6/13/2017 12:39 | Port2-ECD-02 | 0.37105 | Port2-DELCD-02 | 13.85252 |
| 6/13/2017 13:17 | Port4-ECD-03 | 0.756558 | Port4-DELCD-02 | 120.5755 | 6/13/2017 13:36 | Port5-ECD-02 | 0.838187 | Port5-DELCD-02 | 23.88719 |
| 6/13/2017 13:55 | Port6-ECD-01 | 0.678248 | Port6-DELCD-02 | 130.892 | 6/13/2017 14:14 | Port7-ECD-02 | 1.446043 | Port7-DELCD-02 | 19.07081 |
| 6/13/2017 14:51 | Port6-ECD-02 | 0.738766 | Port9-DELCD-02 | 135.9034 | 6/13/2017 15:10 | Port10-ECD-02 | 0.876254 | Port10-DELCD-02 | 17.95404 |
| 6/13/2017 15:28 | Port6-ECD-03 | 0.672295 | Port1-DELCD-03 | 190.4186 | 6/13/2017 15:47 | Port2-ECD-03 | 0.709946 | Port2-DELCD-03 | 15.52725 |
| 6/13/2017 16:25 | Port9-ECD-01 | 0.558481 | Port4-DELCD-03 | 128.2616 | 6/13/2017 16:44 | Port5-ECD-03 | 0.576651 | Port5-DELCD-03 | 16.30432 |
| 6/13/2017 17:03 | Port9-ECD-02 | 0.474552 | Port6-DELCD-03 | 135.635 | 6/13/2017 17:22 | Port7-ECD-03 | 0.827221 | Port7-DELCD-03 | 20.76146 |
| 6/13/2017 17:41 | Port8-ECD-03 | 0.871349 | | | | | | | |



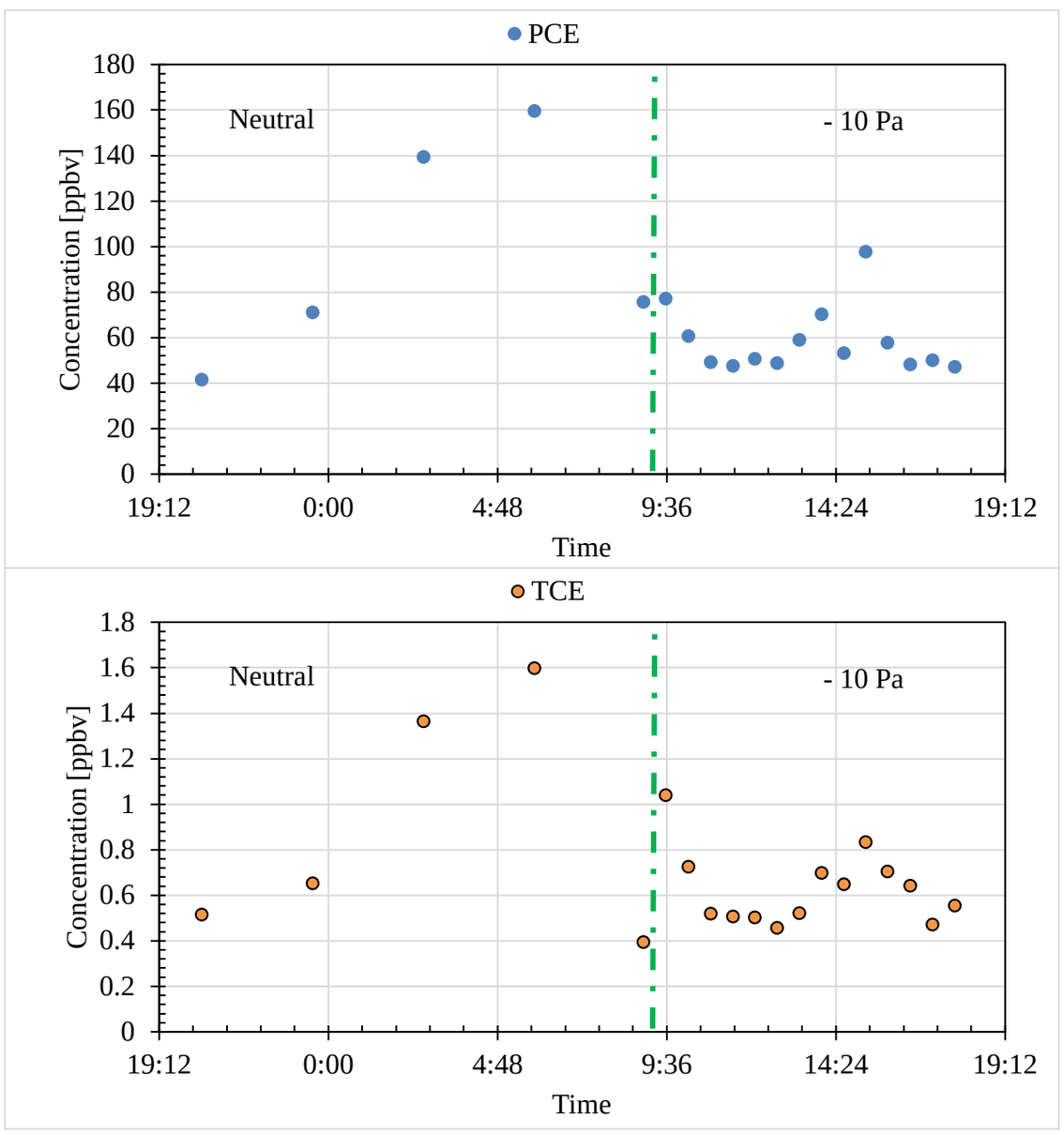
| Location | GC-3 | | | | Location | GC-6 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE |
| 6/12/2017 16:51 | Port3-ECD-01 | 2.401551 | Port3-ECD-01 | 447.5108 | 6/12/2017 17:48 | Port6-ECD-01 | 0.092069 | Port6-ECD-01 | 9.422288 |
| 6/12/2017 20:00 | Port3-ECD-02 | 0.362463 | Port3-DELCD-02 | 69.11775 | 6/12/2017 20:57 | Port6-ECD-02 | 0.056911 | Port6-ECD-02 | 4.974075 |
| 6/12/2017 23:09 | Port3-ECD-03 | 0.314807 | Port3-DELCD-03 | 55.06568 | 6/13/2017 0:06 | Port6-ECD-03 | 0.091177 | Port6-ECD-03 | 7.939019 |
| 6/13/2017 2:18 | Port3-ECD-04 | 0.405175 | Port3-DELCD-04 | 78.13631 | 6/13/2017 3:15 | Port6-ECD-04 | 0.098782 | Port6-ECD-04 | 9.144084 |
| 6/13/2017 5:27 | Port3-ECD-05 | 0.38135 | Port3-DELCD-05 | 57.9166 | 6/13/2017 6:24 | Port6-ECD-05 | 0.106819 | Port6-ECD-05 | 9.658214 |
| 6/13/2017 9:49 | Port3-ECD-01 | 0.987779 | Port3-DELCD-01 | 179.101 | 6/13/2017 11:24 | Port8-ECD-01 | 1.341364 | Port8-ECD-01 | 0.665324 |
| 6/13/2017 12:58 | Port3-ECD-02 | 0.830074 | Port3-DELCD-02 | 129.5392 | 6/13/2017 14:33 | Port8-ECD-02 | 6.994685 | Port8-ECD-02 | 7.2461 |
| 6/13/2017 16:06 | Port3-ECD-03 | 2.314072 | Port3-DELCD-03 | 412.6362 | 6/13/2017 17:41 | Port8-ECD-03 | 0.871349 | Port8-DELCD-03 | 127.9972 |

# 8-h Building depressurization test @ -10 Pa

-10 Pa 6/14/2017 9:05
-20 Pa 6/14/2017 14:30

| Location | ASU fan | | | | Location | GC-3 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE |
| 6/13/2017 20:24 | Port9-ECD-01 | 0.513185 | Port9-DELCD-01 | 41.51678 | 6/13/2017 18:30 | Port3-ECD-01 | 3.808976 | Port3-DELCD-01 | 798.9916 |
| 6/13/2017 23:33 | Port9-ECD-02 | 0.652298 | Port9-DELCD-02 | 70.94429 | 6/13/2017 21:39 | Port3-ECD-02 | 0.619783 | Port3-DELCD-02 | 86.00831 |
| 6/14/2017 2:41 | Port9-ECD-03 | 1.363913 | Port9-DELCD-03 | 139.364 | 6/14/2017 0:47 | Port3-ECD-03 | 1.321953 | Port3-DELCD-03 | 177.4187 |
| 6/14/2017 5:50 | Port9-ECD-04 | 1.59767 | Port9-DELCD-04 | 159.4709 | 6/14/2017 3:56 | Port3-ECD-04 | 1.869399 | Port3-DELCD-04 | 216.2746 |
| 6/14/2017 8:56 | Port1-ECD-01 | 0.392897 | Port1-ECD-01 | 75.55977 | 6/14/2017 7:05 | Port3-ECD-05 | 1.968687 | Port3-DELCD-05 | 228.2117 |
| 6/14/2017 9:34 | Port3-ECD-01 | 1.038073 | Port3-DELCD-01 | 77.03902 | 6/14/2017 9:15 | Port2-ECD-01 | 1.551215 | Port2-DELCD-01 | 177.4409 |
| 6/14/2017 10:12 | Port5-ECD-01 | 0.723627 | Port5-DELCD-01 | 60.57349 | 6/14/2017 12:24 | Port2-ECD-02 | 0.719199 | Port2-DELCD-02 | 162.2555 |
| 6/14/2017 10:50 | Port7-ECD-01 | 0.517516 | Port7-DELCD-01 | 49.16088 | 6/14/2017 15:33 | Port2-ECD-03 | 0.797048 | Port2-DELCD-03 | 179.814 |
| 6/14/2017 11:28 | Port9-ECD-01 | 0.505196 | Port9-DELCD-01 | 47.49047 | | | | | |
| 6/14/2017 12:05 | Port1-ECD-02 | 0.501276 | Port1-DELCD-02 | 50.49607 | | | | | |
| 6/14/2017 12:43 | Port3-ECD-02 | 0.456506 | Port3-DELCD-02 | 48.78132 | | | | | |
| 6/14/2017 13:21 | Port5-ECD-02 | 0.520277 | Port5-DELCD-02 | 58.92278 | | | | | |
| 6/14/2017 13:59 | Port7-ECD-02 | 0.698439 | Port7-DELCD-02 | 70.15077 | | | | | |
| 6/14/2017 14:37 | Port9-ECD-02 | 0.646475 | Port9-DELCD-02 | 53.15698 | | | | | |
| 6/14/2017 15:14 | Port1-ECD-03 | 0.832568 | Port1-DELCD-03 | 97.63465 | | | | | |
| 6/14/2017 15:52 | Port3-ECD-03 | 0.704231 | Port3-DELCD-03 | 57.72273 | | | | | |
| 6/14/2017 16:30 | Port5-ECD-03 | 0.641755 | Port5-DELCD-03 | 48.04904 | | | | | |
| 6/14/2017 17:08 | Port7-ECD-03 | 0.469912 | Port7-DELCD-03 | 49.97312 | | | | | |
| 6/14/2017 17:46 | Port9-ECD-03 | 0.554606 | Port9-DELCD-03 | 47.13911 | | | | | |

| Location | GC-7 | | | |
|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE |
| 6/13/2017 19:46 | Port7-ECD-01 | 0.236677 | Port7-DELCD-01 | 18.80911 |
| 6/13/2017 22:55 | Port7-ECD-02 | 0.226737 | Port7-DELCD-02 | 31.11452 |
| 6/14/2017 2:03 | Port7-ECD-03 | 0.753691 | Port7-DELCD-03 | 84.13903 |
| 6/14/2017 5:12 | Port7-ECD-04 | 1.310549 | Port7-DELCD-04 | 140.8157 |
| 6/14/2017 8:21 | Port7-DELCD-05 | 0.719488 | Port7-DELCD-05 | 34.66801 |
| 6/14/2017 11:09 | Port8-ECD-01 | 0.847975 | Port8-DELCD-01 | 63.99238 |
| 6/14/2017 14:18 | Port8-ECD-02 | 0.623379 | Port8-DELCD-02 | 79.44603 |
| 6/14/2017 17:27 | Port8-ECD-03 | 0.567535 | Port8-DELCD-03 | 62.41276 |



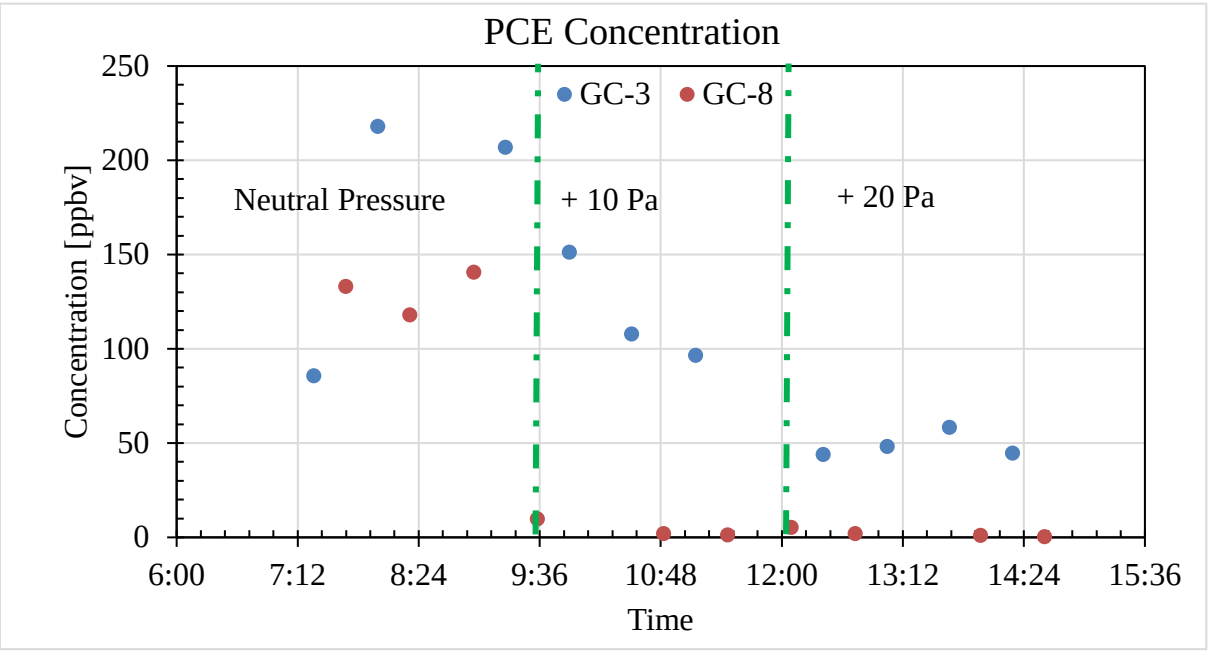
| Location | GC-4 | | | | Location | GC-6 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE |
| 6/13/2017 18:49 | Port4-ECD-01 | 0.906987 | Port4-DELCD-01 | 127.498 | 6/13/2017 19:27 | Port6-ECD-01 | 0.207158 | Port6-DELCD-01 | 16.35882 |
| 6/13/2017 21:58 | Port4-ECD-02 | 0.510875 | Port4-DELCD-02 | 67.3526 | 6/13/2017 22:36 | Port6-ECD-02 | 0.170636 | Port6-DELCD-02 | 26.14103 |
| 6/14/2017 1:06 | Port4-ECD-03 | 1.17707 | Port4-DELCD-03 | 149.4623 | 6/14/2017 1:44 | Port6-ECD-03 | 0.57788 | Port6-DELCD-03 | 75.24659 |
| 6/14/2017 4:15 | Port4-ECD-04 | 1.664399 | Port4-DELCD-04 | 184.6766 | 6/14/2017 4:53 | Port6-ECD-04 | 1.071512 | Port6-DELCD-04 | 121.0672 |
| 6/14/2017 7:24 | Port4-ECD-05 | 1.836415 | Port4-DELCD-05 | 200.0057 | 6/14/2017 8:02 | Port6-ECD-05 | 1.285777 | Port6-DELCD-05 | 138.8715 |
| 6/14/2017 9:53 | Port4-ECD-01 | 1.213819 | Port4-DELCD-01 | 133.5014 | 6/14/2017 10:31 | Port6-ECD-01 | 0.337939 | Port6-DELCD-01 | 26.95153 |
| 6/14/2017 13:02 | Port4-ECD-02 | 0.606132 | Port4-DELCD-02 | 114.8484 | 6/14/2017 13:40 | Port6-ECD-02 | 0.306592 | Port6-DELCD-02 | 21.23507 |
| 6/14/2017 16:11 | Port4-ECD-03 | 0.532154 | Port4-DELCD-03 | 110.7716 | 6/14/2017 16:49 | Port6-ECD-03 | 0.232989 | Port6-DELCD-03 | 25.11089 |

| Location | GC-8 | | | |
|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE |
| 6/13/2017 20:05 | Port8-ECD-01 | 0.521647 | Port8-DELCD-01 | 37.47035 |
| 6/13/2017 23:14 | Port8-ECD-02 | 0.614761 | Port8-DELCD-02 | 66.11177 |
| 6/14/2017 2:22 | Port8-ECD-03 | 1.306237 | Port8-DELCD-03 | 135.4105 |
| 6/14/2017 5:31 | Port8-ECD-04 | 1.630048 | Port8-DELCD-04 | 164.6642 |
| 6/14/2017 11:47 | Port10-ECD-01 | 0.600748 | Port10-DELCD-01 | 54.11118 |
| 6/14/2017 14:56 | Port10-ECD-02 | 0.367195 | Port10-DELCD-02 | 54.32597 |
| 6/14/2017 18:06 | Port10-ECD-03 | 0.260052 | Port10-DELCD-03 | 58.24098 |

# Building pressurization test

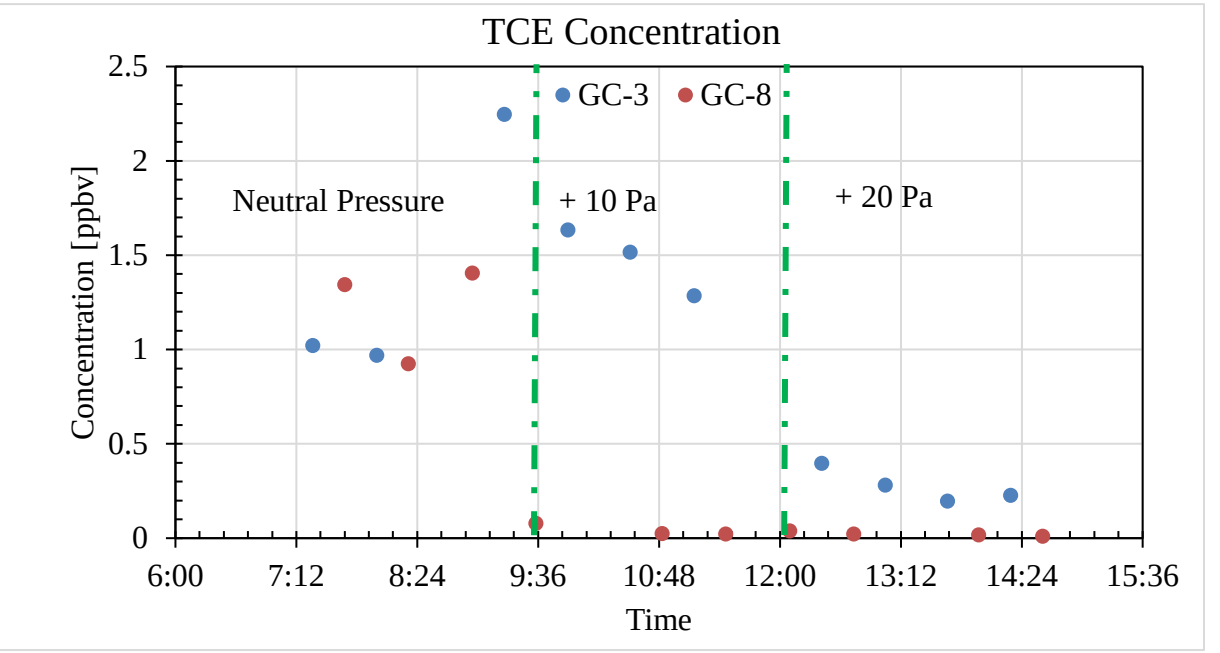
| | |
|---|---|
| + 10 Pa | 6/15/2017 9:05 |
| + 20 Pa | 6/15/2017 12:55 |
| Single sampling location near rear window, window closed | 6/15/2017 15:14 |
| Window open | 6/15/2017 16:00 |

| Location | GC-3 | | | |
|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE |
| 6/15/2017 7:21 | Port1-ECD-01 | 1.020263 | Port1-DELCD-01.C | 85.65377 |
| 6/15/2017 7:59 | Port3-ECD-01 | 0.970356 | Port3-DELCD-01 | 217.8772 |
| 6/15/2017 9:15 | Port7-ECD-01 | 2.247484 | Port7-DELCD-01 | 206.8343 |
| 6/15/2017 9:53 | Port9-ECD-01 | 1.633827 | Port9-DELCD-01 | 151.1832 |
| 6/15/2017 10:30 | Port1-ECD-02 | 1.517123 | Port1-DELCD-02.C | 107.7429 |
| 6/15/2017 11:08 | Port3-ECD-02 | 1.284067 | Port3-DELCD-02 | 96.37972 |
| 6/15/2017 12:24 | Port7-ECD-02 | 0.396293 | Port7-DELCD-02 | 43.86695 |
| 6/15/2017 13:02 | Port9-ECD-02 | 0.281521 | Port9-DELCD-02 | 48.06473 |
| 6/15/2017 13:39 | Port1-ECD-03 | 0.196943 | Port1-DELCD-03.C | 58.24098 |
| 6/15/2017 14:17 | Port3-ECD-03 | 0.226247 | Port3-DELCD-03 | 44.54557 |




| Location | Rear window | | | |
|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE |
| 6/15/2017 15:14 | Port6-ECD-03 | 0.710537 | Port6-DELCD-03 | 132.5776 |
| 6/15/2017 15:33 | Port7-ECD-03 | 0.021564 | Port7-DELCD-03 | 8.991801 |
| 6/15/2017 15:52 | Port8-ECD-03 | 0.02215 | Port8-DELCD-03 | 4.556798 |
| 6/15/2017 16:11 | Port9-ECD-03 | 0.014528 | Port9-DELCD-03 | 5.381393 |
| 6/15/2017 16:30 | Port10-ECD-03 | 0.020941 | Port10-DELCD-03 | 9.665953 |
| 6/15/2017 16:48 | Port1-ECD-04 | 0.04667 | Port1-DELCD-04.C | 14.24412 |
| 6/15/2017 17:07 | Port2-ECD-04 | 0.039311 | Port2-DELCD-04 | 14.02706 |
| 6/15/2017 17:26 | Port3-ECD-04 | 0.03746 | Port3-DELCD-04 | 19.74996 |

| Location | GC-8 | | | | Location | GC-4 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE |
| 6/15/2017 7:40 | Port2-ECD-01 | 1.343251 | Port2-DELCD-01 | 133.0603 | 6/15/2017 11:56 | Port5-ECD-02 | 0.039321 | Port5-ECD-02 | 0.025284 |
| 6/15/2017 8:18 | Port4-ECD-01 | 0.924735 | Port4-DELCD-01 | 118.0292 | 6/15/2017 15:05 | Port5-ECD-03 | 0.009591 | Port5-ECD-03 | 0.008801 |
| 6/15/2017 8:56 | Port6-ECD-01 | 1.405238 | Port6-DELCD-01 | 140.4818 | | | | | |
| 6/15/2017 9:34 | Port8-ECD-01 | 0.077562 | Port8-ECD-01 | 9.584978 | | | | | |
| 6/15/2017 10:49 | Port2-ECD-02 | 0.024735 | Port2-ECD-02 | 1.792275 | | | | | |
| 6/15/2017 11:27 | Port4-ECD-02 | 0.021725 | Port4-ECD-02 | 1.207581 | | | | | |
| 6/15/2017 12:05 | Port6-ECD-02 | 0.039462 | Port6-ECD-02 | 5.267801 | | | | | |
| 6/15/2017 12:43 | Port8-ECD-02 | 0.022213 | Port8-ECD-02 | 1.933914 | | | | | |
| 6/15/2017 13:58 | Port2-ECD-03 | 0.018544 | Port2-ECD-03 | 0.864531 | | | | | |
| 6/15/2017 14:36 | Port4-ECD-03 | 0.010168 | Port4-ECD-03 | 0.266708 | | | | | |



| Location | GC-10 Wander sampler | | | |
|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE |
| 6/15/2017 10:22 | Port10-ECD-01 | 1.30944 | Port10-DELCD-01 | 405.7613 |
| 6/15/2017 13:31 | Port10-ECD-02 | 0.252164 | Port10-DELCD-02 | 46.99245 |

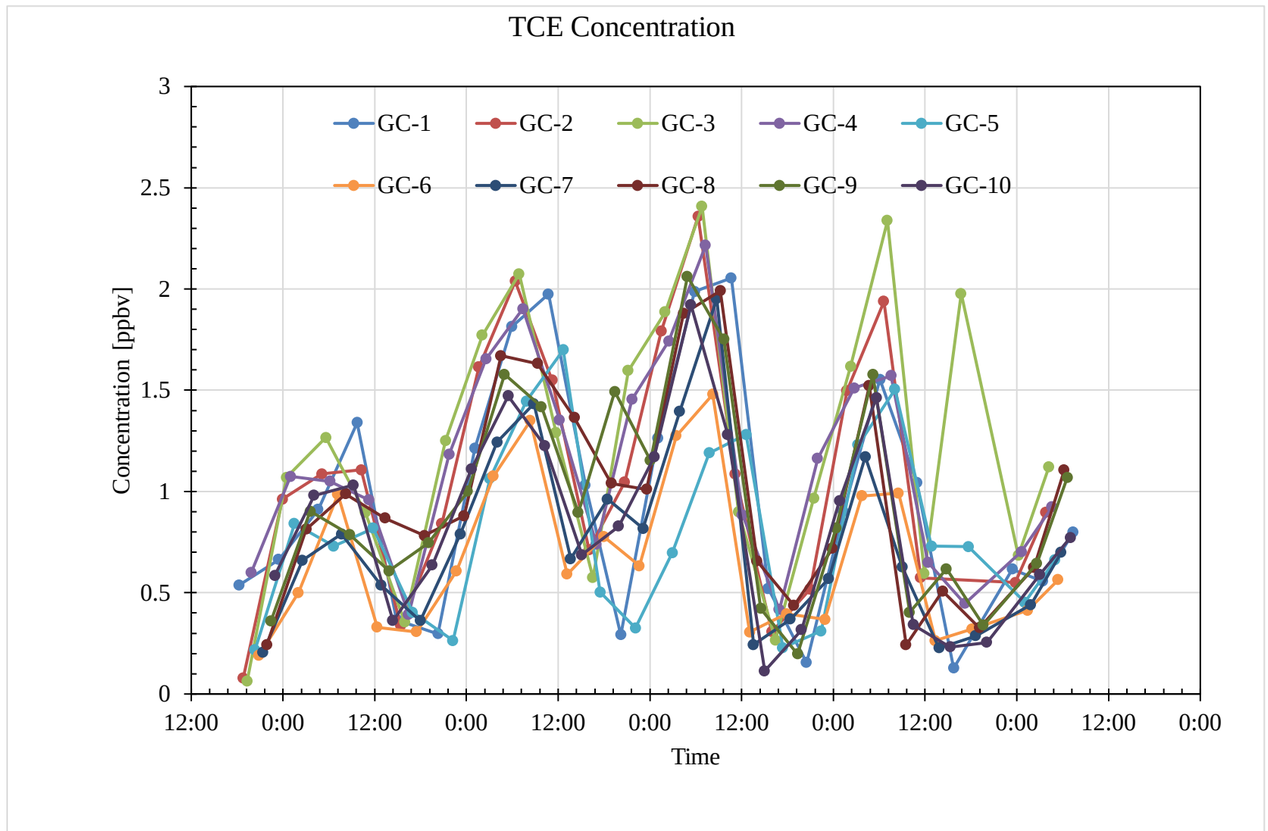
# Natural Pressure Condition over weekend 06/15-06/20

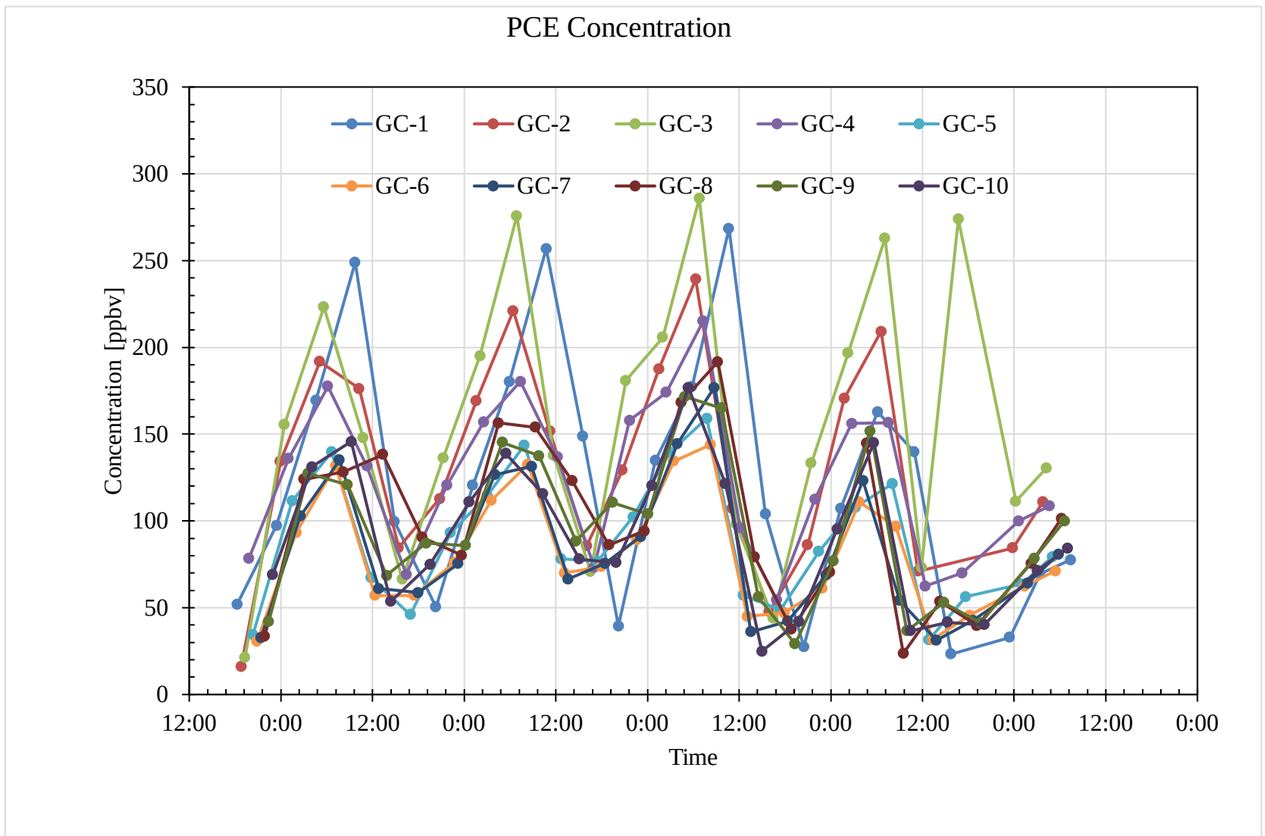
| Location | GC-1 | | | | Location | GC-2 | | | | Location | GC-3 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE |
| 6/15/2017 18:16 | Port1-ECD-01.CHR | 0.537231 | Port1-DELCD-01 | 51.97421 | 6/15/2017 18:47 | Port2-ECD-01.CHR | 0.07888 | Port2-DELCD-01 | 16.0505 | 6/15/2017 19:18 | Port3-ECD-01.CHR | 0.063658 | Port3-DELCD-01 | 21.23765 |
| 6/15/2017 23:25 | Port1-ECD-02.CHR | 0.663442 | Port1-DELCD-02 | 97.4072 | 6/15/2017 23:56 | Port2-ECD-02.CHR | 0.961445 | Port2-DELCD-02 | 134.3292 | 6/16/2017 0:27 | Port3-ECD-02.CHR | 1.069045 | Port3-DELCD-02 | 155.5409 |
| 6/16/2017 4:34 | Port1-DELCD-03 | 0.910745 | Port1-DELCD-03 | 169.3962 | 6/16/2017 5:05 | Port2-DELCD-03 | 1.086833 | Port2-DELCD-03 | 191.8149 | 6/16/2017 5:36 | Port3-DELCD-03 | 1.265666 | Port3-DELCD-03 | 223.1617 |
| 6/16/2017 9:43 | Port1-DELCD-04 | 1.339563 | Port1-DELCD-04 | 248.9726 | 6/16/2017 10:14 | Port2-DELCD-04 | 1.10679 | Port2-DELCD-04 | 176.1967 | 6/16/2017 10:45 | Port3-DELCD-04 | 0.897424 | Port3-DELCD-04 | 147.875 |
| 6/16/2017 14:52 | Port1-DELCD-05 | 0.367337 | Port1-DELCD-05 | 99.61747 | 6/16/2017 15:24 | Port2-DELCD-05 | 0.337526 | Port2-DELCD-05 | 84.54852 | 6/16/2017 15:55 | Port3-DELCD-05 | 0.355559 | Port3-DELCD-05 | 66.40932 |
| 6/16/2017 20:17 | Port1-ECD-01 | 0.296645 | Port1-DELCD-01 | 50.40444 | 6/16/2017 20:46 | Port2-ECD-01 | 0.841692 | Port2-DELCD-01 | 112.8247 | 6/16/2017 21:15 | Port3-ECD-01 | 1.251246 | Port3-DELCD-01 | 136.2609 |
| 6/17/2017 1:06 | Port1-ECD-01 | 1.212428 | Port1-DELCD-02 | 120.5587 | 6/17/2017 1:35 | Port2-ECD-02 | 1.613706 | Port2-DELCD-02 | 169.2416 | 6/17/2017 2:04 | Port3-ECD-02 | 1.771313 | Port3-DELCD-02 | 195.1896 |
| 6/17/2017 5:55 | Port1-ECD-01.CHR | 1.813051 | Port1-DELCD-03 | 180.1575 | 6/17/2017 6:24 | Port2-ECD-03 | 2.038305 | Port2-DELCD-03 | 221.048 | 6/17/2017 6:53 | Port3-ECD-03 | 2.074311 | Port3-DELCD-03 | 275.7327 |
| 6/17/2017 10:44 | Port1-ECD-02 | 1.974958 | Port1-DELCD-04 | 256.9002 | 6/17/2017 11:13 | Port2-ECD-04 | 1.548898 | Port2-DELCD-04 | 151.6584 | 6/17/2017 11:42 | Port3-ECD-04 | 1.289712 | Port3-DELCD-04 | 137.8103 |
| 6/17/2017 15:33 | Port1-ECD-02 | 1.031469 | Port1-DELCD-05 | 148.7338 | 6/17/2017 16:02 | Port2-ECD-05 | 0.712233 | Port2-DELCD-05 | 85.59427 | 6/17/2017 16:31 | Port3-ECD-05 | 0.573971 | Port3-DELCD-05 | 70.67357 |
| 6/17/2017 20:12 | Port1-ECD-02.CHR | 0.291981 | Port1-DELCD-01 | 39.47333 | 6/17/2017 20:41 | Port2-ECD-01 | 1.047018 | Port2-DELCD-01 | 129.2529 | 6/17/2017 21:10 | Port3-ECD-01 | 1.597246 | Port3-DELCD-01 | 180.8634 |
| 6/18/2017 1:01 | Port1-ECD-03 | 1.262667 | Port1-DELCD-02 | 134.8139 | 6/18/2017 1:30 | Port2-ECD-02 | 1.790956 | Port2-DELCD-02 | 187.4878 | 6/18/2017 1:59 | Port3-ECD-02 | 1.886313 | Port3-DELCD-02 | 205.7817 |
| 6/18/2017 5:50 | Port1-ECD-03 | 1.986634 | Port1-DELCD-03 | 177.3938 | 6/18/2017 6:18 | Port2-ECD-03 | 2.357588 | Port2-DELCD-03 | 239.1796 | 6/18/2017 6:47 | Port3-ECD-03 | 2.406743 | Port3-DELCD-03 | 285.8344 |
| 6/18/2017 10:38 | Port1-ECD-03.CHR | 2.054299 | Port1-DELCD-04 | 268.4996 | 6/18/2017 11:07 | Port2-ECD-04 | 1.085389 | Port2-DELCD-04 | 107.2451 | 6/18/2017 11:36 | Port3-ECD-04 | 0.899521 | Port3-DELCD-04 | 98.25954 |
| 6/18/2017 15:27 | Port1-ECD-04 | 0.52085 | Port1-DELCD-05 | 104.048 | 6/18/2017 15:56 | Port2-ECD-05 | 0.307004 | Port2-DELCD-05 | 47.81174 | 6/18/2017 16:25 | Port3-ECD-05 | 0.26582 | Port3-DELCD-05 | 44.05794 |
| 6/18/2017 20:28 | Port1-ECD-04 | 0.155179 | Port1-DELCD-01 | 27.54603 | 6/18/2017 20:57 | Port2-ECD-01.CHR | 0.517288 | Port2-DELCD-01 | 86.09289 | 6/18/2017 21:26 | Port3-ECD-01.CHR | 0.967248 | Port3-DELCD-01 | 133.3663 |
| 6/19/2017 1:17 | Port1-ECD-04.CHR | 0.902461 | Port1-DELCD-02 | 107.1831 | 6/19/2017 1:46 | Port2-ECD-02.CHR | 1.497935 | Port2-DELCD-02 | 170.5069 | 6/19/2017 2:15 | Port3-ECD-02.CHR | 1.617913 | Port3-DELCD-02 | 196.7827 |
| 6/19/2017 6:06 | Port1-ECD-05 | 1.552907 | Port1-DELCD-03 | 162.8824 | 6/19/2017 6:35 | Port2-ECD-03.CHR | 1.937954 | Port2-DELCD-03 | 209.1792 | 6/19/2017 7:04 | Port3-ECD-03.CHR | 2.337436 | Port3-DELCD-03 | 262.8999 |
| 6/19/2017 10:55 | Port1-ECD-05 | 1.04258 | Port1-DELCD-04 | 139.642 | 6/19/2017 11:24 | Port2-ECD-04.CHR | 0.573658 | Port2-DELCD-04 | 70.99355 | 6/19/2017 11:53 | Port3-ECD-04.CHR | 0.594562 | Port3-DELCD-04 | 73.08339 |
| 6/19/2017 15:44 | Port1-ECD-05.CHR | 0.127122 | Port1-DELCD-05 | 23.2786 | 6/19/2017 23:49 | Port2-ECD-01.CHR | 0.550275 | Port2-DELCD-01.C | 84.48099 | 6/19/2017 16:42 | Port3-ECD-05.CHR | 1.977574 | Port3-DELCD-05 | 273.8343 |
| 6/19/2017 23:25 | Port1-ECD-01.CHR | 0.616427 | Port1-DELCD-01.C | 32.91833 | 6/20/2017 3:48 | Port2-ECD-02.CHR | 0.89609 | Port2-DELCD-02.C | 110.971 | 6/20/2017 0:13 | Port3-ECD-01.CHR | 0.683976 | Port3-DELCD-01.C | 111.3266 |
| 6/20/2017 3:24 | Port1-ECD-02.CHR | 0.556306 | Port1-DELCD-02.C | 69.55673 | | | | | | 6/20/2017 4:12 | Port3-ECD-02.CHR | 1.122023 | Port3-DELCD-02.C | 130.4036 |
| 6/20/2017 7:23 | Port1-ECD-03.CHR | 0.798266 | Port1-DELCD-03.C | 77.62291 | | | | | | | | | | |

| Location | GC-4 | | | | Location | GC-5 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE |
| 6/15/2017 19:49 | Port4-ECD-01.CHR | 0.598506 | Port4-DELCD-01 | 78.50207 | 6/15/2017 20:20 | Port5-ECD-01.CHR | 0.218612 | Port5-DELCD-01 | 34.53205 |
| 6/16/2017 0:58 | Port4-ECD-02.CHR | 1.073609 | Port4-DELCD-02 | 135.9685 | 6/16/2017 1:29 | Port5-ECD-01 | 0.841145 | Port5-DELCD-02 | 111.4795 |
| 6/16/2017 6:07 | Port4-DELCD-03 | 1.050848 | Port4-DELCD-03 | 177.5677 | 6/16/2017 6:38 | Port5-DELCD-02 | 0.729795 | Port5-DELCD-03 | 139.6466 |
| 6/16/2017 11:16 | Port4-DELCD-04 | 0.957673 | Port4-DELCD-04 | 131.5266 | 6/16/2017 11:48 | Port5-DELCD-03 | 0.818765 | Port5-DELCD-04 | 67.1867 |
| 6/16/2017 16:26 | Port4-DELCD-05 | 0.393082 | Port4-DELCD-05 | 69.18339 | 6/16/2017 16:57 | Port5-DELCD-04 | 0.403558 | Port5-DELCD-05 | 46.03432 |
| 6/16/2017 21:44 | Port4-ECD-01 | 1.182004 | Port4-DELCD-01 | 120.6201 | 6/16/2017 22:13 | Port5-DELCD-05 | 0.263531 | Port5-DELCD-01 | 93.14629 |
| 6/17/2017 2:33 | Port4-ECD-02 | 1.653403 | Port4-DELCD-02 | 156.8631 | 6/17/2017 3:02 | Port5-ECD-01 | 1.063875 | Port5-DELCD-02 | 114.7981 |
| 6/17/2017 7:22 | Port4-ECD-03 | 1.902655 | Port4-DELCD-03 | 180.3125 | 6/17/2017 7:51 | Port5-ECD-02 | 1.446 | Port5-DELCD-03 | 143.6183 |
| 6/17/2017 12:11 | Port4-ECD-04 | 1.353104 | Port4-DELCD-04 | 136.7461 | 6/17/2017 12:40 | Port5-ECD-03 | 1.69856 | Port5-DELCD-04 | 78.09902 |
| 6/17/2017 17:00 | Port4-ECD-05 | 0.737965 | Port4-DELCD-05 | 73.20859 | 6/17/2017 17:29 | Port5-ECD-04 | 0.502477 | Port5-DELCD-05 | 76.6963 |
| 6/17/2017 21:39 | Port4-ECD-01 | 1.454484 | Port4-DELCD-01 | 157.9017 | 6/17/2017 22:08 | Port5-ECD-05 | 0.325607 | Port5-DELCD-01 | 102.3576 |
| 6/18/2017 2:28 | Port4-ECD-02 | 1.742719 | Port4-DELCD-02 | 174.0193 | 6/18/2017 2:57 | Port5-ECD-01.CHR | 0.69697 | Port5-DELCD-02 | 139.5224 |
| 6/18/2017 7:16 | Port4-ECD-03 | 2.215699 | Port4-DELCD-03 | 215.2209 | 6/18/2017 7:45 | Port5-ECD-02.CHR | 1.190504 | Port5-DELCD-03 | 159.114 |
| 6/18/2017 12:05 | Port4-ECD-04 | 0.884845 | Port4-DELCD-04 | 96.26527 | 6/18/2017 12:34 | Port5-ECD-03.CHR | 1.281458 | Port5-DELCD-04 | 57.07586 |
| 6/18/2017 16:54 | Port4-ECD-05 | 0.41625 | Port4-DELCD-05 | 54.41093 | 6/18/2017 17:23 | Port5-ECD-04.CHR | 0.228569 | Port5-DELCD-05 | 48.90312 |
| 6/18/2017 21:55 | Port4-ECD-01.CHR | 1.162775 | Port4-DELCD-01 | 112.5647 | 6/18/2017 22:24 | Port5-ECD-05.CHR | 0.310124 | Port5-DELCD-01 | 82.41556 |
| 6/19/2017 2:44 | Port4-ECD-02.CHR | 1.510732 | Port4-DELCD-02 | 156.2226 | 6/19/2017 3:13 | Port5-ECD-02 | 1.229475 | Port5-DELCD-02 | 107.8035 |
| 6/19/2017 7:33 | Port4-ECD-03.CHR | 1.571728 | Port4-DELCD-03 | 156.6567 | 6/19/2017 8:02 | Port5-ECD-03 | 1.503938 | Port5-DELCD-03 | 121.4091 |
| 6/19/2017 12:22 | Port4-ECD-04.CHR | 0.649669 | Port4-DELCD-04 | 62.49894 | 6/19/2017 12:51 | Port5-ECD-04 | 0.729434 | Port5-DELCD-04 | 31.62368 |
| 6/19/2017 17:11 | Port4-ECD-05.CHR | 0.446588 | Port4-DELCD-05 | 70.02177 | 6/19/2017 17:40 | Port5-ECD-05 | 0.727767 | Port5-DELCD-05 | 56.31985 |
| 6/20/2017 0:37 | Port4-ECD-01.CHR | 0.702137 | Port4-DELCD-01.C | 99.97216 | 6/20/2017 1:01 | Port5-ECD-01.CHR | 0.452725 | Port5-DELCD-01.C | 63.66155 |
| 6/20/2017 4:36 | Port4-ECD-02.CHR | 0.923477 | Port4-DELCD-02.C | 108.5189 | 6/20/2017 5:00 | Port5-ECD-02.CHR | 0.660779 | Port5-DELCD-02.C | 79.25557 |

| Location | GC-6 | | | | Location | GC-7 | | | | Location | GC-8 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE |
| 6/15/2017 20:51 | Port6-ECD-01.CHR | 0.190016 | Port6-DELCD-01 | 30.68313 | 6/15/2017 21:22 | Port7-ECD-01.CHR | 0.205497 | Port7-DELCD-01 | 32.61751 | 6/15/2017 21:53 | Port8-ECD-01.CHR | 0.243953 | Port8-DELCD-01 | 33.68623 |
| 6/16/2017 2:00 | Port6-DELCD-02 | 0.500369 | Port6-DELCD-02 | 93.31962 | 6/16/2017 2:31 | Port7-DELCD-02 | 0.660328 | Port7-DELCD-02 | 102.6836 | 6/16/2017 3:02 | Port8-DELCD-02 | 0.813241 | Port8-DELCD-02 | 124.0037 |
| 6/16/2017 7:09 | Port6-DELCD-03 | 0.985109 | Port6-DELCD-03 | 131.6906 | 6/16/2017 7:40 | Port7-DELCD-03 | 0.789928 | Port7-DELCD-03 | 135.0585 | 6/16/2017 8:11 | Port8-DELCD-03 | 0.988525 | Port8-DELCD-03 | 128.1768 |
| 6/16/2017 12:19 | Port6-DELCD-04 | 0.329308 | Port6-DELCD-04 | 56.98688 | 6/16/2017 12:50 | Port7-DELCD-04 | 0.538031 | Port7-DELCD-04 | 60.9582 | 6/16/2017 13:21 | Port8-DELCD-04 | 0.867795 | Port8-DELCD-04 | 138.2683 |
| 6/16/2017 17:28 | Port6-DELCD-05 | 0.3068 | Port6-DELCD-05 | 56.98976 | 6/16/2017 17:59 | Port7-DELCD-05 | 0.361582 | Port7-DELCD-05 | 58.71103 | 6/16/2017 18:30 | Port8-DELCD-05 | 0.781774 | Port8-DELCD-05 | 90.5595 |
| 6/16/2017 22:42 | Port6-ECD-01 | 0.607315 | Port6-DELCD-01 | 75.9193 | 6/16/2017 23:11 | Port7-ECD-01 | 0.787993 | Port7-DELCD-01 | 75.35481 | 6/16/2017 23:40 | Port8-ECD-01 | 0.879236 | Port8-DELCD-01 | 80.1649 |
| 6/17/2017 3:31 | Port6-ECD-02 | 1.074854 | Port6-DELCD-02 | 111.779 | 6/17/2017 4:00 | Port7-ECD-02 | 1.244125 | Port7-DELCD-02 | 126.6214 | 6/17/2017 4:29 | Port8-ECD-02 | 1.669804 | Port8-DELCD-02 | 156.3727 |
| 6/17/2017 8:20 | Port6-ECD-03 | 1.349105 | Port6-DELCD-03 | 132.5341 | 6/17/2017 8:49 | Port7-ECD-03 | 1.433828 | Port7-DELCD-03 | 131.4075 | 6/17/2017 9:18 | Port8-ECD-03 | 1.631152 | Port8-DELCD-03 | 153.9872 |
| 6/17/2017 13:09 | Port6-ECD-04 | 0.591473 | Port6-DELCD-04 | 69.97979 | 6/17/2017 13:38 | Port7-ECD-04 | 0.667008 | Port7-DELCD-04 | 66.54385 | 6/17/2017 14:07 | Port8-ECD-04 | 1.364107 | Port8-DELCD-04 | 123.2165 |
| 6/17/2017 17:58 | Port6-ECD-05 | 0.776624 | Port6-DELCD-05 | 73.59785 | 6/17/2017 18:27 | Port7-ECD-05 | 0.962119 | Port7-DELCD-05 | 75.50533 | 6/17/2017 18:56 | Port8-ECD-05 | 1.040793 | Port8-DELCD-05 | 86.14003 |
| 6/17/2017 22:37 | Port6-ECD-01 | 0.631929 | Port6-DELCD-01 | 89.27577 | 6/17/2017 23:06 | Port7-ECD-01 | 0.817535 | Port7-DELCD-01 | 90.98317 | 6/17/2017 23:35 | Port8-ECD-01 | 1.010053 | Port8-DELCD-01 | 94.15028 |
| 6/18/2017 3:26 | Port6-ECD-02 | 1.275376 | Port6-DELCD-02 | 134.4855 | 6/18/2017 3:55 | Port7-ECD-02 | 1.396026 | Port7-DELCD-02 | 144.5813 | 6/18/2017 4:24 | Port8-ECD-02 | 1.878974 | Port8-DELCD-02 | 168.2804 |
| 6/18/2017 8:14 | Port6-ECD-03 | 1.479072 | Port6-DELCD-03 | 143.864 | 6/18/2017 8:43 | Port7-ECD-03 | 1.951574 | Port7-DELCD-03 | 176.8872 | 6/18/2017 9:12 | Port8-ECD-03 | 1.990724 | Port8-DELCD-03 | 191.7176 |
| 6/18/2017 13:03 | Port6-ECD-04 | 0.305695 | Port6-DELCD-04 | 44.97136 | 6/18/2017 13:32 | Port7-ECD-04 | 0.243403 | Port7-DELCD-04 | 36.07051 | 6/18/2017 14:01 | Port8-ECD-04 | 0.656362 | Port8-DELCD-04 | 79.17645 |
| 6/18/2017 17:52 | Port6-ECD-05 | 0.395465 | Port6-DELCD-05 | 47.0474 | 6/18/2017 18:21 | Port7-ECD-05 | 0.369208 | Port7-DELCD-05 | 42.17964 | 6/18/2017 18:50 | Port8-ECD-05 | 0.43646 | Port8-DELCD-05 | 37.70416 |
| 6/18/2017 22:53 | Port6-ECD-01.CHR | 0.36796 | Port6-DELCD-01 | 61.16768 | 6/18/2017 23:22 | Port7-ECD-01.CHR | 0.570538 | Port7-DELCD-01 | 68.7047 | 6/18/2017 23:51 | Port8-ECD-01.CHR | 0.719033 | Port8-DELCD-01 | 70.41149 |
| 6/19/2017 3:42 | Port6-ECD-02.CHR | 0.978289 | Port6-DELCD-02 | 110.888 | 6/19/2017 4:11 | Port7-ECD-02.CHR | 1.171612 | Port7-DELCD-02 | 123.299 | 6/19/2017 4:40 | Port8-ECD-02.CHR | 1.52229 | Port8-DELCD-02 | 144.6464 |
| 6/19/2017 8:31 | Port6-ECD-03.CHR | 0.992005 | Port6-DELCD-03 | 96.8484 | 6/19/2017 9:00 | Port7-ECD-03.CHR | 0.627039 | Port7-DELCD-03 | 54.13589 | 6/19/2017 9:29 | Port8-ECD-03.CHR | 0.241992 | Port8-DELCD-03 | 23.62571 |
| 6/19/2017 13:20 | Port6-ECD-04.CHR | 0.263022 | Port6-DELCD-04 | 31.61807 | 6/19/2017 13:49 | Port7-ECD-04.CHR | 0.227727 | Port7-DELCD-04 | 31.23943 | 6/19/2017 14:18 | Port8-ECD-04.CHR | 0.50788 | Port8-DELCD-04 | 53.63279 |
| 6/19/2017 18:09 | Port6-ECD-05.CHR | 0.320077 | Port6-DELCD-05 | 45.6277 | 6/19/2017 18:38 | Port7-ECD-05.CHR | 0.286741 | Port7-DELCD-05 | 42.60019 | 6/19/2017 19:07 | Port8-ECD-05.CHR | 0.327527 | Port8-DELCD-05 | 39.70388 |
| 6/20/2017 1:25 | Port6-ECD-01.CHR | 0.413355 | Port6-DELCD-01.C | 62.44573 | 6/20/2017 1:49 | Port7-ECD-01.CHR | 0.440208 | Port7-DELCD-01.C | 64.21899 | 6/20/2017 2:13 | Port8-ECD-01.CHR | 0.623227 | Port8-DELCD-01.C | 75.50215 |
| 6/20/2017 5:24 | Port6-ECD-02.CHR | 0.56342 | Port6-DELCD-02.C | 71.15756 | 6/20/2017 5:48 | Port7-ECD-02.CHR | 0.697983 | Port7-DELCD-02.C | 80.73318 | 6/20/2017 6:12 | Port8-ECD-02.CHR | 1.105806 | Port8-DELCD-02.C | 101.4013 |

| Location | GC-9 | | | | Location | GC-10 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Time | File ID | TCE | File ID | PCE | Time | File ID | TCE | File ID | PCE |
| 6/15/2017 22:24 | Port9-ECD-01.CHR | 0.35969 | Port9-DELCD-01 | 42.01487 | 6/15/2017 22:55 | Port10-ECD-01.CH | 0.585591 | Port10-DELCD-01 | 68.9589 |
| 6/16/2017 3:33 | Port9-DELCD-02 | 0.902205 | Port9-DELCD-02 | 127.3158 | 6/16/2017 4:04 | Port10-DELCD-02 | 0.980189 | Port10-DELCD-02 | 131.1604 |
| 6/16/2017 8:42 | Port9-DELCD-03 | 0.787214 | Port9-DELCD-03 | 120.7698 | 6/16/2017 9:13 | Port10-DELCD-03 | 1.03111 | Port10-DELCD-03 | 145.6766 |
| 6/16/2017 13:52 | Port9-DELCD-04 | 0.607136 | Port9-DELCD-04 | 68.62087 | 6/16/2017 14:23 | Port10-DELCD-04 | 0.362392 | Port10-DELCD-04 | 53.59914 |
| 6/16/2017 19:01 | Port9-DELCD-05 | 0.746416 | Port9-DELCD-05 | 87.23747 | 6/16/2017 19:32 | Port10-DELCD-05 | 0.635621 | Port10-DELCD-05 | 75.00618 |
| 6/17/2017 0:09 | Port9-ECD-01 | 1.000495 | Port9-DELCD-01 | 85.89978 | 6/17/2017 0:38 | Port10-ECD-01 | 1.110183 | Port10-DELCD-01 | 110.8485 |
| 6/17/2017 4:58 | Port9-ECD-02 | 1.577545 | Port9-DELCD-02 | 145.2663 | 6/17/2017 5:27 | Port10-ECD-02 | 1.471354 | Port10-DELCD-02 | 138.7803 |
| 6/17/2017 9:47 | Port9-ECD-03 | 1.418074 | Port9-DELCD-03 | 137.5201 | 6/17/2017 10:16 | Port10-ECD-03 | 1.2246 | Port10-DELCD-03 | 115.6292 |
| 6/17/2017 14:36 | Port9-ECD-04 | 0.896273 | Port9-DELCD-04 | 88.27163 | 6/17/2017 15:05 | Port10-ECD-04 | 0.687417 | Port10-DELCD-04 | 77.96972 |
| 6/17/2017 19:25 | Port9-ECD-05 | 1.492981 | Port9-DELCD-05 | 110.5465 | 6/17/2017 19:54 | Port10-ECD-05 | 0.827725 | Port10-DELCD-05 | 75.9719 |
| 6/18/2017 0:04 | Port9-ECD-01 | 1.152835 | Port9-DELCD-01 | 103.9338 | 6/18/2017 0:33 | Port10-ECD-01 | 1.170235 | Port10-DELCD-01 | 120.4217 |
| 6/18/2017 4:53 | Port9-ECD-02 | 2.06237 | Port9-DELCD-02 | 171.5878 | 6/18/2017 5:22 | Port10-ECD-02 | 1.921472 | Port10-DELCD-02 | 176.6771 |
| 6/18/2017 9:41 | Port9-ECD-03 | 1.751772 | Port9-DELCD-03 | 165.0136 | 6/18/2017 10:10 | Port10-ECD-03 | 1.280337 | Port10-DELCD-03 | 121.4121 |
| 6/18/2017 14:30 | Port9-ECD-04 | 0.421451 | Port9-DELCD-04 | 56.20996 | 6/18/2017 14:59 | Port10-ECD-04 | 0.113821 | Port10-DELCD-04 | 24.94097 |
| 6/18/2017 19:19 | Port9-ECD-05 | 0.196628 | Port9-DELCD-05 | 29.06728 | 6/18/2017 19:48 | Port10-ECD-05 | 0.316606 | Port10-DELCD-05 | 41.91733 |
| 6/19/2017 0:20 | Port9-ECD-01.CHR | 0.817787 | Port9-DELCD-01 | 76.86758 | 6/19/2017 0:49 | Port10-ECD-01.CH | 0.954906 | Port10-DELCD-01 | 95.26939 |
| 6/19/2017 5:09 | Port9-ECD-02.CHR | 1.57609 | Port9-DELCD-02 | 151.618 | 6/19/2017 5:38 | Port10-ECD-02.CH | 1.463098 | Port10-DELCD-02 | 145.0796 |
| 6/19/2017 9:58 | Port9-ECD-03.CHR | 0.403276 | Port9-DELCD-03 | 36.70767 | 6/19/2017 10:27 | Port10-ECD-03.CH | 0.341288 | Port10-DELCD-03 | 36.71844 |
| 6/19/2017 14:47 | Port9-ECD-04.CHR | 0.617123 | Port9-DELCD-04 | 52.97334 | 6/19/2017 15:16 | Port10-ECD-04.CH | 0.232562 | Port10-DELCD-04 | 41.589 |
| 6/19/2017 19:36 | Port9-ECD-05.CHR | 0.339028 | Port9-DELCD-05 | 41.25674 | 6/19/2017 20:05 | Port10-ECD-05.CH | 0.254868 | Port10-DELCD-05 | 40.10867 |
| 6/20/2017 2:37 | Port9-ECD-01.CHR | 0.64442 | Port9-DELCD-01.C | 78.30729 | 6/20/2017 3:01 | Port10-ECD-01.CH | 0.590275 | Port10-DELCD-01. | 71.3196 |
| 6/20/2017 6:36 | Port9-ECD-02.CHR | 1.068966 | Port9-DELCD-02.C | 100.0558 | 6/20/2017 7:00 | Port10-ECD-02.CH | 0.772789 | Port10-DELCD-02. | 84.31865 |


TCE Concentration
GC-1
GC-2
GC-3
GC-4
GC-5
GC-6
GC-7
GC-8
GC-9
GC-10
Concentration [ppbv]
3
2.5
2
1.5
1
0.5
0
12:00
0:00
12:00
0:00
12:00
0:00
12:00
0:00
12:00
0:00
12:00
0:00
Time


PCE Concentration
Concentration [ppbv]
350
300
250
200
150
100
50
0
GC-1
GC-2
GC-3
GC-4
GC-5
GC-6
GC-7
GC-8
GC-9
GC-10
12:00
0:00
12:00
0:00
12:00
0:00
12:00
0:00
12:00
0:00
12:00
0:00
Time

# APPENDIX E. COST MODELS

# Cost Comparison of Conventional Approach Versus Optimized Approach at Building 205

**Inputs**

**Duration of the mitigation system =** **30**

| Conventional Approach | | Optimized Approach | |
|---|---|---|---|
| **No. of Vent pipes** | **27** | **No. of Vent pipes** | **2** |
| **No. of Fans** | **9** | **No. of Fans** | **2** |
| **Area of Building** | **64,000** | **Area of Building** | **64,000** |
| **Total System Flow** | **500** | **Total System Flow** | **100** |

| Category | Item | Unit Costs | Labor | Expenses | Total | Labor | Expenses | Total | Descriptions and comments |
|---|---|---|---|---|---|---|---|---|---|
| **Initiation** | Contracting | | $ 2,000 | $ - | $ 2,000 | $ 2,000 | $ - | $ 2,000 | Contractor procurement, ordering equipment. Assumed equal for both conventional and optimized |
| | Data review & CSM update | | $ 1,000 | $ - | $ 1,000 | $ 1,000 | $ - | $ 1,000 | Assumed equal for both conventional and optimized |
| | Conceptual design & Workplan | $0.15 /sq. ft | $ 9,600 | $ 100 | $ 9,700 | $ 9,600 | $ 100 | $ 9,700 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Regulatory Negotiation | | $ 500 | $ - | $ 500 | $ 500 | $ - | $ 500 | Dependent on the level of regulatory approval based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Permits (as needed) | | $ 125 | $ 200 | $ 325 | $ 125 | $ 200 | $ 325 | Dependent on the permitting process based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Notifications / Fact Sheets | | $ 500 | $ 100 | $ 600 | $ 500 | $ 100 | $ 600 | Assumed equal for both conventional and optimized |
| **Reconnaissance** | Building inspection (Inc. travel) | $0.05 /sq. ft | $ 4,700 | $ 500 | $ 5,200 | $ 4,700 | $ 500 | $ 5,200 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Sealing obvious floor penetrations | $0.15 /sq. ft | $ 9,600 | $ 200 | $ 9,800 | $ 9,600 | $ 200 | $ 9,800 | Dependent on building size but can vary greatly based on condition of the slab. Assumed equal for both conventional and optimized |
| | Install sump for pilot test (assume one per 10,000 ft2 of building) | | $ 200 | $ 1,000 | $ 1,200 | $ 200 | $ 1,000 | $ 1,200 | Assumes asbestos test, geophysical locates and concrete corer. Assumed equal for both conventional and optimized |
| | Baseline cross-slab pressure logging | | $ - | $ - | $ - | $ 500 | $ 200 | $ 700 | 1 week with two locations monitored via dataloggers |
| **Pilot Test** | Install subslab probes | | $ 1,280 | $ 960 | $ 2,240 | $ 1,280 | $ 960 | $ 2,240 | Assumes hammerdrill and Vapor Pin® rental |
| | Measure static vacuum levels | | $ 1,920 | $ 640 | $ 2,560 | $ 1,920 | $ 640 | $ 2,560 | Conventional vacuum vs distance measurements during pilot scale extraction |
| | Measure transient vacuum responses | | $ - | $ - | $ - | $ 1,600 | $ 640 | $ 2,240 | Assumes each cycle is about 2 min duration |
| | Helium Tracer Tests | | $ - | $ - | $ - | $ 3,840 | $ 3,200 | $ 7,040 | Assumes each test is about 10 min, 2 tests per fan) |
| | Measure mass emission rate | | $ - | $ - | $ - | $ 1,280 | $ 3,200 | $ 4,480 | Sample each vent pipe and measure flow rate. |
| | Stress test with blower door and/or HVAC | | $ - | $ - | $ - | $ 3,000 | $ 2,000 | $ 5,000 | 3 steps: 1)-10Pa building, 2) add SSV, 3) only SSV. Costs would change bases on building size and use of HVAC for depressurization. |
| | Calculate ROI | | $ 250 | $ - | $ 250 | $ 2,000 | $ - | $ 2,000 | Semi-log plot versus Hantush-Jacob model and multiple lines of evidence |
| | Design number and location of suction points | $300 /VP | $ 9,100 | $ - | $ 9,100 | $ 1,600 | $ - | $ 1,600 | Assumed equal for both conventional and optimized |
| **Installation** | Installation of sump, vent pipe, placards and manometer | $5,300 /VP | $ 35,100 | $ 108,000 | $ 143,100 | $ 2,500 | $ 5,500 | $ 8,000 | Based on number of vent pipes. Includes oversight, materials and labor |
| | Roof or wall penetration | $1,025 /VP | $ 1,125 | $ 8,100 | $ 9,225 | $ 250 | $ 1,700 | $ 1,950 | Based on number of fans. Includes oversight, materials and labor |
| | Fan installation and alarms | $1,925 /VP | $ 1,125 | $ 16,200 | $ 17,325 | $ 250 | $ 3,500 | $ 3,750 | Based on number of fans. Includes oversight, materials and labor |
| | Electrical connection | $1,625 /VP | $ 1,125 | $ 13,500 | $ 14,625 | $ 250 | $ 3,000 | $ 3,250 | Based on number of fans. Includes oversight, materials and labor |
| | Initial Startup and Balancing | $100 /VP | $ 2,700 | $ - | $ 2,700 | $ 200 | $ - | $ 200 | Based on number of vent pipes. Includes labor |
| **Operation** | Confirmatory sampling (Inc. travel, 1 OA, min 1 IA, max 6 IA) | 1 sample /5000 $ft^2$ | $ 2,500 | $ 2,300 | $ 4,800 | $ 2,500 | $ 2,300 | $ 4,800 | Based on collecting 1 OA, 1 IA/5000 $ft^2$, up to a maximum of 6 IA samples |
| | Periodic monitoring & inspection assume (10 events Inc. travel and sampling) | 1 sample /5000 $ft^2$ | $ 25,000 | $ 23,000 | $ 48,000 | $ 25,000 | $ 23,000 | $ 48,000 | Based on a total of 10 monitoring events |
| | Cost of Electricity | $ 0.13 /kWhr | $ - | $ 46,121 | $ 46,121 | $ - | $ 10,249 | $ 10,249 | Based on a fan drawing power at 150 W |
| | Cost of loss of conditioned air | $ 0.08 /10000 $ft^3$ | $ - | $ 31,536 | $ 31,536 | $ - | $ 6,307 | $ 6,307 | Based on a energy cost of \$0.08/10,000 $ft^3$ |
| | System Modifications and additional monitoring (optional entry) | | | | $ - | $ - | $ - | $ - | Optional entry if multiple mobilizations are needed to complete the system |
| **Maintenance** | Periodic repairs or balancing (if needed) | | $ 1,800 | $ 900 | $ 2,700 | $ 400 | $ 200 | $ 600 | Often not necessary, but worth an occasional check |
| **Fan Replacement** | Hardware and labor | | $ 9,000 | $ 27,000 | $ 36,000 | $ 2,000 | $ 6,000 | $ 8,000 | Assuming a 10-year service life |
| **Training** | AARST Mitigation course / Reading ESTCP report and relevant literature | | $ 3,000 | $ 2,000 | $ 5,000 | $ 4,000 | $ 2,000 | $ 6,000 | Baseline AARST Mitigation, plus read ESTCP Report |
| **TOTALS** | | | | | $ 405,607 | | | $ 159,291 | |
| **Total incremental cost of optimization activities** | | | | | | | | $ 21,210 | |
| **Net Savings** | | | | | | | | $ 246,316 | |
| **Return on Investment** | | | | | | | | 11.6 | |

# Cost Comparison of Conventional Approach Versus Optimized Approach at Building 200

**Inputs**

**Duration of the mitigation system =** **30**

| Conventional Approach | | Optimized Approach | |
|---|---|---|---|
| **No. of Vent pipes** | **3** | **No. of Vent pipes** | **2** |
| **No. of Fans** | **1** | **No. of Fans** | **2** |
| **Area of Building** | **1,100** | **Area of Building** | **1,100** |
| **Total System Flow** | **10** | **Total System Flow** | **15** |

| Category | Item | Unit Costs | Labor | Expenses | Total | Labor | Expenses | Total | Descriptions and comments |
|---|---|---|---|---|---|---|---|---|---|
| **Initiation** | Contracting | | $ 2,000 | $ - | $ 2,000 | $ 2,000 | $ - | $ 2,000 | Contractor procurement, ordering equipment. Assumed equal for both conventional and optimized |
| | Data review & CSM update | | $ 1,000 | $ - | $ 1,000 | $ 1,000 | $ - | $ 1,000 | Assumed equal for both conventional and optimized |
| | Conceptual design & Workplan | $0.15 /sq. ft | $ 165 | $ 100 | $ 265 | $ 165 | $ 100 | $ 265 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Regulatory Negotiation | | $ 500 | $ - | $ 500 | $ 500 | $ - | $ 500 | Dependent on the level of regulatory approval based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Permits (as needed) | | $ 125 | $ 200 | $ 325 | $ 125 | $ 200 | $ 325 | Dependent on the permitting process based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Notifications / Fact Sheets | | $ 500 | $ 100 | $ 600 | $ 500 | $ 100 | $ 600 | Assumed equal for both conventional and optimized |
| **Reconnaissance** | Building inspection (Inc. travel) | $0.05 /sq. ft | $ 1,555 | $ 500 | $ 2,055 | $ 1,555 | $ 500 | $ 2,055 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Sealing obvious floor penetrations | $0.15 /sq. ft | $ 165 | $ 200 | $ 365 | $ 165 | $ 200 | $ 365 | Dependent on building size but can vary greatly based on condition of the slab. Assumed equal for both conventional and optimized |
| | Install sump for pilot test (assume one per 10,000 ft2 of building) | | $ 200 | $ 1,000 | $ 1,200 | $ 200 | $ 1,000 | $ 1,200 | Assumes asbestos test, geophysical locates and concrete corer. Assumed equal for both conventional and optimized |
| | Baseline cross-slab pressure logging | | $ - | $ - | $ - | $ 500 | $ 200 | $ 700 | 1 week with two locations monitored via dataloggers |
| **Pilot Test** | Install subslab probes | | $ 200 | $ 150 | $ 350 | $ 200 | $ 150 | $ 350 | Assumes hammerdrill and Vapor Pin® rental |
| | Measure static vacuum levels | | $ 300 | $ 100 | $ 400 | $ 300 | $ 100 | $ 400 | Conventional vacuum vs distance measurements during pilot scale extraction |
| | Measure transient vacuum responses | | $ - | $ - | $ - | $ 250 | $ 100 | $ 350 | Assumes each cycle is about 2 min duration |
| | Helium Tracer Tests | | $ - | $ - | $ - | $ 600 | $ 500 | $ 1,100 | Assumes each test is about 10 min, 2 tests per fan) |
| | Measure mass emission rate | | $ - | $ - | $ - | $ 200 | $ 500 | $ 700 | Sample each vent pipe and measure flow rate. |
| | Stress test with blower door and/or HVAC | | $ - | $ - | $ - | $ 3,000 | $ 2,000 | $ 5,000 | 3 steps: 1)-10Pa building, 2) add SSV, 3) only SSV. Costs would change bases on building size and use of HVAC for depressurization. |
| | Calculate ROI | | $ 250 | $ - | $ 250 | $ 2,000 | $ - | $ 2,000 | Semi-log plot versus Hantush-Jacob model and multiple lines of evidence |
| | Design number and location of suction points | $300 /VP | $ 1,900 | $ - | $ 1,900 | $ 1,600 | $ - | $ 1,600 | Assumed equal for both conventional and optimized |
| **Installation** | Installation of sump, vent pipe, placards and manometer | $5,300 /VP | $ 3,900 | $ 12,000 | $ 15,900 | $ 2,500 | $ 5,500 | $ 8,000 | Based on number of vent pipes. Includes oversight, materials and labor |
| | Roof or wall penetration | $1,025 /VP | $ 125 | $ 900 | $ 1,025 | $ 250 | $ 1,700 | $ 1,950 | Based on number of fans. Includes oversight, materials and labor |
| | Fan installation and alarms | $1,925 /VP | $ 125 | $ 1,800 | $ 1,925 | $ 250 | $ 3,500 | $ 3,750 | Based on number of fans. Includes oversight, materials and labor |
| | Electrical connection | $1,625 /VP | $ 125 | $ 1,500 | $ 1,625 | $ 250 | $ 3,000 | $ 3,250 | Based on number of fans. Includes oversight, materials and labor |
| | Initial Startup and Balancing | $100 /VP | $ 300 | $ - | $ 300 | $ 200 | $ - | $ 200 | Based on number of vent pipes. Includes labor |
| **Operation** | Confirmatory sampling (Inc. travel, 1 OA, min 1 IA, max 6 IA) | 1 sample /5000 $ft^2$ | $ 2,500 | $ 1,100 | $ 3,600 | $ 2,500 | $ 1,100 | $ 3,600 | Based on collecting 1 OA, 1 IA/5000 $ft^2$, up to a maximum of 6 IA samples |
| | Periodic monitoring & inspection assume (10 events Inc. travel and sampling) | 1 sample /5000 $ft^2$ | $ 25,000 | $ 11,000 | $ 36,000 | $ 25,000 | $ 11,000 | $ 36,000 | Based on a total of 10 monitoring events |
| | Cost of Electricity | $ 0.13 /kWhr | $ - | $ 5,125 | $ 5,125 | $ - | $ 10,249 | $ 10,249 | Based on a fan drawing power at 150 W |
| | Cost of loss of conditioned air | $ 0.08 /10000 $ft^3$ | $ - | $ 631 | $ 631 | $ - | $ 946 | $ 946 | Based on a energy cost of $0.08/10,000 $ft^3$ |
| | System Modifications and additional monitoring (optional entry) | | $ 50,000 | $ 20,000 | $ 70,000 | $ - | $ - | $ - | 9 monitoring events, system expansion, blower upgrade, noise suppression, etc. |
| **Maintenance** | Periodic repairs or balancing (if needed) | | $ 200 | $ 100 | $ 300 | $ 400 | $ 200 | $ 600 | Often not necessary, but worth an occasional check |
| **Fan Replacement** | Hardware and labor | | $ 1,000 | $ 3,000 | $ 4,000 | $ 2,000 | $ 6,000 | $ 8,000 | Assuming a 10-year service life |
| **Training** | AARST Mitigation course / Reading ESTCP report and relevant literature | | $ 3,000 | $ 2,000 | $ 5,000 | $ 4,000 | $ 2,000 | $ 6,000 | Baseline AARST Mitigation, plus read ESTCP Report |
| **TOTALS** | | | | | $ 156,640 | | | $ 103,055 | |
| **Total incremental cost of optimization activities** | | | | | | | | $ 9,600 | |
| **Net Savings** | | | | | | | | $ 53,585 | |
| **Return on Investment** | | | | | | | | 5.6 | |

# Cost Comparison of Conventional Approach Versus Optimized Approach at Sun Devil Manor with Land Drain Closed

**Inputs**

**Duration of the mitigation system =** **30**

| Conventional Approach | | Optimized Approach | |
|---|---|---|---|
| **No. of Vent pipes** | **1** | **No. of Vent pipes** | **0** |
| **No. of Fans** | **1** | **No. of Fans** | **0** |
| **Area of Building** | **900** | **Area of Building** | **900** |
| **Total System Flow** | **100** | **Total System Flow** | **0** |

| Category | Item | Unit Costs | Labor | Expenses | Total | Labor | Expenses | Total | Descriptions and comments |
|---|---|---|---|---|---|---|---|---|---|
| **Initiation** | Contracting | | $ 2,000 | $ - | $ 2,000 | $ 2,000 | $ - | $ 2,000 | Contractor procurement, ordering equipment. Assumed equal for both conventional and optimized |
| | Data review & CSM update | | $ 1,000 | $ - | $ 1,000 | $ 1,000 | $ - | $ 1,000 | Assumed equal for both conventional and optimized |
| | Conceptual design & Workplan | $0.15 /sq. ft | $ 135 | $ 100 | $ 235 | $ 135 | $ 100 | $ 235 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Regulatory Negotiation | | $ 500 | $ - | $ 500 | $ 500 | $ - | $ 500 | Dependent on the level of regulatory approval based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Permits (as needed) | | $ 125 | $ 200 | $ 325 | $ 125 | $ 200 | $ 325 | Dependent on the permitting process based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Notifications / Fact Sheets | | $ 500 | $ 100 | $ 600 | $ 500 | $ 100 | $ 600 | Assumed equal for both conventional and optimized |
| **Reconnaissance** | Building inspection (Inc. travel) | $0.05 /sq. ft | $ 1,545 | $ 500 | $ 2,045 | $ 1,545 | $ 500 | $ 2,045 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Sealing obvious floor penetrations | $0.15 /sq. ft | $ 135 | $ 200 | $ 335 | $ 135 | $ 200 | $ 335 | Dependent on building size but can vary greatly based on condition of the slab. Assumed equal for both conventional and optimized |
| | Install sump for pilot test (assume one per 10,000 ft2 of building) | | $ 200 | $ 1,000 | $ 1,200 | $ 200 | $ 1,000 | $ 1,200 | Assumes asbestos test, geophysical locates and concrete corer. Assumed equal for both conventional and optimized |
| | Baseline cross-slab pressure logging | | $ - | $ - | $ - | $ 500 | $ 200 | $ 700 | 1 week with two locations monitored via dataloggers |
| **Pilot Test** | Install subslab probes | | $ 200 | $ 150 | $ 350 | $ 200 | $ 150 | $ 350 | Assumes hammerdrill and Vapor Pin® rental |
| | Measure static vacuum levels | | $ 300 | $ 100 | $ 400 | $ 300 | $ 100 | $ 400 | Conventional vacuum vs distance measurements during pilot scale extraction |
| | Measure transient vacuum responses | | $ - | $ - | $ - | $ 250 | $ 100 | $ 350 | Assumes each cycle is about 2 min duration |
| | Helium Tracer Tests | | $ - | $ - | $ - | $ 600 | $ 500 | $ 1,100 | Assumes each test is about 10 min, 2 tests per fan) |
| | Measure mass emission rate | | $ - | $ - | $ - | $ 200 | $ 500 | $ 700 | Sample each vent pipe and measure flow rate. |
| | Stress test with blower door and/or HVAC | | $ - | $ - | $ - | $ 3,000 | $ 2,000 | $ 5,000 | 3 steps: 1)-10Pa building, 2) add SSV, 3) only SSV. Costs would change bases on building size and use of HVAC for depressurization. |
| | Calculate ROI | | $ 250 | $ - | $ 250 | $ 2,000 | $ - | $ 2,000 | Semi-log plot versus Hantush-Jacob model and multiple lines of evidence |
| | Design number and location of suction points | $300 /VP | $ 1,300 | $ - | $ 1,300 | $ - | $ - | $ - | Assumed equal for both conventional and optimized |
| **Installation** | Installation of sump, vent pipe, placards and manometer | $5,300 /VP | $ 1,300 | $ 4,000 | $ 5,300 | $ - | $ - | $ - | Based on number of vent pipes. Includes oversight, materials and labor |
| | Roof or wall penetration | $1,025 /VP | $ 125 | $ 900 | $ 1,025 | $ - | $ - | $ - | Based on number of fans. Includes oversight, materials and labor |
| | Fan installation and alarms | $1,925 /VP | $ 125 | $ 1,800 | $ 1,925 | $ - | $ - | $ - | Based on number of fans. Includes oversight, materials and labor |
| | Electrical connection | $1,625 /VP | $ 125 | $ 1,500 | $ 1,625 | $ - | $ - | $ - | Based on number of fans. Includes oversight, materials and labor |
| | Initial Startup and Balancing | $100 /VP | $ 100 | $ - | $ 100 | $ - | $ - | $ - | Based on number of vent pipes. Includes labor |
| **Operation** | Confirmatory sampling (Inc. travel, 1 OA, min 1 IA, max 6 IA) | 1 sample /5000 $ft^2$ | $ 2,500 | $ 1,100 | $ 3,600 | $ - | $ - | $ - | Based on collecting 1 OA, 1 IA/5000 $ft^2$, up to a maximum of 6 IA samples |
| | Periodic monitoring & inspection assume (10 events Inc. travel and sampling) | 1 sample /5000 $ft^2$ | $ 25,000 | $ 11,000 | $ 36,000 | $ - | $ - | $ - | Based on a total of 10 monitoring events |
| | Cost of Electricity | $ 0.13 /kWhr | $ - | $ 5,125 | $ 5,125 | $ - | $ - | $ - | Based on a fan drawing power at 150 W |
| | Cost of loss of conditioned air | $ 0.08 /10000 $ft^3$ | $ - | $ 6,307 | $ 6,307 | $ - | $ - | $ - | Based on a energy cost of \$0.08/10,000 $ft^3$ |
| | System Modifications and additional monitoring (optional entry) | | | | $ - | $ - | $ - | $ - | Optional entry if multiple mobilizations are needed to complete the system |
| **Maintenance** | Periodic repairs or balancing (if needed) | | $ 200 | $ 100 | $ 300 | $ - | $ - | $ - | Often not necessary, but worth an occasional check |
| **Fan Replacement** | Hardware and labor | | $ 1,000 | $ 3,000 | $ 4,000 | $ - | $ - | $ - | Assuming a 10-year service life |
| **Training** | AARST Mitigation course / Reading ESTCP report and relevant literature | | $ 3,000 | $ 2,000 | $ 5,000 | $ - | $ - | $ - | Baseline AARST Mitigation, plus read ESTCP Report |
| **TOTALS** | | | | | $ 80,847 | | | $ 18,840 | |
| **Total incremental cost of optimization activities** | | | | | | | | $ 9,600 | |
| **Net Savings** | | | | | | | | $ 62,007 | |
| **Return on Investment** | | | | | | | | 6.5 | |

# Cost Comparison of Conventional Approach Versus Optimized Approach at Sun Devil Manor with Land Drain Open

**Inputs**

**Duration of the mitigation system =** **30**

| Conventional Approach | | Optimized Approach | |
|---|---|---|---|
| **No. of Vent pipes** | **1** | **No. of Vent pipes** | **1** |
| **No. of Fans** | **1** | **No. of Fans** | **1** |
| **Area of Building** | **900** | **Area of Building** | **900** |
| **Total System Flow** | **100** | **Total System Flow** | **100** |

| Category | Item | Unit Costs | Labor | Expenses | Total | Labor | Expenses | Total | Descriptions and comments |
|---|---|---|---|---|---|---|---|---|---|
| **Initiation** | Contracting | | $ 2,000 | $ - | $ 2,000 | $ 2,000 | $ - | $ 2,000 | Contractor procurement, ordering equipment. Assumed equal for both conventional and optimized |
| | Data review & CSM update | | $ 1,000 | $ - | $ 1,000 | $ 1,000 | $ - | $ 1,000 | Assumed equal for both conventional and optimized |
| | Conceptual design & Workplan | $0.15 /sq. ft | $ 135 | $ 100 | $ 235 | $ 135 | $ 100 | $ 235 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Regulatory Negotiation | | $ 500 | $ - | $ 500 | $ 500 | $ - | $ 500 | Dependent on the level of regulatory approval based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Permits (as needed) | | $ 125 | $ 200 | $ 325 | $ 125 | $ 200 | $ 325 | Dependent on the permitting process based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Notifications / Fact Sheets | | $ 500 | $ 100 | $ 600 | $ 500 | $ 100 | $ 600 | Assumed equal for both conventional and optimized |
| **Reconnaissance** | Building inspection (Inc. travel) | $0.05 /sq. ft | $ 1,545 | $ 500 | $ 2,045 | $ 1,545 | $ 500 | $ 2,045 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Sealing obvious floor penetrations | $0.15 /sq. ft | $ 135 | $ 200 | $ 335 | $ 135 | $ 200 | $ 335 | Dependent on building size but can vary greatly based on condition of the slab. Assumed equal for both conventional and optimized |
| | Install sump for pilot test (assume one per 10,000 ft2 of building) | | $ 200 | $ 1,000 | $ 1,200 | $ 200 | $ 1,000 | $ 1,200 | Assumes asbestos test, geophysical locates and concrete corer. Assumed equal for both conventional and optimized |
| | Baseline cross-slab pressure logging | | $ - | $ - | $ - | $ 500 | $ 200 | $ 700 | 1 week with two locations monitored via dataloggers |
| **Pilot Test** | Install subslab probes | | $ 200 | $ 150 | $ 350 | $ 200 | $ 150 | $ 350 | Assumes hammerdrill and Vapor Pin® rental |
| | Measure static vacuum levels | | $ 300 | $ 100 | $ 400 | $ 300 | $ 100 | $ 400 | Conventional vacuum vs distance measurements during pilot scale extraction |
| | Measure transient vacuum responses | | $ - | $ - | $ - | $ 250 | $ 100 | $ 350 | Assumes each cycle is about 2 min duration |
| | Helium Tracer Tests | | $ - | $ - | $ - | $ 600 | $ 500 | $ 1,100 | Assumes each test is about 10 min, 2 tests per fan) |
| | Measure mass emission rate | | $ - | $ - | $ - | $ 200 | $ 500 | $ 700 | Sample each vent pipe and measure flow rate. |
| | Stress test with blower door and/or HVAC | | $ - | $ - | $ - | $ 3,000 | $ 2,000 | $ 5,000 | 3 steps: 1)-10Pa building, 2) add SSV, 3) only SSV. Costs would change bases on building size and use of HVAC for depressurization. |
| | Calculate ROI | | $ 250 | $ - | $ 250 | $ 2,000 | $ - | $ 2,000 | Semi-log plot versus Hantush-Jacob model and multiple lines of evidence |
| | Design number and location of suction points | $300 /VP | $ 1,300 | $ - | $ 1,300 | $ 1,300 | $ - | $ 1,300 | Assumed equal for both conventional and optimized |
| **Installation** | Installation of sump, vent pipe, placards and manometer | $5,300 /VP | $ 1,300 | $ 4,000 | $ 5,300 | $ 1,250 | $ 2,750 | $ 4,000 | Based on number of vent pipes. Includes oversight, materials and labor |
| | Roof or wall penetration | $1,025 /VP | $ 125 | $ 900 | $ 1,025 | $ 125 | $ 850 | $ 975 | Based on number of fans. Includes oversight, materials and labor |
| | Fan installation and alarms | $1,925 /VP | $ 125 | $ 1,800 | $ 1,925 | $ 125 | $ 1,750 | $ 1,875 | Based on number of fans. Includes oversight, materials and labor |
| | Electrical connection | $1,625 /VP | $ 125 | $ 1,500 | $ 1,625 | $ 125 | $ 1,500 | $ 1,625 | Based on number of fans. Includes oversight, materials and labor |
| | Initial Startup and Balancing | $100 /VP | $ 100 | $ - | $ 100 | $ 100 | $ - | $ 100 | Based on number of vent pipes. Includes labor |
| **Operation** | Confirmatory sampling (Inc. travel, 1 OA, min 1 IA, max 6 IA) | 1 sample /5000 $ft^2$ | $ 2,500 | $ 1,100 | $ 3,600 | $ 2,500 | $ 1,100 | $ 3,600 | Based on collecting 1 OA, 1 IA/5000 $ft^2$, up to a maximum of 6 IA samples |
| | Periodic monitoring & inspection assume (10 events Inc. travel and sampling) | 1 sample /5000 $ft^2$ | $ 25,000 | $ 11,000 | $ 36,000 | $ 25,000 | $ 11,000 | $ 36,000 | Based on a total of 10 monitoring events |
| | Cost of Electricity | $ 0.13 /kWhr | $ - | $ 5,125 | $ 5,125 | $ - | $ 5,125 | $ 5,125 | Based on a fan drawing power at 150 W |
| | Cost of loss of conditioned air | $ 0.08 /10000 $ft^3$ | $ - | $ 6,307 | $ 6,307 | $ - | $ 6,307 | $ 6,307 | Based on a energy cost of $0.08/10,000 $ft^3$ |
| | System Modifications and additional monitoring (optional entry) | | | | $ - | $ - | $ - | $ - | Optional entry if multiple mobilizations are needed to complete the system |
| **Maintenance** | Periodic repairs or balancing (if needed) | | $ 200 | $ 100 | $ 300 | $ 200 | $ 100 | $ 300 | Often not necessary, but worth an occasional check |
| **Fan Replacement** | Hardware and labor | | $ 1,000 | $ 3,000 | $ 4,000 | $ 1,000 | $ 3,000 | $ 4,000 | Assuming a 10-year service life |
| **Training** | AARST Mitigation course / Reading ESTCP report and relevant literature | | $ 3,000 | $ 2,000 | $ 5,000 | $ 4,000 | $ 2,000 | $ 6,000 | Baseline AARST Mitigation, plus read ESTCP Report |
| **TOTALS** | | | | | $ 80,847 | | | $ 90,047 | |
| **Total incremental cost of optimization activities** | | | | | | | | $ 9,600 | |
| **Net Savings** | | | | | | | | $ (9,200) | |
| **Return on Investment** | | | | | | | | -1.0 | |

# Cost Comparison of Conventional Approach Versus Optimized Approach at Building 11193 with 5 Vent Pipes

**Inputs**

**Duration of the mitigation system =** **30**

| Conventional Approach | | Optimized Approach | |
|---|---|---|---|
| **No. of Vent pipes** | **5** | **No. of Vent pipes** | **1** |
| **No. of Fans** | **5** | **No. of Fans** | **1** |
| **Area of Building** | **11,000** | **Area of Building** | **11,000** |
| **Total System Flow** | **250** | **Total System Flow** | **25** |

| Category | Item | Unit Costs | Labor | Expenses | Total | Labor | Expenses | Total | Descriptions and comments |
|---|---|---|---|---|---|---|---|---|---|
| **Initiation** | Contracting | | $ 2,000 | $ - | $ 2,000 | $ 2,000 | $ - | $ 2,000 | Contractor procurement, ordering equipment. Assumed equal for both conventional and optimized |
| | Data review & CSM update | | $ 1,000 | $ - | $ 1,000 | $ 1,000 | $ - | $ 1,000 | Assumed equal for both conventional and optimized |
| | Conceptual design & Workplan | $0.15 /sq. ft | $ 1,650 | $ 100 | $ 1,750 | $ 1,650 | $ 100 | $ 1,750 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Regulatory Negotiation | | $ 500 | $ - | $ 500 | $ 500 | $ - | $ 500 | Dependent on the level of regulatory approval based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Permits (as needed) | | $ 125 | $ 200 | $ 325 | $ 125 | $ 200 | $ 325 | Dependent on the permitting process based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Notifications / Fact Sheets | | $ 500 | $ 100 | $ 600 | $ 500 | $ 100 | $ 600 | Assumed equal for both conventional and optimized |
| **Reconnaissance** | Building inspection (Inc. travel) | $0.05 /sq. ft | $ 2,050 | $ 500 | $ 2,550 | $ 2,050 | $ 500 | $ 2,550 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Sealing obvious floor penetrations | $0.15 /sq. ft | $ 1,650 | $ 200 | $ 1,850 | $ 1,650 | $ 200 | $ 1,850 | Dependent on building size but can vary greatly based on condition of the slab. Assumed equal for both conventional and optimized |
| | Install sump for pilot test (assume one per 10,000 ft2 of building) | | $ 200 | $ 1,000 | $ 1,200 | $ 200 | $ 1,000 | $ 1,200 | Assumes asbestos test, geophysical locates and concrete corer. Assumed equal for both conventional and optimized |
| | Baseline cross-slab pressure logging | | $ - | $ - | $ - | $ 500 | $ 200 | $ 700 | 1 week with two locations monitored via dataloggers |
| **Pilot Test** | Install subslab probes | | $ 220 | $ 165 | $ 385 | $ 220 | $ 165 | $ 385 | Assumes hammerdrill and Vapor Pin® rental |
| | Measure static vacuum levels | | $ 330 | $ 110 | $ 440 | $ 330 | $ 110 | $ 440 | Conventional vacuum vs distance measurements during pilot scale extraction |
| | Measure transient vacuum responses | | $ - | $ - | $ - | $ 275 | $ 110 | $ 385 | Assumes each cycle is about 2 min duration |
| | Helium Tracer Tests | | $ - | $ - | $ - | $ 660 | $ 550 | $ 1,210 | Assumes each test is about 10 min, 2 tests per fan) |
| | Measure mass emission rate | | $ - | $ - | $ - | $ 220 | $ 550 | $ 770 | Sample each vent pipe and measure flow rate. |
| | Stress test with blower door and/or HVAC | | $ - | $ - | $ - | $ 3,000 | $ 2,000 | $ 5,000 | 3 steps: 1)-10Pa building, 2) add SSV, 3) only SSV. Costs would change bases on building size and use of HVAC for depressurization. |
| | Calculate ROI | | $ 250 | $ - | $ 250 | $ 2,000 | $ - | $ 2,000 | Semi-log plot versus Hantush-Jacob model and multiple lines of evidence |
| | Design number and location of suction points | $300 /VP | $ 2,500 | $ - | $ 2,500 | $ 1,300 | $ - | $ 1,300 | Assumed equal for both conventional and optimized |
| **Installation** | Installation of sump, vent pipe, placards and manometer | $5,300 /VP | $ 6,500 | $ 20,000 | $ 26,500 | $ 1,250 | $ 2,750 | $ 4,000 | Based on number of vent pipes. Includes oversight, materials and labor |
| | Roof or wall penetration | $1,025 /VP | $ 625 | $ 4,500 | $ 5,125 | $ 125 | $ 850 | $ 975 | Based on number of fans. Includes oversight, materials and labor |
| | Fan installation and alarms | $1,925 /VP | $ 625 | $ 9,000 | $ 9,625 | $ 125 | $ 1,750 | $ 1,875 | Based on number of fans. Includes oversight, materials and labor |
| | Electrical connection | $1,625 /VP | $ 625 | $ 7,500 | $ 8,125 | $ 125 | $ 1,500 | $ 1,625 | Based on number of fans. Includes oversight, materials and labor |
| | Initial Startup and Balancing | $100 /VP | $ 500 | $ - | $ 500 | $ 100 | $ - | $ 100 | Based on number of vent pipes. Includes labor |
| **Operation** | Confirmatory sampling (Inc. travel, 1 OA, min 1 IA, max 6 IA) | 1 sample /5000 $ft^2$ | $ 2,500 | $ 1,460 | $ 3,960 | $ 2,500 | $ 1,460 | $ 3,960 | Based on collecting 1 OA, 1 IA/5000 $ft^2$, up to a maximum of 6 IA samples |
| | Periodic monitoring & inspection assume (10 events Inc. travel and sampling) | 1 sample /5000 $ft^2$ | $ 25,000 | $ 14,600 | $ 39,600 | $ 25,000 | $ 14,600 | $ 39,600 | Based on a total of 10 monitoring events |
| | Cost of Electricity | $ 0.13 /kWhr | $ - | $ 25,623 | $ 25,623 | $ - | $ 5,125 | $ 5,125 | Based on a fan drawing power at 150 W |
| | Cost of loss of conditioned air | $ 0.08 /10000 $ft^3$ | $ - | $ 15,768 | $ 15,768 | $ - | $ 1,577 | $ 1,577 | Based on a energy cost of \$0.08/10,000 $ft^3$ |
| | System Modifications and additional monitoring (optional entry) | | | | $ - | $ - | $ - | $ - | Optional entry if multiple mobilizations are needed to complete the system |
| **Maintenance** | Periodic repairs or balancing (if needed) | | $ 1,000 | $ 500 | $ 1,500 | $ 200 | $ 100 | $ 300 | Often not necessary, but worth an occasional check |
| **Fan Replacement** | Hardware and labor | | $ 5,000 | $ 15,000 | $ 20,000 | $ 1,000 | $ 3,000 | $ 4,000 | Assuming a 10-year service life |
| **Training** | AARST Mitigation course / Reading ESTCP report and relevant literature | | $ 3,000 | $ 2,000 | $ 5,000 | $ 4,000 | $ 2,000 | $ 6,000 | Baseline AARST Mitigation, plus read ESTCP Report |
| **TOTALS** | | | | | $ 176,676 | | | $ 93,101 | |
| **Total incremental cost of optimization activities** | | | | | | | | $ 9,815 | |
| **Net Savings** | | | | | | | | $ 83,575 | |
| **Return on Investment** | | | | | | | | 8.5 | |

# Cost Comparison of Conventional Approach Versus Optimized Approach at Building 11193 with 8 Vent Pipes

**Inputs**

**Duration of the mitigation system =** **30**

| Conventional Approach | | Optimized Approach | |
|---|---|---|---|
| **No. of Vent pipes** | **8** | **No. of Vent pipes** | **1** |
| **No. of Fans** | **8** | **No. of Fans** | **1** |
| **Area of Building** | **11,000** | **Area of Building** | **11,000** |
| **Total System Flow** | **750** | **Total System Flow** | **25** |

| Category | Item | Unit Costs | Labor | Expenses | Total | Labor | Expenses | Total | Descriptions and comments |
|---|---|---|---|---|---|---|---|---|---|
| **Initiation** | Contracting | | $ 2,000 | $ - | $ 2,000 | $ 2,000 | $ - | $ 2,000 | Contractor procurement, ordering equipment. Assumed equal for both conventional and optimized |
| | Data review & CSM update | | $ 1,000 | $ - | $ 1,000 | $ 1,000 | $ - | $ 1,000 | Assumed equal for both conventional and optimized |
| | Conceptual design & Workplan | $0.15 /sq. ft | $ 1,650 | $ 100 | $ 1,750 | $ 1,650 | $ 100 | $ 1,750 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Regulatory Negotiation | | $ 500 | $ - | $ 500 | $ 500 | $ - | $ 500 | Dependent on the level of regulatory approval based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Permits (as needed) | | $ 125 | $ 200 | $ 325 | $ 125 | $ 200 | $ 325 | Dependent on the permitting process based on applicable regulating agencies. Assumed equal for both conventional and optimized |
| | Notifications / Fact Sheets | | $ 500 | $ 100 | $ 600 | $ 500 | $ 100 | $ 600 | Assumed equal for both conventional and optimized |
| **Reconnaissance** | Building inspection (Inc. travel) | $0.05 /sq. ft | $ 2,050 | $ 500 | $ 2,550 | $ 2,050 | $ 500 | $ 2,550 | Dependent on building size. Assumed equal for both conventional and optimized |
| | Sealing obvious floor penetrations | $0.15 /sq. ft | $ 1,650 | $ 200 | $ 1,850 | $ 1,650 | $ 200 | $ 1,850 | Dependent on building size but can vary greatly based on condition of the slab. Assumed equal for both conventional and optimized |
| | Install sump for pilot test (assume one per 10,000 ft2 of building) | | $ 200 | $ 1,000 | $ 1,200 | $ 200 | $ 1,000 | $ 1,200 | Assumes asbestos test, geophysical locates and concrete corer. Assumed equal for both conventional and optimized |
| | Baseline cross-slab pressure logging | | $ - | $ - | $ - | $ 500 | $ 200 | $ 700 | 1 week with two locations monitored via dataloggers |
| **Pilot Test** | Install subslab probes | | $ 220 | $ 165 | $ 385 | $ 220 | $ 165 | $ 385 | Assumes hammerdrill and Vapor Pin® rental |
| | Measure static vacuum levels | | $ 330 | $ 110 | $ 440 | $ 330 | $ 110 | $ 440 | Conventional vacuum vs distance measurements during pilot scale extraction |
| | Measure transient vacuum responses | | $ - | $ - | $ - | $ 275 | $ 110 | $ 385 | Assumes each cycle is about 2 min duration |
| | Helium Tracer Tests | | $ - | $ - | $ - | $ 660 | $ 550 | $ 1,210 | Assumes each test is about 10 min, 2 tests per fan) |
| | Measure mass emission rate | | $ - | $ - | $ - | $ 220 | $ 550 | $ 770 | Sample each vent pipe and measure flow rate. |
| | Stress test with blower door and/or HVAC | | $ - | $ - | $ - | $ 3,000 | $ 2,000 | $ 5,000 | 3 steps: 1)-10Pa building, 2) add SSV, 3) only SSV. Costs would change bases on building size and use of HVAC for depressurization. |
| | Calculate ROI | | $ 250 | $ - | $ 250 | $ 2,000 | $ - | $ 2,000 | Semi-log plot versus Hantush-Jacob model and multiple lines of evidence |
| | Design number and location of suction points | $300 /VP | $ 3,400 | $ - | $ 3,400 | $ 1,300 | $ - | $ 1,300 | Assumed equal for both conventional and optimized |
| **Installation** | Installation of sump, vent pipe, placards and manometer | $5,300 /VP | $ 10,400 | $ 32,000 | $ 42,400 | $ 1,250 | $ 2,750 | $ 4,000 | Based on number of vent pipes. Includes oversight, materials and labor |
| | Roof or wall penetration | $1,025 /VP | $ 1,000 | $ 7,200 | $ 8,200 | $ 125 | $ 850 | $ 975 | Based on number of fans. Includes oversight, materials and labor |
| | Fan installation and alarms | $1,925 /VP | $ 1,000 | $ 14,400 | $ 15,400 | $ 125 | $ 1,750 | $ 1,875 | Based on number of fans. Includes oversight, materials and labor |
| | Electrical connection | $1,625 /VP | $ 1,000 | $ 12,000 | $ 13,000 | $ 125 | $ 1,500 | $ 1,625 | Based on number of fans. Includes oversight, materials and labor |
| | Initial Startup and Balancing | $100 /VP | $ 800 | $ - | $ 800 | $ 100 | $ - | $ 100 | Based on number of vent pipes. Includes labor |
| **Operation** | Confirmatory sampling (Inc. travel, 1 OA, min 1 IA, max 6 IA) | 1 sample /5000 $ft^2$ | $ 2,500 | $ 1,460 | $ 3,960 | $ 2,500 | $ 1,460 | $ 3,960 | Based on collecting 1 OA, 1 IA/5000 $ft^2$, up to a maximum of 6 IA samples |
| | Periodic monitoring & inspection assume (10 events Inc. travel and sampling) | 1 sample /5000 $ft^2$ | $ 25,000 | $ 14,600 | $ 39,600 | $ 25,000 | $ 14,600 | $ 39,600 | Based on a total of 10 monitoring events |
| | Cost of Electricity | $ 0.13 /kWhr | $ - | $ 40,997 | $ 40,997 | $ - | $ 5,125 | $ 5,125 | Based on a fan drawing power at 150 W |
| | Cost of loss of conditioned air | $ 0.08 /10000 $ft^3$ | $ - | $ 47,304 | $ 47,304 | $ - | $ 1,577 | $ 1,577 | Based on a energy cost of $0.08/10,000 $ft^3$ |
| | System Modifications and additional monitoring (optional entry) | | | | $ - | $ - | $ - | $ - | Optional entry if multiple mobilizations are needed to complete the system |
| **Maintenance** | Periodic repairs or balancing (if needed) | | $ 1,600 | $ 800 | $ 2,400 | $ 200 | $ 100 | $ 300 | Often not necessary, but worth an occasional check |
| **Fan Replacement** | Hardware and labor | | $ 8,000 | $ 24,000 | $ 32,000 | $ 1,000 | $ 3,000 | $ 4,000 | Assuming a 10-year service life |
| **Training** | AARST Mitigation course / Reading ESTCP report and relevant literature | | $ 3,000 | $ 2,000 | $ 5,000 | $ 4,000 | $ 2,000 | $ 6,000 | Baseline AARST Mitigation, plus read ESTCP Report |
| **TOTALS** | | | | | $ 267,311 | | | $ 93,101 | |
| **Total incremental cost of optimization activities** | | | | | | | | $ 9,815 | |
| **Net Savings** | | | | | | | | $ 174,209 | |
| **Return on Investment** | | | | | | | | 17.7 | |