This report for the sampling and analysis of soil gas and groundwater in the Fairview community of Anchorage, Alaska has been prepared for the Alaska Department of Environmental Conservation by Ahtna Engineering Services, LLC, with support from their teaming partner Geosyntec Consultants, Inc.

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ACRONYMS AND ABBREVIATIONS

AAC ..........Alaska Administrative Code
ADEC ..........Alaska Department of Environmental Conservation
Ahtna..........Ahtna Engineering Services, LLC
bgs ..............below ground surface
°C ..................degrees Celsius
cDCE ..........cis-1,2-dichloroethene
COPC ..........contaminant of potential concern
CSM ..........conceptual site model
1,1-DCE .......1,1-dichloroethene
EPA ..........Environmental Protection Agency
GeoTek.........GeoTek Alaska, Inc.
Geosyntec.....Geosyntec Consultants, Inc.
µg/L ..........microgram per liter
µg/m³ ..........microgram per cubic meter
OnSite ......OnSite Environmental Laboratories
PCE ..........tetrachloroethene
PPE ..........personal protective equipment
PVC ..........polyvinyl chloride
ROW ..........right-of-way
1,1,1-TCA ......1,1,1-trichloroethane
TCE ..........trichloroethene
tDCE ..........trans-1,2-dichloroethene
VC ..........vinyl chloride
WMS ..........Waterloo Membrane Sampler
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1.0 INTRODUCTION AND BACKGROUND

Ahtna Engineering Services, LLC (Ahtna), with support from their teaming partner Geosyntec Consultants, Inc. (Geosyntec), has prepared this report for the Fairview Redevelopment Area – Chlorinated Solvent Investigation in Anchorage, Alaska (Figure 1). The work has been conducted for the Alaska Department of Environmental Conservation (ADEC) under Notice to Proceed Number 18-8036-01-015, Contract Number CT 160001126. This report summarizes the study objectives, investigative strategy, field activities, laboratory results, and conclusions.

1.1 Site Summary

The study area as outlined in Figure 2 is approximately 240 acres (0.4 square miles) in the Fairview and downtown neighborhoods of Anchorage, Alaska. The study area is comprised of nearly 600 property parcels; approximately 15 percent are residential and 85 percent are commercial. Of the residential properties, approximately 70 percent (about 60 properties) are single family homes with the remainder being multi-unit homes (about 30). Approximately 40 percent (about 200) of the commercial lots are categorized as vacant lots or parking areas. Other commercial lots include retail, office buildings, automobile dealers, automobile service centers, and restaurants.

1.2 Environmental Setting

The study area is located in Anchorage, Alaska, at approximately latitude 61.2 degrees north and longitude of 149.9 degrees west (Figure 1). The City of Anchorage is located on moderately broad lowland bounded on the east by the Chugach Mountains, on the west by Cook Inlet, and by Knik Arm and Turnagain Arm of Cook Inlet to the north and south, respectively. Unconsolidated deposits in this area include glacial, alluvial, colluvial, and lacustrine deposits. The unconsolidated deposits were placed during multiple glacial and non-glacial geologic events, resulting in a complex, vertically discontinuous stratigraphy, measuring from 650 feet thick near Anchorage to only several feet thick along the Chugach Mountains (Miller and Dobrovolny, 1959).

The surficial geological conditions primarily consist of quaternary glacial outwash deposits comprised of gravel, sand, silt, and clay. The deposits vary in thickness depending on location. These deposits are interfingered with thin silt and fine sand lenses. The entire area is underlain with a layer of poorly permeable silty-clay, known locally as the Bootlegger Cove Formation. The Bootlegger Cove Formation was deposited over older sand, gravel, and glaciofluvial silt which were then subjected to a period of erosion before deposition of the Bootlegger Cove Formation. The cohesive facies of this formation have been referred to as the Bootlegger Cove clay or the “blue clay.” The Bootlegger Cove Formation ranges in thickness from zero up to about 300 feet and averages about 100 to 150 feet (Miller and Dobrovolny, 1959).

1.3 Project Objectives

The project objective was to determine if significant releases of chlorinated solvents had occurred in the Fairview community of Anchorage, and if so does the contamination pose a risk to human health or the environment, especially related to potential redevelopment of Fairview.
The investigation focused on current and former dry cleaning operations, which were previously documented throughout the study area as the sources of potential contamination.

1.4 Scope of Work

Ahtna executed the following tasks to meet the project objectives:

- Installed and developed soil gas monitoring wells in the study area within public right-of-way.
- Deployed Waterloo Membrane Samplers (WMS) in the soil gas monitoring wells for 3 days and analyzed for a select list of volatile organic compounds (VOCs).
- Sampled two temporary groundwater monitoring wells and analyzed for VOCs.

1.5 Conceptual Site Model

A generalized conceptual site model (CSM) was developed by Ahtna in the spring of 2015 for the area-wide property assessment report (Ahtna, 2015a). The CSM examined several contaminants, including petroleum hydrocarbons, metals, and chlorinated solvents. This investigation only examined chlorinated solvents. The results of this investigation did not necessitate any changes to the CSM.

1.6 Regulatory Framework

1.6.1 Contaminants of Potential Concern

This study’s primary focus was to investigate for chlorinated solvents related to dry cleaning operations in soil gas and groundwater in the study area. The list of contaminants of potential concerns (COPCs) was taken from the ADEC-approved State Coalition for Remediation of Drycleaners (2010). The primary COPC is tetrachloroethene (PCE). The breakdown or degradation products of PCE are also considered COPCs and include trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cDCE), trans-1,2-dichloroethene (tDCE), and vinyl chloride (VC). Carbon tetrachloride and its degradation product, 1,1,1-trichloroethane (1,1,1-TCA), also are included given the historical use of carbon tetrachloride as a dry cleaning solvent.

1.6.2 Cleanup Criteria

A regulatory framework for this project was developed by considering the following regulations and guidance documents:

- 18 Alaska Administrative Code (AAC) 75, Oil and Other Hazardous Substances Pollution Control, June 17, 2015
- Draft Field Sampling Guidance, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, May 2010
Monitoring Well Guidance, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, September 2013

Vapor Intrusion Guidance for Contaminated Sites, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, October 2012

Table 2-1 lists the current cleanup levels for the COPC by media.

**TABLE 2-1: CLEANUP AND TARGET LEVELS FOR CONTAMINANTS OF CONCERN**

<table>
<thead>
<tr>
<th>Compound</th>
<th>Vapor Intrusion Target Levels</th>
<th>Groundwater Cleanup Level (µg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shallow Soil Gas (µg/m³)</td>
<td>Groundwater (µg/L)</td>
</tr>
<tr>
<td></td>
<td>Residential</td>
<td>Commercial</td>
</tr>
<tr>
<td>PCE</td>
<td>420</td>
<td>1,800</td>
</tr>
<tr>
<td>TCE</td>
<td>21</td>
<td>88</td>
</tr>
<tr>
<td>cDCE</td>
<td>73</td>
<td>310</td>
</tr>
<tr>
<td>tDCE</td>
<td>630</td>
<td>2,600</td>
</tr>
<tr>
<td>1,1-DCE</td>
<td>2,100</td>
<td>8,800</td>
</tr>
<tr>
<td>VC</td>
<td>16</td>
<td>280</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>41</td>
<td>200</td>
</tr>
<tr>
<td>1,1,1-TCA</td>
<td>52,100</td>
<td>219,000</td>
</tr>
</tbody>
</table>

Key:
PCE  tetrachloroethylene
TCE  trichloroethylene
cDCE  cis-1,2-dichloroethylene
tDCE  trans-1,2-dichloroethylene
1,1-DCE  1,1-dichloroethylene
VC  vinyl chloride
1,1,1-TCA  1,1,1-trichloroethane
µg/L  micrograms per liter
µg/m³  micrograms per cubic meter
2.0 HISTORICAL INFORMATION REVIEW AND LOCATION SELECTION

Ahtna performed a historical information review prior to selecting sample locations. A more detailed summary of the historical information review is available in Section 3 of the project work plan (Ahtna, 2015b). The review resulted in identification of 30 historical locations of known or suspected former drycleaners. Table 2-1 summarizes the 30 historical locations and identifies the associated nearby soil gas sampling location(s). Figure 2 shows the historical locations of known or suspected former drycleaners, and Figure 3 presents the soil gas sampling locations.

### Table 2-1: Known or Suspected Former Drycleaner Addresses

<table>
<thead>
<tr>
<th>Site Name(s)</th>
<th>Historical Address</th>
<th>Associated Soil Gas Sampling Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absher's Cleaners; Ray's Personal Cleaning Service</td>
<td>337 East 4th Avenue</td>
<td>SV-05</td>
</tr>
<tr>
<td>Alaska Cleaners &amp; Laundry - Gambell Branch</td>
<td>636 East 15th Avenue</td>
<td>SV-39, SV-41, SV-43</td>
</tr>
<tr>
<td>K Speed Wash</td>
<td>600 East 6th Avenue</td>
<td>SV-19</td>
</tr>
<tr>
<td>C &amp; K Sanitary Cleaners</td>
<td>4th Avenue &amp; Gambell Street</td>
<td>NA – Known site, chlorinated solvents previously documented</td>
</tr>
<tr>
<td>Snow White Laundry &amp; Cleaners - Fairview Office</td>
<td>11th Avenue &amp; Gambell Street</td>
<td>SV-47</td>
</tr>
<tr>
<td>Washeteria; Fifth Ave Laundry &amp; Cleaners</td>
<td>120 / 122 5th Avenue</td>
<td>SV-09</td>
</tr>
<tr>
<td>Rainbow Cleaners</td>
<td>12th Avenue &amp; Gambell Street</td>
<td>SV-30, SV-31, SV-32</td>
</tr>
<tr>
<td>Snow White Laundry &amp; Cleaners</td>
<td>13th Avenue &amp; Gambell Street</td>
<td>SV-33</td>
</tr>
<tr>
<td>Alaska Cleaners</td>
<td>15th Avenue &amp; Gambell Street</td>
<td>SV-38, SV-41, SV-42</td>
</tr>
<tr>
<td>Alaska Cleaners; Alaska Cleaning &amp; Pressing; Alaska Cleaners</td>
<td>201 / 205 East 4th Avenue</td>
<td>SV-46</td>
</tr>
<tr>
<td>Tidy Dy-De</td>
<td>220 5th Avenue</td>
<td>SV-09, SV-10</td>
</tr>
<tr>
<td>Snow White</td>
<td>300 East 5th Avenue</td>
<td>NA – Known site, under investigation</td>
</tr>
<tr>
<td>E. Side Laundry; George's Tailor Shop &amp; Star Laundry; American Cleaners &amp; Laundry; Brown's Cleaning Shop</td>
<td>231 / 234 4th Avenue</td>
<td>SV-46</td>
</tr>
<tr>
<td>Cole's Service Cleaners; Service Cleaners</td>
<td>232/236/240 East 5th Avenue</td>
<td>SV-10</td>
</tr>
<tr>
<td>Anchorage Hand Laundry; Anchorage Laundry</td>
<td>333 4th Avenue</td>
<td>SV-05</td>
</tr>
<tr>
<td>Alaska Carpet Cleaners</td>
<td>407 5th Avenue</td>
<td>SV-13</td>
</tr>
<tr>
<td>Paris Dry Cleaners</td>
<td>419 4th Avenue</td>
<td>SV-06, SV-12</td>
</tr>
<tr>
<td>Clean Shirts</td>
<td>516 5th Avenue</td>
<td>SV-18</td>
</tr>
<tr>
<td>Peacock Cleaners</td>
<td>526 East 10th Avenue</td>
<td>SV-26</td>
</tr>
<tr>
<td>A &amp; B Cleaners</td>
<td>538 5th Avenue</td>
<td>SV-15, SV-18</td>
</tr>
<tr>
<td>New Method Cleaners</td>
<td>715 4th Avenue</td>
<td>SV-16</td>
</tr>
<tr>
<td>Olson Bros. Tailors Cleaners; O K Cleaners</td>
<td>727 4th Avenue</td>
<td>SV-16</td>
</tr>
<tr>
<td>New Method Cleaners</td>
<td>732 4th Avenue</td>
<td>SV-16</td>
</tr>
<tr>
<td>Pioneer Laundry &amp; Cleaners aka Pioneer Cleaners</td>
<td>739 4th Avenue</td>
<td>SV-16</td>
</tr>
<tr>
<td>Pioneer Laundry</td>
<td>1107 East 7th Avenue</td>
<td>SV-22</td>
</tr>
<tr>
<td>Tidy Didy Diaper Service</td>
<td>1236 East 7th Avenue</td>
<td>SV-23</td>
</tr>
<tr>
<td>Davis; Miss Mary</td>
<td>145 West 4th Avenue</td>
<td>SV-01</td>
</tr>
</tbody>
</table>
As depicted in Figure 2, many of the suspected or known former drycleaners were grouped within the study area; therefore, additional soil gas sampling locations were selected to provide a more comprehensive investigation of the entire study area. These locations are SV-17, SV-20, SV-21, SV-24, SV-37, SV-44, and SV-45 and are presented in Figure 3.
3.0 FIELD ACTIVITIES

Field activities were performed in November 2015 and March 2016. In November, 28 soil gas samples and four duplicates were collected. In March, four soil gas samples and one duplicate were collected, and two groundwater samples plus one duplicate were collected. Field notes and a photo log are included in Appendices A and B, respectively.

3.1 Site Access

Soil gas and groundwater sampling locations were in municipal right-of-ways (ROWs) with preference for alley locations to minimize traffic disruptions and traffic control requirements. Prior to performing the field work, ROW permits were acquired from the Municipality of Anchorage. The subcontractors Work Zone (in November) and Shaman Traffic (in March) provided traffic control for all installation, sampling, and decommissioning activities based on the specifics of each individual location. Copies of the permits used during this investigation are included in Appendix C.

3.2 Utility Locates

Prior to drilling, utility locates were performed to ensure clearance for drilling activities. Locate requests were called into the AK DigLine, which then notified utilities of the potential drill locations. Utilities included water, sewer, electricity, natural gas, and telephone. Ahtna and GeoTek Alaska, Inc. (GeoTek) only drilled in areas cleared by the utility locate.

3.3 Soil Gas

The following sections summarize the installation, sampling, and retrieval methodologies associated with the soil gas sampling. The activities were documented on the field sampling forms (Appendix D).

In November 2015, 28 locations were installed and sampled. Originally, 44 locations had been planned, but due to utility conflicts or shallow subsurface water, 16 of the locations were not sampled. In March 2016, four locations were installed and sampled, including two locations near a previous sample from November 2015 and two new locations to examine areas not previously evaluated during the November investigation because of utility conflicts.

3.3.1 Installation and Purging

GeoTek was subcontracted to drill 10-foot borings at selected locations (Figure 3). The boreholes were advanced using direct push technology and MacroCore tooling. Ahtna installed 1-inch diameter polyvinyl chloride (PVC) soil gas wells with one-foot screens at the bottom to sample soil gas from 9 to 10 feet below ground surface (bgs). The wells were completed with sand pack around the screens and hydrated bentonite seals to approximately one foot bgs.

A modified surface completion was used for the soil gas wells. The surface completion terminated at approximately eight inches bgs and the well was covered with loose sand and gravel. A small metallic object, such as a washer, was placed in the top of the borehole, which
assisted in the relocation of the sampling location through the use of a metal detector. A global positioning system unit was used to record the location. Field notes, locational data, and a metal detector were used to return to the well location.

Following installation, Ahtna purged the soil gas wells of 10 volumes of combined inner and outer annulus to remove atmospheric air that may have been entrained in the subsurface during drilling. The air was purged through the use of a sealing well cap with appropriate connections, peristaltic pump, and a rotameter to control flow rate.

### 3.3.2 Sampler Deployment

Following the purge, Ahtna deployed a WMS within the screened portion of each well using string to suspend the sampler from a compression cap. The date and time of deployment were noted in the field logbook. The WMSs remained deployed for three days. Ahtna collected duplicate soil gas samples at 10% of the wells. For duplicates, the two WMSs were hung in the well at the same time and depth.

A datalogger was deployed into one of the wells for the duration of the sampling event. This was used to record temperature data, which was included in the laboratory submission of WMSs. The site specific temperature data provides more accurate uptake rates for the samplers which in turn yields more accurate concentration data from the laboratory.

### 3.3.3 Sampler Retrieval and Well Decommissioning

After three days, the WMSs were retrieved and placed into the laboratory-supplied vials and sealed with the provided Teflon tape. The date and time of the retrieval was recorded in the field notebook as well as on the sample label with the deployment information. A trip blank was included for the WMSs to ensure cross contamination did not occur during sample handling and transport. The trip blank sampler was placed directly into the vial, sealed, and shipped with the other samplers. The samples were sent to Eurofins/Air Toxics in Folsom, California, for analysis.

When all passive soil gas sampling was completed, the soil gas monitoring points were decommissioned following standard practice as contained in ADEC’s *Monitoring Well Guidance (2013)*. The PVC wells were lifted out of the ground manually or with the use of the drill rig. The used PVC was disposed of as non-hazardous solid waste. The borehole was filled with bentonite chips and gravel, and closed in place with an asphalt patch were applicable.

### 3.4 Groundwater

Groundwater sampling locations were selected after the November 2015 soil gas sampling results were evaluated. Two temporary groundwater monitoring locations were sampled (Figure 3).

#### 3.4.1 Installation

GeoTek, as a subcontractor to Ahtna, installed temporary groundwater monitoring points using a Geoprobe 66DT rig and SP-16 tooling. The field team drilled to 35 feet bgs and began collecting MacroCore samples to determine the depth of the groundwater table. After groundwater was
encountered, the SP-16 tooling was advanced to the appropriate depth within the top five feet of the groundwater table. Location GW-48 had the screen set from 38.4 to 42.4 feet bgs. Location GW-49 had the screen set from 40.1 to 44.1 feet bgs. The drill rod was then raised to expose the sampling screen and allow groundwater infiltration.

3.4.2 Sampling

Groundwater sampling was performed using check valve pumps. Due to the lack of storage options for waste water, no-purge sampling was conducted. The pump intake was placed beneath the water surface at approximately the midpoint of the screened interval, about 2 to 3 feet below the water table, to ensure that groundwater most likely to contribute to the soil gas pathway was sampled.

Dedicated sample tubing and check valves were used to prevent cross-contamination between sampling points. The samples were collected from the pump outflow into laboratory-provided, clean volatile organic analysis (VOA) vials with septa lids. The vials were completely filled to eliminate headspace and prevent volatilization. The vials were inverted and tapped to confirm that no air bubbles were present. After the containers were appropriately filled, they were labeled and placed into a cooler with ice and maintained at 4 ± 2 degrees Celsius (°C). The samples were analyzed by OnSite Environmental of Redmond, Washington, an ADEC-approved laboratory, for COPCs using EPA Method 8260C.

3.4.3 Decommissioning

The temporary wells were decommissioned after sampling was completed. The drilling equipment and SP-16 tooling were removed from the borehole. The hole was backfilled with any soil from MacroCore sampling and the remaining space was filled with bentonite. An asphalt patch was used to repair the surface of the road.

3.5 Decontamination

Disposable or dedicated sampling and personal protective equipment (PPE) was used for field activities. No decontamination of equipment was necessary.

3.6 Waste Management

The investigation-derived waste generated during the field event includes the following:

- Used soil gas monitoring wells
- Used disposable sampling equipment
- Used PPE

All waste was consolidated and disposed of via the Municipality of Anchorage waste disposal system.
### 3.7 Work Plan Deviations

The work plan established 44 soil gas sampling locations for the November 2015 sampling event. Due to presence of utilities or shallow subsurface water, 16 of these locations were not sampled. The second round of sampling was originally meant to be only groundwater sampling to further investigate potential impacts from elevated soil gas results. However, four soil gas samples were collected in March 2016: two to further examine soil gas sample location SV-20 and two to replace potentially significant locations that were skipped during the first sampling event because of utility issues.

The groundwater sampling methodology was adjusted to a no-purge sampling procedure. This was changed due to the lack of purge water storage options in the study area.
4.0 RESULTS

4.1 Soil Gas

In November 2015, 28 locations were sampled and analyzed for the eight COPCs. Detection and reporting limits were sufficiently low to compare results to the shallow soil gas target levels with one exception. The detection and reporting limits for vinyl chloride exceeded the residential shallow soil gas target level. This issue was known and documented in the project work plan. Vinyl chloride was not detected in any of the samples. The complete laboratory results are summarized in Table 1. The following analytes were detected at one or more locations:

- PCE at SV-22, SV-26, SV-37, and SV-38
- Carbon tetrachloride at SV-20
- 1,1,1-trichloroethane at SV-09 and SV-18

All detections were below the ADEC target levels with one exception: a carbon tetrachloride concentration of 1,600 µg/m³ at SV-20, which exceeded both residential and commercial target levels for shallow soil gas (Figure 4).

In March 2016, four locations were sampled. Two locations (SV-46 and SV-47) were selected to sample areas that were not sampled in November; no COPCs were detected in these samples. Two locations (SV-44 and SV-45) were collected in the vicinity of SV-20 to further examine the carbon tetrachloride concentration previously measured (Figure 4). SV-45 had a carbon tetrachloride concentration of 210 µg/m³, which is nearly an order of magnitude less than the result (1,600 µg/m³) from SV-20 in November 2015, but still above both the residential and commercial target levels. The March 2016 sample results are summarized in Table 2.

The temperature data collected at the site remained fairly consistent between 2.5°C and 6.5°C, although air temperature during this timeframe varied much more significantly. This indicates that the surface seals for the soil gas wells are competent, and there was no intrusion of atmospheric air into the well.

Laboratory reports for both sample events are available in Appendix E.

4.2 Groundwater

Two groundwater sampling locations were selected based on the November 2015 soil gas results. Two samples and one duplicate were collected. One groundwater sample was collected in the vicinity of SV-22 to further examine the PCE soil gas detection and one was collected at the same location as SV-45 and SV-20 to further examine the carbon tetrachloride exceedance. Analytical results for all COPCs were below detection limits and all reporting limits were below the GCLs and VI target levels. The data are provided in Table 3. The laboratory report is provided in Appendix E.
4.3 Data Quality Review

The ADEC Data Quality Review Checklists are included in Appendix F. The data quality is sufficient for the requirements of this project. The following items are of note for usability of the data.

The second soil gas sampling event did not have a trip blank sent to the laboratory. However, three of the field samples and the field duplicate had no detectable concentrations of COPCs. This demonstrates that cross-contamination likely did not occur during field activities or during sample shipping.

The groundwater data are suspected to be biased low for the collected samples. This is due to the work plan deviation related to no-purge sampling, which resulted in the presence of sediment in the laboratory sample containers. The laboratory had to combine vials with sediment to obtain sufficient water for analyses. This process exposed the sample to the atmosphere and volatiles may have been lost in the transfer process. As the nature of this project was to investigate potential large-scale contamination in the study area, these samples are believed to provide sufficient information indicating that the area is not significantly contaminated.
5.0 CONCLUSIONS

The purpose of this investigation was to examine potential impacts to the Fairview Redevelopment Area from former dry cleaning operations. The 25 soil gas and one groundwater sampling locations associated with the 30 suspected or known former drycleaner addresses did not have chlorinated solvent concentrations above shallow target levels or groundwater cleanup levels, respectively. These findings indicate that there are likely no significant source areas in the vicinity of these sampling locations, and redevelopment near these areas probably would not encounter soil vapor concerns. The disclaimer, however, associated with this conclusion is that the investigation was conducted solely in ROWs with sampling locations that were widely dispersed in the study area. Any specific redevelopment project should evaluate the project location using standards of practice for environmental site assessments.

For the seven other soil gas sampling locations that were not located near a suspected or known former drycleaners, two locations collected in close proximity, SV-20 and SV-45, contained carbon tetrachloride concentrations that exceeded ADEC shallow soil gas levels. An additional soil gas sample, SV-44, was collected approximately 500 ft to the east and a groundwater sample, GW-49, was also collected at the location where the highest carbon tetrachloride concentration (1,600 µg/m³) was measured. Both of these samples did not contain detectable concentrations of COPCs. These findings indicate that the carbon tetrachloride concentrations detected at SV-20 and SV-45 are likely not representative of large scale contamination, but rather may represent a discrete area, or hot spot, of carbon tetrachloride and redevelopment would likely be affected only if the project occurred at or very near the locations of SV-20 and SV-45.
6.0 REFERENCES


ADEC, 2015a. Title 18 Alaska Administrative Code 75 Oil and Other Hazardous Substances Pollution Control, June 17.


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<table>
<thead>
<tr>
<th>Location</th>
<th>SV-01</th>
<th>SV-05</th>
<th>SV-06</th>
<th>SV-09</th>
</tr>
</thead>
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<tr>
<td>Sample ID</td>
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<td>15-FVOC-SV06</td>
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### Analyte CAS Residential Commercial Units

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Detected concentration

Below reporting limit

Reporting limit exceeds Residential Target Level

Detection exceeds target level
Table 1
November 2015 Soil Gas Results

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Detected concentration
Below reporting limit
Reporting limit exceeds Residential Target Level
Detection exceeds target level
### Table 1

#### November 2015 Soil Gas Results

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**Detected concentration**

*Below reporting limit*

*Reporting limit exceeds Residential Target Level*

*Detection exceeds target level*
## Table 1
November 2015 Soil Gas Results

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**Detected concentration**

*Below reporting limit*

*Reporting limit exceeds Residential Target Level*

*Detection exceeds target level*
## Table 2
March 2016 Soil Gas Results

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**Detected concentration**

*Below reporting limit*

*Reporting limit exceeds Residential Target Level*

*Detection exceeds target level*
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Table 3
March 2016 Groundwater Results

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FIGURES
FAIRVIEW REDEVELOPMENT AREA CHLORINATED SOLVENTS
INVESTIGATION REPORT
ANCHORAGE, ALASKA

STATE AND SITE VICINITY

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE
2. MAP SOURCE: ARCGIS ONLINE, ESRI, INC.
(This Page Intentionally Left Blank)
NOTES:
1. Unconfirmed Contaminated Site not displayed on this map.
2. Locations are approximate.

Known or Suspected Former Drycleaner Locations
FAIRVIEW REDEVELOPMENT AREA CHLORINATED SOLVENTS
INVESTIGATION REPORT
ANCHORAGE, ALASKA

SOIL GAS AND GROUNDWATER SAMPLING LOCATIONS

NOTES:
Sample locations are approximate.
FAIRVIEW REDEVELOPMENT AREA CHLORINATED SOLVENTS INVESTIGATION REPORT
ANCHORAGE, ALASKA

CARBON TETRACHLORIDE DETECTIONS IN SOIL GAS

NOTES:
Sample locations are approximate.

Legend
- Groundwater Sample Location
- Soil Gas Sample Location
- Soil Gas Sample Location (exceeds ADEC target level)

OFFSET

0 100 200 Feet

---

Architects and Engineers for Social Justice
APPENDIX A

FIELD NOTES
0400  Get to location 08. Check utilities and decide which is no location to start drilling. Move on to location 09 and set up traffic control.

0410  Begin drilling at location 09.

Finish drilling and installation of vapor well.

Purge 10 well, volume = ~17.1 liters

Purgina at ~2 L/min

1052  Install sampler in well at 9.5 ft.

Sample: 15-FWC-5V09

1110  Move to location 10 to begin drilling.

S fool location 11. Decide that well cannot be placed in right of way with location of utilities will strip this boring and move to 12 after.

Begin installation vapor well at location 09.

1150  Purge well and deploy sampler.

Collects on well construction and sampling can be saved on log.
11/16/15  5°F clear

- Sheets for each well
- 1206  Sample 15-FVOC-SV10 deployed
- 1250  Begin drilling at location 12
- 1325  Well installed, begin purge
- 1341  Sample 15-FVOC-SV12 deployed
- 1345  Begin drilling at location 13
- 1357  Deploy sampler 15-FVOC-SV13
- 1430  Move to location 01 and begin drilling
- 1510  Well installed, begin purge
- 1522  Deploy sampler 15-FVOC-SV01
- 1545  Start drill on right of any
- 1545  For locations 2, 3, 4 due to utility conflicts, will skip those locations
- 1600  Move to location 05 to begin drilling
- 1620  Finish well installation and begin purge of 10 well vols
- 1633  Deploy sampler, sample name = 15-FVOC-SV05

End of day

11/17/15  5°F clear

- A6
- 0800 on site at location 06, meet with contractors & work zone
- 0820 Conduct safety meeting 12.31
- 0835 Begin drilling at location 06
- 0905 Well installed, begin purge of 10 well vols
- 0920 Deploy sampler 15-FVOC-SV06
- 0940 Move to location 15, location 14.5 skipped due to utility conflicts
- 0950 Begin drilling at location 15
- 1015 Begin purge, well installed completed
- 1035 Deploy sampler, 15-FVOC-SV15
- 1040 Begin drilling at location 16
- 1055 Well is installed, begin purge
- 1110 Begin purge take
- 1123 Deploy sampler 15-FVOC-SV16
- 1130 Move to location 17
1140 Begin drilling at location 17
1200 Well installed
1212 Begin purge at 10 well vals
1235 Deploy sample 15-FUOC-SV17
1238 Move to location 07 Begin drilling
1358 Well installed at 07
1358 Begin Purge at 07, Purge 10 well
1400 15-FUOC-SV17
1525 Deploy sample 15-FUOC-SV17
1425 Move to location 18
1430 Begin drilling at location 18
1500 Install vapor well, Begin purge
1515 Deploy sampler 15-FUOC-SV18
1520 Move to location 19
1525 Begin drilling at location
1545 Install vapor well
1555 Purge 10 well vals
1608 Deploy sampler 15-FUOC-SV19
Move to location 21
1620 Begin drilling at location 21
1640 Well installed
1642 Purge vapor well
1700 Deploy sampler 15-FUOC-SV21
1701 Deploy duplicate sampler
1710 EOD

Scale: 1 square = __________
11/18/15 A Geigel 5°F, clear

0530 Meet at site, conduct safety meeting
talk about days activities

0630 Mobilize to location 20

0600 Begin drilling at location 20

0930 Well installed, begin purge

0941 Deploy sampler 15-FVOC-SV20

1000 Move to location 22, begin drilling

1020 Begin purge to well vents

1042 Deploy sampler 15-FVOC-SV22

1040 Move to and begin drilling at location 23

1100 End of drilling, install well

1103 Begin purge

1115 Deploy sampler 15-FVOC-SV23

1130 Move to location 24

1140 Begin drilling at location 24

1215 Well installed, purge 10 well volumes of

1231 Deploy sampler 15-FVOC-SV24

1240 Move to location 25, begin drilling

1300 Well installed, purge 10 well volumes

1313 Deploy sampler 15-FVOC-SV25

While deploying sampler, observe color

in bottom of well 1-2 ft is later

1330 Will check well is determined if

will check writer loaded in during cantonite

Ambient Delay sampler retrieval until

this is determined if well drains

Mobilize to location 26

1350 Begin drilling

1359 Purge 10 well volumes of air

1410 Deploy sampler 15-FVOC-SV26

1420 Move to location 27, decide next

Utilities permit drilling,

1430 Move to location 28, Utilities allow

permit drilling in right of way

1445 Move to location 31 and begin drilling

Install well, Purge well

1500 Deploy sampler 15-FVOC-SV31

1510 Move to location 30

Purge well 10 well volumes

1525 Day change

1605 Deploy sampler 15-FVOC-SV30

1610 Move to location 29

1630 Begin purge 10

Deploy sampler 15-FVOC-SV29

While setting up purge equipment notice

water in well, measure at approx

4 ft to 6 ft, will not
11/19/15 Abelich 10-15°F Snow

1320 Set up at location 43
1335 Begin drilling
1340 Install well pipe 10 well lots
1342 Deploy sampler 15-FUOC-SV49
1345 Move to location 42
1350 Begin drilling
1350 Install well at 42
1400 Begin filing
1503 Deploy sampler 15-FUOC-SV49
1510 Go for truck to location 44 and begin drilling. After installation of well return water to bottom of well. Do not deploy sampler.
1550 Retrieve sampler 15-FUOC-SV04
Move to location 10, retrieve 15-FUOC-SV10
Check find well at location 12, 13 will try again turn morning
Retrieve sampler at 01, 15-FUOC-SV01
Check find sampler at 05, will

11/19/15 Abelich 10-15°F Snow

1220 Deploy sampler - 15-FUOC-SV41
1223 Deploy sampler - 15-FUOC-SV53

Abelich
11/20/15  A Ge. 124, 25°F, cloudy

0400 New S/Ge. took off. Walked over to meet client morning and go over day 1 activities.

0830 Met w/ Olga (Geoprene) and Nicole to go over Hi5 plan and what we will be doing.

0900 Begin drilling at location 37

0920 Well is installed on 10 ft. pipe.

1020 Well is being filled with air from truck.

0924 Deploy sampler 15-FVOC-SV37

0940 Move to location 36

1010 Install well, begin air purge

1024 Deploy sampler 15-FVOC-SV36

1045 Move to location 13 to remove sampler.

1104 Retrieve 15-FVOC-SV13

1115 Move to be 12, retrieve 15-FVOC-SV12

Ge. took off. Well decommissioning. They are pulling the pipe well out manually and then filling empty hole with fillite. Then hydrate fillite, place asphalt over

1135 Well 12, 13 decommissioned.

1149 Retrieve 15-FVOC-SV05, decom well

1155 Retrieve 15-FVOC-SV06, decom well

1201 Retrieve 15-FVOC-SV15

1202 Retrieve 15-FVOC-SV50 (Duplicate of 15)

1211 Retrieve, 15-FVOC-SV16, decom well

1315 Retrieve 15-FVOC-SV17, decom well

1330 End of day
11/21/15 15-20°F, rainy, snow

1300 on site to begin sampler retrieval. No stream taking place, will come back w/ geotech on Monday to stream all wells.

1350 retrieve 15-FVOC-SV18
1411 retrieve 15-FVOC-SV19
1435 retrieve 15-FVOC-SV22
1440 retrieve 15-FVOC-SV23
1450 retrieve 15-FVOC-SV21
1451 retrieve 15-FVOC-SV51 (dup of SV21)

1517 retrieve 15-FVOC-SV20
1526 retrieve 15-FVOC-SV24

1540 attempt to retrieve sampler at location 26. Can not find in snow, will try tomorrow.

1615 retrieve 15-FVOC-SV30
1627 retrieve 15-FVOC-SV31
1650 End of day

11/22/15 15-20°F, cloudy, snow

1230 on site to continue sampler retrieval.

1240 retrieve 15-FVOC-SV26
1251 retrieve 15-FVOC-SV52 (dup of location 26)

1330 attempt to retrieve sampler and data logger from loc 32. String gets stuck and cannot pull sampler out. Will retrieve sampler when well is removed tomorrow.

1405 retrieve sampler 15-FVOC-SV38
1420 retrieve 15-FVOC-SV41
1421 retrieve 15-FVOC-SV53 (dup of location 41)
1436 retrieve 15-FVOC-SV43
1458 retrieve 15-FVOC-SV33
1515 retrieve 15-FVOC-SV42

1530 off site, E&D

AC

AC
11/23/15 Abellah

25°F, cloudy

0800 on site w/ Brock Jr. and Whittenton
now go over safety issues and plan for day

0815 Decom well at location 32
when well is pulled out, retrieve
sample 15-FUOC-SV32 and data logger

0825 Decom well at loc 33

0840 Decom well 38

0850 Decom well 42

0905 Decom well 44

0915 Decom well 41

0925 Decom well 43

0940 Decom well 31

1000 Decom well 30

1015 Decom well 29

1027 Retrieve sample 15-FUOC-SV37
and decom well

1033 Retrieve sample 15-FUOC-SV36
and decom well

1045 Decom well 25

1055 Decom well 26

1105 Decom well 24

1110 Decom well 22

1120 Decom well 23

1130 Decom well 21

1140 Decom well 20

1150 Decom well 28

1200 Decom well 29

1220 Decom well 01, finish decommissioning
wells, EOD

Scale 1 square = ____________
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0700</td>
<td>Meet with Geotech and Sharma</td>
</tr>
<tr>
<td>0820</td>
<td>Move to first site at 11th Avenue, 11th Avenue drilling with crew.</td>
</tr>
<tr>
<td>0830</td>
<td>Geotech begins drilling at location 46</td>
</tr>
<tr>
<td>0855</td>
<td>Geotech finishes installing well, begins pumping, at 22 l/min for 10 minutes.</td>
</tr>
<tr>
<td>0905</td>
<td>Finish purge, deploy 90-l water sampler in well 16-FWOC-SV47.</td>
</tr>
<tr>
<td>0930</td>
<td>Move to location 46</td>
</tr>
<tr>
<td>0950</td>
<td>Begin purge for 10 min.</td>
</tr>
<tr>
<td>1005</td>
<td>Deploy sampler 16-FWOC-SV46 also deploy temperature data logger in well 46.</td>
</tr>
<tr>
<td>1020</td>
<td>Move to location 44 and begin drilling</td>
</tr>
<tr>
<td>1100</td>
<td>Begin air purge at 12 l/min for 10 min.</td>
</tr>
<tr>
<td>1115</td>
<td>Deploy sampler 16-FWOC-SV141 also deploy duplicate sampler 16-FWOC-SV54 with fine 1120.</td>
</tr>
<tr>
<td>1125</td>
<td>Move to location 45, begin drilling</td>
</tr>
<tr>
<td>1140</td>
<td>Begin purge</td>
</tr>
<tr>
<td>1155</td>
<td>Deploy sampler 16-FWOC-SV45</td>
</tr>
<tr>
<td>1200</td>
<td>Geotech off site to get extra drill rod to prepare for water sampling.</td>
</tr>
<tr>
<td>1300</td>
<td>Geotech begins mariscith drilling at location 49 to determine water level.</td>
</tr>
<tr>
<td>1310</td>
<td>Mariscith shows water level at 38 ft in sand directly below silt layer. Geotech will now drill SP-16 to collect water sample.</td>
</tr>
<tr>
<td>1355</td>
<td>Collect ground water sample 16-FWOC-SV149 screen set at 40-1 to 44-1 ft, 6 in. below in screen 35.72 ft. Soil in core was dry at 38 ft, depth water table by silt layer so sample water represents water within 5 ft of water table.</td>
</tr>
<tr>
<td>1630</td>
<td>Clean up site and leave.</td>
</tr>
</tbody>
</table>
3/2/16 Match Clear 30°F

0500 meet at site to measure to determine water level at location 48
0530 Traffic control set up in wrong intersection, past for them to arrive is more obvious
0910 Traffic control set up, begin drilling at location 4B
1020 GeoTek pulls up auger core from 5-40 ft, Plastic line melted, so cannot get core out of drill rod. Evidence of water visible in section at soil visible at end of rod. GeoTek will set SP-16 past with bottom at 24 ft. Soil visible in end of rod was sandy/silt
1100 GeoTek sets SP-16, DTW = 39.21 ft. Sticks. Total well depth = 42.43 ft
1110 Sample water 16-FVOC-GW-48, and duplicate 16-FVOC-GW-55 with time = 1200
1140 GeoTek pulls rods, backfills hole, repair asphalt. Will meet Friday to pull upset

3/4/16 A Getch Snow 25°F

1200 meet to remove vapor samplers and decommission wells, discuss health safety issues with snow and traffic
1220 Retrieve sample at location 47. Repairs to opening, well by pulling out and filling hole with bentonite and repairing surface with asphalt patch
1255 Retrieve sample 4B and get data logs from well. Door well
1250 Retrieve sample at location 44 and
1245 duplicate sample Door well
1300 Retrieve sample at location 45 Door well
1320 All samples retrieved and wells decommissioned
1330 Leave site

Scale: 1 square = 

AG

Note on the paper: SAC
APPENDIX B

PHOTO LOG
Photograph 1: Looking north. Geotek personnel performing vapor monitoring well installation.

Photograph 2: Vapor monitoring well screen and casing.
Photograph 3: Purging vapor well and collection of GPS information.

Photograph 4: Looking east. Removal of a vapor monitoring well.
Photograph 5: Filling empty borehole with bentonite chips.

Photograph 6: Close up of asphalt patch applied during decommissioning.
Photograph 7: Looking west. Geotek personnel drilling at location GW-48 during Round 2 sampling.

Photograph 8: View of soil core at GW-49. Silt to saturated sand transition visible.
APPENDIX C

ROW PERMITS
MOA RIGHT OF WAY
INSPECTION REQUEST LINE
343-8206

Requests must be received 2 working days in advance of starting work and 2 working days in advance for final inspection. Permit is not valid without the call-in and the utility locate number.

Call the voice message system at 343-8206 and give the following information in the order listed below:

1. Permit Number
2. Contractor Name
3. Contact Person
4. Phone Number
5. Start Date
6. Start Time
7. Project Location
8. Utility Locate Ticket Number

Utility companies (ACS, GCI, ML&P, AWWU, ENSTAR, CEA, MEA, MTA) must notify the Right of Way office a minimum of 24 hours prior of starting work.

Municipality of Anchorage – Right of Way Section
Main Phone 343-8240  Fax 343-8250  7:30am – 4:30pm
POST IN A CONSPICUOUS PLACE
ALL WORK MUST BE INSPECTED
Field Inspection Request required 2 working days in advance of starting work and 2 working days in advance for final inspection. Call (907) 343-8206 (voice recorder) for scheduling. Permit is not valid without the call-in and also must include the one-call ticket (utility locate) number.

MUNICIPALITY OF ANCHORAGE
RIGHT OF WAY DIVISION
4700 ELMORE ROAD
TELEPHONE (907) 343-8240

POST
RIGHT OF WAY PERMIT
POST
R152610

Type: General
Construction Start:

Grid: SW1932
Date Issued: 11/6/2015
Last Update by: PWDEW
Last Updated: 11/06/2015

Permittee: GEOTEK ALASKA, INC.
Contact Person: Katherine Smith, 569-5900
Primary Inspector: 343-8240

Site Address: 907 E DOWLING RD, STE 000016, Anchorage - @ Various location within Municipality of Anchorage

Legal Description: T13N R3W SEC 32 E2SW4SW4SW4 PTN PARCEL 1-11 G:1932
Original Work
Description: Drill 44 boreholes in various locations for soil sampling 10' below ground surface. Locations are listed on attachment.

Most Recent Summary
Work Area
various locations/see R3W Boring Full 11/7/2015 7:00:00AM 12/31/2015 9:00:00PM
various locations/see nR3W Boring Partial 11/7/2015 7:00:00AM 12/31/2015 9:00:00PM

Financial Summary
Fee Description QTY AMT
Construction Method 1.00 225.00
Road Closure 1.00 280.00
Total Fees: 505.00

See reverse for requirements/remarks.
I have read and understand both sides of this permit. I agree to the terms and conditions; and I certify that all work will comply with federal, state, and municipal codes and regulations and the provisions of this permit.

Signature: Katherine Smith Date: 11/06/2015
Date: 10/29/2015  Author: Work Zone TCM/Tricia Early ATSSA# 27410  Project: Geosyntec Fairview Soil Gas & GW  Project NO: 15-220

Comments:
TCP#1 Lane Closure on a Two Lane Road Using Flaggers  Contractor: GeoTek Alaska Inc  Project superintendent: Alex Geillich 908-256-2885  TCS: Trisha Early 907-232-4536  24 Hour contact: Alex Geillich 908-256-2885  Effective date: 11/4/2015 - 12/31/2015  Work hours: 7:00 am - 7:00 pm

Notes:
Pedestrians shall be provided with access and safe passage through or around the work zone at all times.
Emergency vehicle access through the work zone must be maintained at all times.
All signs and devices shall conform to the standards and specifications of the Alaska Traffic Manual (ATM).
Roadway occupancy and work completion time shall be minimized to reduce exposure to potential hazards.
Work Area shall be delineated by channelizing devices or shielded by barriers to exclude traffic and pedestrians. Fencing may be required.
Should field adjustments be necessary, additional signage and/or barricades may be required by the Municipal Traffic Engineer.

This Traffic Control Plan conforms with the Alaska Traffic Manual (ATM), which is the MUTCD with the Alaska supplement and the contract specifications.

Worksite supervisor:
Date:

Legend:
- Work Area
- Cone
- road work ahead W20-1
- one lane road ahead W20-4
- flagger symbol

Notes:
1. Cone spacing 20 ft apart
2. Urban area
3. Light plants shall be used for flagger during dusk/dark working hours.
This Traffic Control Plan conforms with the Alaska Traffic Manual (ATM), which is the MUTCD with the Alaska supplement and the contract specifications.

Notes:
- Pedestrians shall be provided with access and safe passage through or around the work zone at all times.
- Emergency vehicle access through the work zone must be maintained at all times.
- All signs and devices shall conform to the standards and specifications of the Alaska Traffic Manual (ATM).
- Roadway occupancy and work completion time shall be minimized to reduce exposure to potential hazards.
- Work Areas shall be delineated by channelizing devices or shielded by barriers to exclude traffic and pedestrians. Fencing may be required.
- Shoulder adjustments may be necessary, additional signage and/or barricades may be required by the Municipal Traffic Engineer.

Legend:
- Cone
- Work Area
- Shoulder Work W2L-S

Note:
- Taper Length Criteria for Temporary Traffic Control Zones
  - Type of Taper Taper Length
    - Merging Taper at least L
    - Shifting Taper at least 0.5L
    - Shoulder Taper at least 0.33L
  - One-Lane, Two-Way Traffic: Taper 50 feet minimum, 100 feet maximum
  - Downstream Taper 50 feet minimum, 100 feet maximum
- Formulas for Determining Taper Length
  - Speed (S) Taper Length (L) in feet
    - 40 mph or less: L = WS2 x 80
    - 45 mph or more: L = WS
  - Where: L = taper length in feet
  - W = width of offset in feet
  - S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

Worksites supervisor: [Signature]
Date: [Signature]
This Traffic Control Plan conforms with the Alaska Traffic Manual (ATM), which is the MUTCD with the Alaska supplement and the contract specifications.

Worksite supervisor

The Contractor shall conduct the work in such a manner as to cause minimum inconvenience to pedestrians and vehicular traffic and to persons conducting commercial enterprises or residing along the route of work. Without prior approval of the Engineer, entrances or driveways of all kinds shall not be blocked for more than three (3) hours. The Contractor shall provide the property owners and/or tenants written notification no less than forty-eight (48) hours prior to any closure of access. The Contractor shall conduct his work to ensure that there is no disruption of mail service, school bus service, applicable trash collection, access by emergency vehicles, or any unnecessary disruption of general access to any business or private residence.

Legend
- Work Area
  - Type I
  - Type II
  - Detour ahead W20-2
  - Detour ahead H20-3
  - Detour (L) H4-12
  - Detour (R) O2-2H
  - Detour (L) O2-2H

Notes:
- Pedestrians shall be provided with access and safe passage through or around the work zone at all times.
- Emergency vehicle access through the work zone must be maintained at all times.
- All signs and devices shall conform to the standards and specifications of the Alaska Traffic Manual (ATM).
- Pedestrian occupancy and work completion times shall be minimized to reduce exposure to potential hazards.
- Work areas shall be delineated by channelizing devices or shielded by barriers to exclude traffic and pedestrians. Fencing may be required.
- Shoulder adjustments be necessary, additional signs and lane markings may be required by the Municipal Traffic Engineer.
This Traffic Control Plan conforms with the Alaska Traffic Manual (ATM), which is the MUTCD with the Alaska supplement and the contract specifications.

**Legend**

- **Road work ahead** W20-1
- **Work Area**
- **Type II Barricade**
- **Sidewalk closed cross here (L)** R9-11a
- **Sidewalk closed cross here (R)** R9-11a
- **Sidewalk closed** R9-9

**Notes:**

- Pedestrians shall be provided with access and safe passage through or around the work zone at all times.
- Emergency vehicle access through the work zone must be maintained at all times.
- All signs and devices shall conform to the standards and specifications of the Alaska Traffic Manual (ATM).
- Roadway occupancy and work completion time shall be minimized to reduce exposure to potential hazards.
- Work Areas shall be delineated by channelizing devices or shielded by barriers to exclude traffic and pedestrians. Fencing may be required.
- Should field adjustments be necessary, additional signage and/or barricades may be required by the Municipal Traffic Engineer.
Date: 10/28/2015  Author: Work Zone TCM/Trisha Early ATSSA #27410  Project: Geosyntec Fairview Soil Gas & GW
Project NO: 15-220

Comments:
TCP# 5 Lane Closure
Contractor: GeoTek Alaska Inc
Project superintendent: Alex Gellich 908-256-2885
TCS: Trisha Early 907-232-4536
24 Hour contact: Alex Gellich 908-256-2885
Effective date: 11/4/2015 - 12/31/2015
Work hours: 7:00 am - 7:00 pm

This Traffic Control Plan conforms with the Alaska Traffic Manual (ATM), which is the MUTCD with the Alaska supplement and the contract specifications.

Worksite supervisor: [Signature]
Date: [Signature]

Notes:
1. Taper length 540 ft
2. Barrel spacing 25 ft
3. Construction signs 48x48

Legend
- Road work ahead W20-1
- CW4-2L CW4-2L
- Work Area
- Barrel
- CW9-3R CW9-3R
- Arrowboard (Single)

Notes:
Pedestrians shall be provided with access and safe passage through or around the work zone at all times.
Emergency vehicle access through the work zone must be maintained at all times.
All signs and devices shall conform to the standards and specifications of the Alaska Traffic Manual (ATM).
Noise exposure and work completion time shall be minimized to reduce exposure to potential hazards.
Work Areas shall be delineated by channelizing devices or shielded by barriers to exclude traffic and pedestrians. Fencing may be required. Should field adjustments be necessary, additional signage and/or barricades may be required by the Municipal Traffic Engineer.
<table>
<thead>
<tr>
<th>Location ID</th>
<th>SampleType</th>
<th>Borhole Depth</th>
<th>Location Description</th>
<th>Potential Grouping</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>3rd/4th Alley between A/B Streets</td>
<td>1 Full</td>
</tr>
<tr>
<td>2</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>3rd/4th Alley between A/Barrow Streets</td>
<td>1 Full</td>
</tr>
<tr>
<td>3</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>3rd/4th Alley between Barrow/Cordova Streets (west)</td>
<td>1 Full</td>
</tr>
<tr>
<td>4</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>3rd/4th Alley between Barrow/Cordova Streets (east)</td>
<td>1 Full</td>
</tr>
<tr>
<td>5</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>3rd Avenue between Cordova/Eagle Streets</td>
<td>Part</td>
</tr>
<tr>
<td>6</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Eagle St and 3rd Avenue</td>
<td>Part</td>
</tr>
<tr>
<td>7</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Latouche Street between 3rd Ave/ Post Road</td>
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<tr>
<td>8</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>4th/5th Alley between A/B Streets</td>
<td>1 Full</td>
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<tr>
<td>9</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>4th/5th Alley between A/Barrow Streets</td>
<td>1 Full</td>
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<tr>
<td>10</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>4th/5th Alley between Barrow/Cordova Streets</td>
<td>1 Full</td>
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<tr>
<td>11</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>4th/5th Alley between Cordova/Denali Streets</td>
<td>1 Full</td>
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<td>12</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Denali Street and 4th Avenue</td>
<td>Part</td>
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<td>Soil Vapor</td>
<td>10'</td>
<td>4th/5th Alley between Cordova/Denali Streets</td>
<td>1 Full</td>
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<td>14</td>
<td>Soil Vapor</td>
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<td>4th/5th Alley between Eagle/Gambell Streets (west)</td>
<td>2 Full</td>
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<tr>
<td>15</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>4th/5th Alley between Eagle/Gambell Streets (east)</td>
<td>2 Full</td>
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<td>Soil Vapor</td>
<td>10'</td>
<td>4th/5th Alley between Gambell/Ingra Streets</td>
<td>2 Full</td>
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<td>17</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Juneau Street and 4th Avenue</td>
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<tr>
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<td>5th/6th Alley between Eagle/Fairbanks Streets</td>
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<td>19</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>5th/6th Alley between Fairbanks/Gambell Streets</td>
<td>2 Full</td>
</tr>
<tr>
<td>20</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>5th/6th Alley between Ingra/Juneau Streets</td>
<td>Full</td>
</tr>
<tr>
<td>21</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>6th/7th Alley between Hyder/Ingra streets</td>
<td>Full</td>
</tr>
<tr>
<td>22</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>7th Avenue between Karluk/Latouche Streets</td>
<td>Full</td>
</tr>
<tr>
<td>23</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>7th Avenue between Latouche/Medfra Streets</td>
<td>Full</td>
</tr>
<tr>
<td>24</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>8th/9th Alley between Gambell/Hyder Streets</td>
<td>Full</td>
</tr>
<tr>
<td>25</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>9th/10th Alley between Gambell/Hyder Streets</td>
<td>Full</td>
</tr>
<tr>
<td>26</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>10th Avenue and Fairbanks Street</td>
<td>Part</td>
</tr>
<tr>
<td>27</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>10th/11th Alley between Fairbanks/Gambell Streets</td>
<td>Full</td>
</tr>
<tr>
<td>28</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>10th/11th Alley between Gambell/Hyder Streets</td>
<td>Full</td>
</tr>
<tr>
<td>29</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>11th Avenue between Fairbanks/Gambell Streets</td>
<td>Full</td>
</tr>
<tr>
<td>30</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>11th/12th Alley between Fairbanks/Gambell Streets</td>
<td>Full</td>
</tr>
<tr>
<td>31</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>11th/12th Alley between Gambell/Hyder Streets</td>
<td>Full</td>
</tr>
<tr>
<td>32</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>12th Avenue between Gambell/Hyder Streets</td>
<td>Part</td>
</tr>
<tr>
<td>33</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>12th/13th Alley between Gambell/Hyder Streets</td>
<td>5 Full</td>
</tr>
<tr>
<td>No.</td>
<td>Method</td>
<td>Width</td>
<td>Location</td>
<td>Duration</td>
</tr>
<tr>
<td>-----</td>
<td>------------</td>
<td>-------</td>
<td>--------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>34</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>12th/13th Alley between Hyder/Ingra Streets</td>
<td>Full</td>
</tr>
<tr>
<td>35</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>13th Avenue between Fairbanks/Gambell Streets</td>
<td>Park</td>
</tr>
<tr>
<td>36</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Hyder/Gambell Alley between 13th/14th Avenue</td>
<td>Full</td>
</tr>
<tr>
<td>37</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Hyder/Ingra Alley between 13th/14th Avenue</td>
<td>Full</td>
</tr>
<tr>
<td>38</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Hyder/Gambell Alley between 14th/15th Avenue</td>
<td>Full</td>
</tr>
<tr>
<td>39</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>14th/15th Alley between Fairbanks/Gambell Streets</td>
<td>Full</td>
</tr>
<tr>
<td>40</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Hyder/Ingra Alley between 14th/15th Avenue</td>
<td>Full</td>
</tr>
<tr>
<td>41</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>East 15th Terrace between 15th and East 15th Terrace (north)</td>
<td>Full</td>
</tr>
<tr>
<td>42</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Gambell/Hyder Alley south of 15th</td>
<td>Full</td>
</tr>
<tr>
<td>43</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>East 15th Terrace between 15th and East 15th Terrace (south)</td>
<td>Full</td>
</tr>
<tr>
<td>44</td>
<td>Soil Vapor</td>
<td>10'</td>
<td>Unnamed Road north of Sullivan Arena</td>
<td>N/A</td>
</tr>
</tbody>
</table>
MOA RIGHT OF WAY
INSPECTION REQUEST LINE
343-8206 or MOAROWrequests@muni.org

Requests must be received 2 working days in advance of starting work and 2 working days in advance for final inspection. Permit is not valid without the call-in and the utility locate number.

Call the voice message system at 343-8206 or email to MOAROWrequests@muni.org and give the following information in the order listed below:

1. Permit Number
2. Contractor Name
3. Contact Person
4. Phone Number
5. Start Date
6. Start Time
7. Project Location
8. Utility Locate Ticket Number

Utility companies (ACS, GCI, ML&P, AWWU, ENSTAR, CEA, MEA, MTA) must notify the Right of Way office a minimum of 24 hours prior of starting work.

Municipality of Anchorage – Right of Way Section
Main Phone 343-8240  Fax 343-8250  7:30am – 4:30pm
POST IN A CONSPICUOUS PLACE
ALL WORK MUST BE INSPECTED

Field Inspection Request required 2 working days in advance of starting work and 2 working days in advance for final inspection. Call (907) 343-8206 (voice recorder) for scheduling. Permit is not valid without the call-in and also must include the one-call ticket (utility locate) number.

MUNICIPALITY OF ANCHORAGE
RIGHT OF WAY DIVISION
4700 ELMORE ROAD
TELEPHONE (907) 343-8240

POST
RIGHT OF WAY PERMIT

Type: General
Construction Start: 
Grid: SW1231
Date Issued: 2/9/2016
Last Update by: PWDEW
Last Updated: 02/09/2016

Permittee: Geotek Alaska., Inc.
Contact Person: Katherine Smith, 569-5900
Primary Inspector: F.Kelly 343-8436

Site Address: 325 BARROW ST, Anchorage - @ various locations

Legal Description: ORIGINAL BLK 116 LT 7, 8 & 9 G:1231

Original Work Description: Drilling 9 boreholes in 5 locations for soil and water sampling. Borehole depth ranging from 10 - 60 feet.

Borehole locations: Barrow Street between 3rd & 4th Avenues; Alley off Ingraham between 5th & 6th Avenues; Juneau Street between 5th & 6th Avenues; East 7th Avenue between Karluk and Latouche Streets and East 11th Avenue between Gambell and Hyder Street.

Most Recent Summary

<table>
<thead>
<tr>
<th>Work Area</th>
<th>Boring</th>
<th>Full</th>
<th>Date</th>
<th>QTY</th>
<th>AMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>11th@Gambell-Hyder</td>
<td>Boring</td>
<td>Full</td>
<td>2/22/2016</td>
<td>1.00</td>
<td>225.00</td>
</tr>
<tr>
<td>7th@Karluk-Juneau</td>
<td>Boring</td>
<td>Full</td>
<td>2/22/2016</td>
<td>1.00</td>
<td>395.00</td>
</tr>
<tr>
<td>Barrow@3rd-4th</td>
<td>Boring</td>
<td>Full</td>
<td>2/22/2016</td>
<td>1.00</td>
<td>130.00</td>
</tr>
<tr>
<td>Juneau@9th-6th</td>
<td>Boring</td>
<td>Full</td>
<td>2/22/2016</td>
<td>1.00</td>
<td>130.00</td>
</tr>
<tr>
<td>alley@5th-6th&amp;Ingraham</td>
<td>Boring</td>
<td>Full</td>
<td>2/22/2016</td>
<td>1.00</td>
<td>130.00</td>
</tr>
</tbody>
</table>

Total Fees: 750.00

See reverse for requirements/remarks.

I have read and understand both sides of this permit. I agree to the terms and conditions; and I certify that all work will comply with federal, state, and municipal codes and regulations and the provisions of this permit.

Signature: [Signature]
Date: 2-12-16
Notes:
Pedestrians shall be provided with access and safe passage through or around the work zone at all times.
Emergency vehicle access through the work zone must be maintained at all times.
All signs and devices shall conform to the standards and specifications of the Alaska Traffic Manual (ATM).
Roadway occupancy and work completion time shall be minimized to reduce exposure to potential hazards.
Work Areas shall be delineated by channelizing devices or shielded by barriers to exclude traffic and pedestrians. Fencing may be required.
Should field adjustments be necessary, additional signage and/or barricades may be required by the Municipal Traffic Engineer.
Notes:
Pedestrians shall be provided with access and safe passage through or around the work zone at all times.
Emergency vehicle access through the work zone must be maintained at all times.
All signs and devices shall conform to the standards and specifications of the Alaska Traffic Manual (ATM).
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Work Areas shall be delineated by channelizing devices or shielded by barriers to exclude traffic and pedestrians. Fencing may be required.
Should field adjustments be necessary, additional signage and/or barricades may be required by the Municipal Traffic Engineer.

The Contractor shall conduct the work in such a manner as to cause minimum inconvenience to pedestrians and vehicular traffic and to persons conducting commercial enterprises or residing along the route of Work. Without prior approval of the Engineer, entrances or driveways of all kinds shall not be blocked for more than three (3) hours.
The Contractor shall provide the property owners and/or tenants written notification no less than forty-eight (48) hours prior to any closure of access. The Contractor shall conduct his work to insure that there is no disruption of mail service, school bus service as applicable, trash collection, access by emergency vehicles, or any unnecessary disruption of general access to any business or private residence.
Notes:
Pedestrians shall be provided with access and safe passage through or around the work zone at all times.
Emergency vehicle access through the work zone must be maintained at all times.
All signs and devices shall conform to the standards and specifications of the Alaska Traffic Manual (ATM).
Roadway occupancy and work completion time shall be minimized to reduce exposure to potential hazards.
Work Areas shall be delineated by channelizing devices or shielded by barriers to exclude traffic and pedestrians. Fencing may be required.
Should field adjustments be necessary, additional signage and/or barricades may be required by the Municipal Traffic Engineer.

Approved for Municipality of Anchorage Right-Of-Way ONLY. Additional AKDOT approval may be required.
Notes:
Pedestrians shall be provided with access and safe passage through or around the work zone at all times.
Emergency vehicle access through the work zone must be maintained at all times.
All signs and devices shall conform to the standards and specifications of the Alaska Traffic Manual (ATM).
Roadway occupancy and work completion times shall be minimized to reduce exposure to potential hazards.
Work Areas shall be delineated by channelizing devices or shielded by barriers to exclude traffic and pedestrians. Fencing may be required. Should field adjustments be necessary, additional signage and/or barricades may be required by the Municipal Traffic Engineer.

Approved for Municipality of Anchorage Right-Of-Way ONLY. Additional AKDOT approval may be required.

[Map with street names and landmarks]
**PURGE VOLUME**

**Inner Well Annulus**

\[
\text{Well Radius (in)} \times \text{Well Radius (in)} = 0.5 \\
\times \text{Well Depth (ft)} = 10 \\
\times 0.62 = 1.55 \\
\text{liters (1)}
\]

**Outer Well Annulus**

\[
\text{Boring Radius (in)} \times \text{Boring Radius (in)} = 2.25 \\
\times \text{Sand Pack Height (ft)} = 1.125 \\
\times 0.186 = 0.417 \\
\text{liters (2)}
\]

\[
\text{Well Radius (in)} \times \text{Well Radius (in)} = 0.5 \\
\times \text{Sand Pack Height (ft)} = 2 \\
\times 0.62 = 0.31 \\
\text{liters (3)}
\]

\[
\text{Total Purge Volume} = 1.55 + 0.417 + 0.31 = 2.28 \\
\text{liters (4)}
\]

**PURGING**

Start Time: 1510

Flow Rate: 2 liters/min

Purging Notes and Observations:

**SAMPLING**

Sample No: 15-FVOC-5V01

Sampler Serial No: 1513-AN-LU-028

Sample Start Date: 11/16/15

Start Time: 1522

Sample Start Date: 11/19

End Time: 1647

Sampling Notes and Observations:

Duplicate Sample: No

If yes:

Sample No: 

Sampler Serial No: 

### SOIL GAS WELL CONSTRUCTION and PASSIVE SOIL GAS SAMPLING LOG

#### PURGE VOLUME

<table>
<thead>
<tr>
<th>Inner Well Annulus</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outer Well Annulus</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Boreg Radius (in)</td>
<td>1.125</td>
</tr>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
</tr>
</tbody>
</table>

**Total Purge Volume**

(3) - Total Well Annulus Volume

| 1.71 liters | X | Required # of Purge Volumes | 10 | = 17.1 liters |

#### PURGING

**Start Time:** 1620  
**Flow Rate:** 2 liters/min  
**End Time:** 1650

Purging Notes and Observations:

#### SAMPLING

<table>
<thead>
<tr>
<th>Sample No.:</th>
<th>15-FX2-5V05</th>
<th>Sampler Serial No.:</th>
<th>1513-AN-0U-013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Start Date:</td>
<td>11/14/15</td>
<td>Start Time:</td>
<td>1633</td>
</tr>
<tr>
<td>Sample End Date:</td>
<td>11/20/15</td>
<td>End Time:</td>
<td>1149</td>
</tr>
</tbody>
</table>

Sampling Notes and Observations:

**Duplicate Sample:** Yes **No**

If yes:

<table>
<thead>
<tr>
<th>Sample No.:</th>
<th>Sampler Serial No.:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Purge Volume

<table>
<thead>
<tr>
<th>Inner Well Annulus</th>
<th>Outer Well Annulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
</tr>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
</tr>
<tr>
<td>Well Depth (ft)</td>
<td>10</td>
</tr>
<tr>
<td>x</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>1.55 liters</td>
</tr>
</tbody>
</table>

### Total Purge Volume

\[(1) \quad 0.47 \text{ liters} - (2) \quad 0.31 \text{ liters} = 0.16 \text{ liters} \]

\[\text{Total Well Annulus Volume: } 1.71 \text{ liters} \times \text{Required No. of Purge Volumes: } 10 = 17.1 \text{ liters} \]

## Purging

- Start Time: 09:05
- End Time: 09:15
- Flow Rate: 2 liters/min

Purging Notes and Observations:

## Sampling

- Sample No: A10-0915
- Sampler Serial No: 1513-AN-LV-061

### Sample Start Date
- Start Time: 09:21
- End Time: 11:55

Sampling Notes and Observations:

- Duplicate Sample: No
# SOIL GAS WELL CONSTRUCTION and PASSIVE SOIL GAS SAMPLING LOG

## PURGE VOLUME

### Inner Well Annulus

- Well Radius (in): 0.5
- Well Depth (ft): 10
- Sand Pack Height (ft): 2

\[
0.5 \times 10 \times 0.62 = 3.1 \text{ liters (1)}
\]

### Outer Well Annulus

- Boring Radius (in): 1.125
- Well Radius (in): 0.5
- Sand Pack Height (ft): 2

\[
1.125 \times 0.5 \times 2 \times 0.185 = 0.47 \text{ liters (2)}
\]

\[
0.5 \times 0.5 \times 2 \times 0.62 = 0.31 \text{ liters (3)}
\]

\[
0.47 - 0.31 = 0.16 \text{ liters (4)}
\]

### Total Purge Volume

\[
1.71 \text{ liters (1)} + 0.16 \text{ liters (4)} = 1.87 \text{ liters}
\]

## PURGING

- Start Time: 1045
- Flow Rate: 2 liters/min

## SAMPLING

- Sample No: 15 - PVOC-5409
- Sample Start Date: 11/16/15
- Start Time: 1052
- Sample Start Date: 11/16
- End Time: 1607

## Sampling Notes and Observations:

### Duplicate Sample:
- Yes

## If yes:

- Sample No:
- Sampler Serial No: AN-LU-060
## PURGE VOLUME

**Inner Well Annulus**

| Well Radius (in) | 0.5 | Wall Radius (in) | 0.5 | Wall Depth (ft) | 10 | X | 0.62 | = 1.55 liters (1) |

**Outer Well Annulus**

| Boring Radius (in) | 1.125 | Boring Radius (in) | 1.125 | End Pack Height (ft) | 2 | X | 0.186 | = 0.47 liters (2) |
| Well Radius (in) | 0.5 | Well Radius (in) | 0.5 | Sand Pack Height (ft) | 2 | X | 0.62 | = 0.31 liters (3) |

(2) 0.47 liters - (1) 0.31 liters = 0.16 liters (4)

**Total Purge Volume**

(1) Inner Well Annulus 1.71 liters + (4) Outer Well Annulus 0.16 liters = 17.1 liters

## PURGING

- **Start Time:** 1150
- **Flow Rate:** 2 liters/min
- **Start Time:**

**Purging Notes and Observations:**

## SAMPLING

- **Sample No:** 15-EVOC 5V10
- **Sampler Serial No:** 1513 - AV-LV - 056
- **Sample Start Date:** 11/16
- **Start Time:** 1206
- **Sample Start Date:** 11/19
- **End Time:** 1633

**Sampling Notes and Observations:**

- **Duplicate Sample:** No
- **If yes:**

**Sample No:**

**Sampler Serial No:**

<table>
<thead>
<tr>
<th>Inner Well Annulus</th>
<th>Outer Well Annulus</th>
<th>Total Purge Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
<td>1.125</td>
</tr>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Well Depth (ft)</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.55</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.31</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>171</td>
</tr>
</tbody>
</table>

**Purging**

- Start Time: 1925
- Flow Rate: 2 Bar/min
- Start Time: __________

**Sampling**

- Sample No: 15-EVOC-SV12
- Sample Start Date: 11/16/15
- Start Time: 1341
- Sample Start Date: 11/20
- End Time: 1115

**Duplicate Sample:** No

**Sampling Notes and Observations:**

**Sampler Serial No:** 1513-AN-LU-055
### PURGE VOLUME

**Inner Well Annulus**
- Well Radius (in): 0.5
- Well Radius (in): 0.5
- Well Depth (in): 10
- \( \times 0.62 = 1.55 \) liters [1]

**Outer Well Annulus**
- Bore Radius (in): 1.125
- Bore Radius (in): 1.125
- Sand Pack Height (in): 2
- \( \times 0.186 = 0.47 \) liters [2]

\[ \frac{2}{2} \times \frac{2}{2} \times 0.5 \times 0.5 = 0.16 \] liters [4]

**Total Purge Volume**
- Inner Well Annulus: \( 1.71 \) liters + Outer Well Annulus: \( 10 \) liters \( \times 10 = 17.1 \) liters

### PURGING

- Start Time: 1957
- Flow Rate: 2 liters/min
- Start Time: 

*Purging Notes and Observations:*

### SAMPLING

- Sample No: 15-8940C-SV13  
  Sampler Serial No: 1513-AN-LU-058

- Sample Start Date: 11/16/15  
  Start Time: 4940q 1400

- Sample Start Date: 11/20/15  
  End Time: 1104

*Sampling Notes and Observations:*

*Duplicate Sample:* Yes [No]

*If Yes:*
- Sample No: 
- Sampler Serial No:
**PURGE VOLUME**

**Inner Well Annulus**

\[
\text{Well Radius (in)} 	imes 0.5 \times \text{Well Radius (in)} = 0.5 \times \text{Well Depth (ft)} = 10 \times 0.62 = 1.55 \text{ liters (1)}
\]

**Outer Well Annulus**

\[
\text{Boring Radius (in)} = 1.125 \times \text{Boring Radius (in)} = 1.125 \times \text{Sand Pack Height (ft)} = 2 \times 0.62 = 0.47 \text{ liters (1)}
\]

\[
\text{Well Radius (in)} = 0.5 \times \text{Well Radius (in)} = 0.5 \times \text{Sand Pack Height (ft)} = 2 \times 0.62 = 0.31 \text{ liters (1)}
\]

\[
\text{(1) - Total Well Annulus Volume} = 0.47 \text{ liters} + 0.31 \text{ liters} = 0.16 \text{ liters (2)}
\]

\[
\text{Total Purge Volume} = \frac{1.71 \text{ liters}}{\text{Required # of Purge Volumes}} = \frac{1.71 \text{ liters}}{10} = 0.171 \text{ liters (3)}
\]

**PURGING**

- **Start Time:** 1015
- **End Time:** 1025
- **Flow Rate:** 2 liters/min
- **Purging Notes and Observations:**

**SAMPLING**

- **Sample No:** 15-FVOC-SV05
- **Sample Start Date:** 11/17/15
- **Sample End Date:** 11/20
- **Sample Start Time:** 1025
- **Sample End Time:** 1201
- **Sampling Notes and Observations:**
- **Duplicate Sample:** Yes
- **Sample No:** 15-FVOC-SV50
- **Sampler Serial No:** 1513-AN-LU-051
- **Time:** 1026
PURGE VOLUME

Inner Well Annulus

\[
0.5 \times 0.5 \times 10 \times 0.62 = 1.55 \text{ liters}
\]

Outer Well Annulus

\[
1.125 \times 0.5 \times 2 \times 0.86 = 0.47 \text{ liters (1)}
\]

\[
0.5 \times 0.5 \times 2 \times 0.62 = 0.31 \text{ liters (2)}
\]

\[
0.47 - 0.31 = 0.16 \text{ liters (3)}
\]

Total Purge Volume

\[
1.71 \times 10 = 17.1 \text{ liters (4)}
\]

PURGING

Start Time: 1110
Flow Rate: 2 liters/min
End Time: 1120

Purging Notes and Observations:

SAMPLING

Sample No: 15 - FUC - 5016
Sampler Serial No: 1513 - AN - LU - 062

Sample Start Date: 11/17/15
Start Time: 1123

Sample End Date: 11/20
End Time: 12:11

Sampling Notes and Observations:

Duplicate Sample: Yes

If yes:
Sample No: 
Sampler Serial No: 


### Purge Volume

**Inner Well Annulus**

| Well Radius (in) x | 0.5 x Wall Radius (in) x Wall Depth (ft) x 10 x 0.62 |  = 1.55 liters |

**Outer Well Annulus**

| Borehole Radius (in) | 1.125 x Wall Radius (in) x Sand Pack Height (ft) x 2 x 0.86 | = 0.47 liters |
| Wall Radius (in) x 0.5 x Wall Radius (in) x Wall Height (ft) | 2 x 0.82 | = 0.31 liters |

(1) 0.47 liters - (2) 0.31 liters = 0.16 liters (3)

**Total Purge Volume**

(4) Total Well Annulus Volume 1.71 liters x Required # of Purge Volumes 10 = 17.1 liters

---

### Purging

- **Start Time:** 1213
- **End Time:** 1223
- **Flow Rate:** 2 liters/min

Purging Notes and Observations:

---

### Sampling

- **Sample No:** 15 - EVOC - SU17
- **Sampler Serial No:** 1513 - AN - LU - 063
- **Sample Start Date:** 11/17
- **Sample End Date:** 11/20
- **Start Time:** 1225
- **End Time:** 1715

Sampling Notes and Observations:

**Duplicate Sample:** Yes **No**
PURGE VOLUME

Inner Well Annulus

Well Radius (in) \( \times \) 0.5 x Well Radius (in) 0.5 x Well Depth (ft) 10 x 0.62 = 1.55 liters

Outer Well Annulus

Boring Radius (in) 1.125 x Boring Radius (in) 1.125 x Sand Pack Height (ft) 2 x 0.356 = 0.47 liters (1)

Well Radius (in) \( \times \) Well Radius (in) 0.5 x Sand Pack Height (ft) 2 x 0.62 = 0.31 liters (1)

\( \frac{0.47}{(1)} \) liters \(-\) \( \frac{0.31}{(2)} \) liters = \( \frac{0.16}{(3)} \) liters

Total Purge Volume

\( \frac{1.71}{(3)} \) liters \( \times \) Required # of Purge Volumes 10 = \( \frac{17.1}{(4)} \) AB liters

PURGING

Start Time: 1500 Flow Rate: 2 liters/min
End Time: 1510

Purging Notes and Observations:

SAMPLING

Sample No: 15-FV0C-5V18 Sampler Serial No: 1513-AN- RV.054

Sample Start Date: 11/17/15 Start Time: 1515
Sample End Date: 11/20
End Time: 13:00

Sampling Notes and Observations:

Duplicate Sample: Yes No

If yes:

Sample No: Sampler Serial No:
**SOIL GAS WELL CONSTRUCTION and PASSIVE SOIL GAS SAMPLING LOG**

### PURGE VOLUME

<table>
<thead>
<tr>
<th>Inner Well Annulus</th>
<th>Outer Well Annulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
</tr>
<tr>
<td>x</td>
<td>Well Radius (in)</td>
</tr>
<tr>
<td>0.5</td>
<td>x</td>
</tr>
<tr>
<td>Well Depth (ft)</td>
<td>10</td>
</tr>
<tr>
<td>x</td>
<td>0.42</td>
</tr>
<tr>
<td>=</td>
<td>1.55</td>
</tr>
<tr>
<td>liters</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Boring Radius (in)</th>
<th>1.125</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>Boring Radius (in)</td>
</tr>
<tr>
<td>1.125</td>
<td>x</td>
</tr>
<tr>
<td>Sand Pack Height (ft)</td>
<td>2</td>
</tr>
<tr>
<td>x</td>
<td>0.086</td>
</tr>
<tr>
<td>=</td>
<td>0.47</td>
</tr>
<tr>
<td>liters (1)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Well Radius (in)</th>
<th>0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>Well Radius (in)</td>
</tr>
<tr>
<td>0.5</td>
<td>x</td>
</tr>
<tr>
<td>Sand Pack Height (ft)</td>
<td>2</td>
</tr>
<tr>
<td>x</td>
<td>0.63</td>
</tr>
<tr>
<td>=</td>
<td>0.31</td>
</tr>
<tr>
<td>liters (2)</td>
<td></td>
</tr>
</tbody>
</table>

(1) \(0.47\) liters - (2) \(0.31\) liters = \(0.16\) liters (I)

**Total Purge Volume**

\(1.71\) liters \(\times\) Required # of Purge Volumes 2 = \(3.42\) liters

### PURGING

- **Start Time:** 1555
- **Flow Rate:** 2 liters/min
- **End Time:** 1605

Purging Notes and Observations:

### SAMPLING

- **Sample No.:** 15 - FvOC - SV19
- **Sampler Serial No.:** 1513 - AN - LU - 057

- **Sample Start Date:** 11/17/15
- **Start Time:** 16:08

- **Sample End Date:** 11/20
- **End Time:** 24:11

Sampling Notes and Observations:

- **Duplicate Sample:** Yes **No**

If yes:

- **Sample No.:** 
- **Sampler Serial No.:**

---

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<table>
<thead>
<tr>
<th></th>
<th>Inner Well Annulus</th>
<th>Outer Well Annulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>0.5 x</td>
<td>1.125 x</td>
</tr>
<tr>
<td>Boring Radius (in)</td>
<td>0.5 x</td>
<td>1.125 x</td>
</tr>
<tr>
<td>Well Depth (ft)</td>
<td>10 x</td>
<td>2 x</td>
</tr>
<tr>
<td>Sand Pack Height (ft)</td>
<td>0.5 x</td>
<td>0.5 x</td>
</tr>
<tr>
<td></td>
<td>0.62 = 1.55 liters</td>
<td>0.388 = 0.47 liters</td>
</tr>
</tbody>
</table>

\[(1) \text{ Total Purge Volume} = 1.71 \text{ liters} \]

**PURGING**

- Start Time: 0930
- Flow Rate: 2 liters/min
- End Time: 0940

**SAMPLING**

- Sample No: 15-FVOC-SV20
- Sampler Serial No: 1513-AN-2U-027
- Sample Start Date: 11/16/15
- Start Time: 0941
- Sample End Date: 11/21/15
- End Time: 1517

**Duplicate Sample:** No
SOIL GAS WELL CONSTRUCTION and PASSIVE SOIL GAS SAMPLING LOG

PURGE VOLUME

Inner Well Annulus

Well Radius (in) \( \times \) Well Radius (in) \( \times \) Well Depth (ft) \( \times \) 0.62 = liters

Outer Well Annulus

Boring Radius (in) \( \times \) Boring Radius (in) \( \times \) Sand Pack Height (ft) \( \times \) 0.62 = liters (1)

Well Radius (in) \( \times \) Well Radius (in) \( \times \) Sand Pack Height (ft) \( \times \) 0.62 = liters (2)

\( (1) - 0.47 \) liters - \( (2) - 0.31 \) liters = \( 0.16 \) liters (3)

Total Purge Volume

1.71 liters \( \times \) Required F of Purge Volumes \( \times \) 10 = \( 17.1 \) liters

PURGING

Start Time: \( 16:42 \)

Flow Rate: 2 liters/min

End Time: \( 16:52 \)

Purging Notes and Observations:

SAMPLING

Sample No: 15-FVOC-SV21

Sample Serial No: 1513-AN-LU-052

Sample Start Date: 11/17/15

Start Time: 17:00

Sample End Date: 11/21

End Time: 14:50

Sampling Notes and Observations:

Duplicate Sample: Yes

If yes:

Sample No: 15-FVOC-SV51

Sample Serial No: 1513-AN-LU-059

Start Time = 17:01
## Purge Volume

### Inner Well Annulus

\[
\text{Well Radius (m)} \times \text{Well Radius (m)} \times \text{Well Depth (m)} \times 0.62 = 1.55 \text{ liters}
\]

### Outer Well Annulus

\[
\text{Boring Radius (m)} \times \text{Boring Radius (m)} \times \text{Sand Pack Height (m)} \times 0.586 = 0.47 \text{ liters (1)}
\]

\[
\text{Well Radius (m)} \times \text{Well Radius (m)} \times \text{Sand Pack Height (m)} \times 0.62 = 0.31 \text{ liters (2)}
\]

\[
\text{(1) - (2)} = \text{Total Purge Volume} = 0.16 \text{ liters (3)}
\]

### Total Purge Volume

\[
\text{Total Purge Volume} = 0.16 \text{ liters (3)}
\]

\[
\text{Total Purge Volume} = 17.1 \text{ liters}
\]

### Purging

- Start Time: 10:20
- Flow Rate: 2 liters/min
- End Time: 10:40

Purging Notes and Observations:

### Sampling

- Sample No: 15-EVC-5V22
- Sampler Serial No: 1513-AN-LU-030
- Sample Start Date: 11/16/15
- Start Time: 10:32
- Sample End Date: 11/17/15
- End Time: 14:35

Sampling Notes and Observations:

- Duplicate Sample: No

If yes:
- Sample No:
- Sampler Serial No:
## Purge Volume

### Inner Well Annulus

Well Radius (in) \( \times \) Well Radius (in) \( \times \) Well Depth (ft) \( \times \) 0.02 = 1.55 liters

### Outer Well Annulus

Boring Radius (in) \( \times \) Boring Radius (in) \( \times \) Sand Pack Height (ft) \( \times \) 0.0266 = 0.47 liters

Well Radius (in) \( \times \) Well Radius (in) \( \times \) Sand Pack Height (ft) \( \times \) 0.0266 = 0.31 liters

\( \frac{0.47}{(2)} - \frac{0.31}{(2)} = \frac{0.16}{(3)} \)

Total Purge Volume

\( \frac{1.71}{(3)} \times \) Required # of Purge Volumes \( \times \) 10 = 17.1 liters

## Purging

Start Time: 1055

Flow Rate: 2 liters/min

End Time: 1105

Purging Notes and Observations:

## Sampling

Sample No: 15-FV0C-SU27

Sample Serial No: 1513-AN-LU-020

Sample Start Date: 11/18/15

Start Time: 1115

Sample End Date: 11/21/15

End Time: 1440

Sampling Notes and Observations:

Duplicate Sample: **No**

If yes:

Sample No: 

Sampler Serial No:
### PURGE VOLUME

<table>
<thead>
<tr>
<th>Inner Well Annulus</th>
<th>Outer Well Annulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
</tr>
<tr>
<td>x</td>
<td>0.5</td>
</tr>
<tr>
<td>Well Radius (in)</td>
<td>x</td>
</tr>
<tr>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Well Depth (ft)</td>
<td>10</td>
</tr>
<tr>
<td>x</td>
<td></td>
</tr>
<tr>
<td>0.61</td>
<td>= 1.55 liters</td>
</tr>
<tr>
<td>(3) 0.31 liters</td>
<td>0.16 liters</td>
</tr>
<tr>
<td>(4) Total Well Annulus Volume</td>
<td>1.71 liters x Required # of Purge Volumes</td>
</tr>
</tbody>
</table>

### PURGING

- **Start Time:** 12:15
- **End Time:** 12:25
- **Flow Rate:** 2 liters/min

**Purging Notes and Observations:**

### SAMPLING

- **Sample No.:** 15-FX-5V 21
- **Sampler Serial No.:** 1513-AN-LU-026
- **Sample Start Date:** 11/18/15
- **Start Time:** 12:31
- **Sample End Date:** 11/21/15
- **End Time:** 15:26

**Sampling Notes and Observations:**

**Duplicate Sample:** Yes

If yes:

- **Sample No.:**
- **Sampler Serial No.:**
## Purge Volume

### Inner Well Annulus
- Well Radius (in): 0.5
- Well Depth (ft): 10
- Sand Pack Height (ft): 2

\[
\text{V} = \frac{0.5 \times 10 \times 2 \times 0.62}{52.8} = 1.55 \text{ liters}
\]

### Outer Well Annulus
- Boring Radius (in): 1.125
- Well Radius (in): 0.5
- Sand Pack Height (ft): 2

\[
(1) \quad \frac{0.47 \text{ liters}}{(2) \quad 0.31 \text{ liters}} = 0.16 \text{ liters}
\]

### Total Purge Volume
- Total Well Annulus Volume

\[
1.71 \text{ liters} \times \text{Required # of Purge Volumes} = 1.71 \text{ liters}
\]

## Purging
- Start Time: 1358
- Flow Rate: 2 liters/min
- End Time: 1404

Purging Notes and Observations:

## Sampling
- Sample No: 15-EVOC-SV26
- Sampler Serial No: 1513-AN-LU-031
- Sample Start Date: 11/15/15
- Start Time: 1410
- Sample End Date: 11/15/15
- End Time: 1240

Sampling Notes and Observations:

Duplicate Sample: Yes

Separate Sample:
- Sample No: 15-EVOC-SV52
- Sampler Serial No: 1513-AN-LU-021
- Start Time: 1411
### PURGE VOLUME

**Inner Well Annulus**

\[
\text{Well Radius (m) \times \text{Wall Radius (m)} \times \text{Well Depth (m)} \times \text{0.12}} = 1.55 \text{ liters}
\]

**Outer Well Annulus**

\[
\text{Borehole Radius (m) \times \text{Wall Radius (m)} \times \text{Sand Pack Height (m)} \times \text{0.186}} = 0.47 \text{ liters (1)}
\]

\[
\text{Well Radius (m) \times \text{Wall Radius (m)} \times \text{Sand Pack Height (m)} \times \text{0.62}} = 0.31 \text{ liters (2)}
\]

\[
\text{Total Purge Volume} = 0.47 \text{ liters} - 0.31 \text{ liters} = 0.16 \text{ liters (3)}
\]

**Total Well Annulus Volume**

\[
1.71 \text{ liters} \times \text{Required # of Purge Volumes} \times 10 = 1.71 \text{ liters}
\]

### PURGING

- **Start Time:** 1555
- **End Time:** 1605
- **Flow Rate:** 2 liters/min

Purging Notes and Observations:

### SAMPLING

- **Sample No.:** 15-FVOC-SV30
- **Sample Start Date:** 11/16/15
- **Sample End Date:** 11/21/15
- **Start Time:** 1605
- **End Time:** 1615

Sampling Notes and Observations:

**Duplicate Sample:** No
## Purge Volume

**Inner Well Annulus**

\[
\text{Well Radius (in) \times \text{Well Radius (in) \times \text{Well Depth (ft) \times 0.42 = 1.55 liters}}} \\
0.5 \times 0.5 \times 10 \times 0.42 = 1.55 \text{ liters}
\]

**Outer Well Annulus**

\[
\text{Haurig Radius (in) \times \text{Haurig Radius (in) \times \text{Sand Pack Height (ft) \times 0.56 = 0.47 liters}}} \\
1.125 \times 1.125 \times 2 \times 0.56 = 0.47 \text{ liters (I)}
\]

\[
\text{Well Radius (in) \times \text{Well Radius (in) \times \text{Sand Pack Height (ft) \times 0.52 = 0.31 liters}}} \\
0.5 \times 0.5 \times 2 \times 0.52 = 0.31 \text{ liters (II)}
\]

\[
\text{Total Purge Volume = (I) - (II) \times \text{Required # of Purge Volumes \times 10 = 1.71 liters}} \\
0.47 \text{ liters} - 0.31 \text{ liters} = 0.16 \text{ liters (III)}
\]

\[
1.71 \text{ liters} \times \text{Required # of Purge Volumes \times 10 = 1.71 liters}
\]

## Purging

- **Start Time:** 15:10
- **Flow Rate:** 2 liters/min
- **End Time:** 15:20

Purging Notes and Observations:

## Sampling

- **Sample No.:** 15 - EVOC - SU31
- **Sample Serial No.:** 1513 - AN - LU - 034
- **Sample Start Date:** 11/16/16
- **Sample End Date:** 11/21/16
- **Start Time:** 15:23
- **End Time:** 16:27

Sampling Notes and Observations:

- **Duplicate Sample:** Yes

If yes:

- **Sample No.:**
- **Sample Serial No.:**
### PURGE VOLUME

**Inner Well Annulus**

- Well Radius (in) \( \times \) 0.5
- Well Radius (in)
- Well Depth (ft)
- 10
- \( \times \) 0.52
- = 1.55 liters

**Outer Well Annulus**

- Borehole Radius (in)
- 1.125
- Borehole Radius (in)
- 1.125 \( \times \) Sand Pack Height (ft)
- 2
- \( \times \) 0.526
- = 0.47 liters (1)

- Well Radius (in)
- 0.5
- Well Radius (in)
- 0.5 \( \times \) Sand Pack Height (ft)
- 2
- \( \times \) 0.52
- = 0.31 liters (2)

\( \frac{0.47 \text{ liters}}{1} - \frac{0.31 \text{ liters}}{2} = 0.16 \text{ liters} \) \( \text{(3)} \)

**Total Purge Volume**

\( \frac{1.71 \text{ liters}}{1} \times \text{Required # of Purge Volumes} \times 10 = 17.1 \text{ liters} \)

---

### PURGING

- Start Time: 1000
- Flow Rate: 2 liters/minute
- End Time: 1010

Purging Notes and Observations:

---

### SAMPLING

- Sample No: 15-EVC - SU32
- Sample Serial No: 1513-AN-LU-025
- Sample Start Date: 11/14/15
- Start Time: 1012
- Sample End Date: 11/29/15
- End Time: 04/16

Sampling Notes and Observations:

- also put temperature datalogger in this

Duplicate Sample: Yes \( \times \) No

If yes:

- Sample No: 
- Sampler Serial No: 

## SOIL GAS WELL CONSTRUCTION and PASSIVE SOIL GAS SAMPLING LOG

### PURGE VOLUME

**Inner Well Annulus**

<table>
<thead>
<tr>
<th>Well Radius (in)</th>
<th>0.5</th>
<th>x</th>
<th>Well Radius (in)</th>
<th>0.5</th>
<th>x</th>
<th>Wall Depth (ft)</th>
<th>10</th>
<th>x</th>
<th>0.62</th>
<th>= 1.55 liters</th>
</tr>
</thead>
</table>

**Outer Well Annulus**

<table>
<thead>
<tr>
<th>Drilling Radius (in)</th>
<th>1.125</th>
<th>Drilling Radius (in)</th>
<th>1.125</th>
<th>x</th>
<th>Sand Pack Height (ft)</th>
<th>2</th>
<th>x</th>
<th>0.366</th>
<th>= 0.47 liters (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
<td>x</td>
<td>Well Radius (in)</td>
<td>0.5</td>
<td>x</td>
<td>Sand Pack Height (ft)</td>
<td>2</td>
<td>x</td>
<td>0.62</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------</td>
<td>---</td>
<td>---------------------</td>
<td>-------</td>
<td>---</td>
<td>---------------------</td>
<td>-----</td>
<td>---</td>
<td>-------</td>
</tr>
</tbody>
</table>

(1) 0.47 liters  •  (2) 0.31 liters = 0.16 liters (3)

Total Purge Volume

<table>
<thead>
<tr>
<th>1.71 liters x Required # of Purge Volumes</th>
<th>10</th>
<th>= 17.1 liters</th>
</tr>
</thead>
</table>

### PURGING

Start Time: 0656  •  Flow Rate: 2 liters/minutes

End Time: 0900

Purging Notes and Observations:

### SAMPLING

<table>
<thead>
<tr>
<th>Sample No: 15-FVOC-SV33</th>
<th>Sampler Serial No: 1513-AN-LV-045</th>
</tr>
</thead>
</table>

Sample Start Date: 11/19/15  •  Start Time: 0900

Sample End Date: 11/22/15  •  End Time: 1458

Sampling Notes and Observations:

Duplicate Sample: Yes  •  No

If Yes:

Sample No:  
Sample Serial No:  

...
### Purge Volume

**Inner Well Annulus**
- Well Radius (in) \(0.5\) x 2 = 1 liter
- Well Radius (in) \(0.5\) x Well Depth (ft) 10 x 0.02 = 1.55 liters

**Outer Well Annulus**
- Inner Radius (in) \(1.125\) x Inner Radius (in) \(1.125\) x Sand Pack Height (ft) 2 x 0.366 = 0.47 liters (1)
- Well Radius (in) \(5\) x Well Radius (in) \(0.5\) x Sand Pack Height (ft) 2 x 0.44 = 0.31 liters (2)

\[\frac{1}{2} - \frac{1}{2} = \frac{1}{2} \text{ liters (3)}\]

**Total Purge Volume**
- 1.71 liters x Required # of Purge Volumes 10 = 17.1 liters

### Purging

- Start Time: 1010
- Flow Rate: 2 liters/min
- End Time: 1020

Purging Notes and Observations:

### Sampling

- Sample No: 15-FVDC-5V36
- Sampler Serial No: 1513-AN-LV-035
- Sample Start Date: 4/20/15
- Start Time: 1024
- Sample End Date: 4/23/15
- End Time: 1033

Sampling Notes and Observations:

**Duplicate Sample:**
- Yes **No**

If yes:
- Sample No:
- Sampler Serial No:
**PURGE VOLUME**

**Inner Well Annulus**
- Well Radius (in) \( \times \) 0.5 \( \times \) Well Radius (in) \( \times \) 0.5 \( \times \) Well Depth (ft) \( \times \) 10 \( \times \) 0.82 = 1.55 liters

**Outer Well Annulus**
- Boring Radius (in) \( \times \) 1.125 \( \times \) Boring Radius (in) \( \times \) Sand Pack Height (ft) \( \times \) 2 \( \times \) 0.86 = 0.47 liters (1)
- Well Radius (in) \( \times \) 0.5 \( \times \) Well Radius (in) \( \times \) Sand Pack Height (ft) \( \times \) 2 \( \times \) 0.82 = 0.31 liters (1)

Total Purge Volume:
- \((1) - \text{Total Well Annulus Volume} = 1.71\) liters \( \times \) Required # of Purge Volumes \( \times \) 10 = 17.1 liters

**PURGING**
- Start Time: 0920
- Flow Rate: 2 liters/min
- End Time: 0930

Purging Notes and Observations:

**SAMPLING**
- Sample No: 15-FV0C-5V37
- Sampler Serial No: 1513-AN-LV-052

Sample Start Date: 11/20/15
- Start Time: 0934

Sample End Date: 11/23/15
- End Time: 1027

Sampling Notes and Observations:

Duplicate Sample: Yes

Yes

If yes:
- Sample No: 
- Sampler Serial No: 

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SOIL GAS WELL CONSTRUCTION and
PASSIVE SOIL GAS SAMPLING LOG

WELL NUMBER: 37

PAGE NO: 1 OF 1
## SOIL GAS WELL CONSTRUCTION and PASSIVE SOIL GAS SAMPLING LOG

### PURGE VOLUME

**Inner Well Annulus**
- Well Radius (in) × 0.5 × Well Radius (in) × 0.5 × Well Depth (ft) × 10 × 0.02 = 1.55 liters

**Outer Well Annulus**
- Soring Radius (in) × 1.125 × Soring Radius (in) × 1.125 × Sand Pack Height (ft) × 2 × 0.086 = 0.47 liters (1)
- Well Radius (in) × 0.5 × Well Radius (in) × 0.5 × Sand Pack Height (ft) × 2 × 0.63 = 0.31 liters (1)

\[(1) \quad 0.47 \text{ liters} \quad - \quad (2) \quad 0.31 \text{ liters} = 0.16 \text{ liters} \quad (3)\]

**Total Purge Volume**
- \(1.71 \text{ liters} \times \text{Required # of Purge Volumes} \times 10 \quad = \quad 1.71 \text{ liters}\)

### PURGING

- **Start Time:** 10:20
- **Flow Rate:** 2 liters/min
- **End Time:** 10:30
- Purging Notes and Observations:

### SAMPLING

- **Sample No:** 15-EVOC-9V38
- **Sample Serial No:** 1513-AN-6V-042
- **Sample Start Date:** 11/14/15
- **Start Time:** 11:33
- **Sample End Date:** 11/22/15
- **End Time:** 14:05
- **Sampling Notes and Observations:**

**Duplicate Sample:**
- Yes [No]

If yes:
- **Sample No:**
- **Sample Serial No:**
### Purge Volume

**Inner Well Annulus**

<table>
<thead>
<tr>
<th>Well Radius (in)</th>
<th>0.5</th>
<th>x</th>
<th>Well Radius (in)</th>
<th>0.5</th>
<th>x</th>
<th>Well Depth (ft)</th>
<th>10</th>
<th>x</th>
<th>0.61</th>
<th>=</th>
<th>1.55 liters</th>
</tr>
</thead>
</table>

**Outer Well Annulus**

<table>
<thead>
<tr>
<th>Boiling Radius (in)</th>
<th>1.125</th>
<th>x</th>
<th>Boiling Radius (in)</th>
<th>1.125</th>
<th>x</th>
<th>Sand Pack Height (ft)</th>
<th>2</th>
<th>x</th>
<th>0.56</th>
<th>=</th>
<th>0.47 liters (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>0.5</td>
<td>x</td>
<td>Well Radius (in)</td>
<td>0.5</td>
<td>x</td>
<td>Sand Pack Height (ft)</td>
<td>2</td>
<td>x</td>
<td>0.62</td>
<td>=</td>
<td>0.31 liters (2)</td>
</tr>
<tr>
<td>(1)</td>
<td>0.47 liters -</td>
<td>(2)</td>
<td>0.31 liters =</td>
<td>0.16 liters (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Purge Volume**

(3) - Total Well Annulus Volume

\[
\text{Total Purge Volume} = 1.71 \text{ liters} \times \text{Required # of Purge Volumes} = 10 = 1.71 \text{ liters}
\]

### Purging

- **Start Time:** 12:10
- **Flow Rate:** 2 l/min
- **End Time:** 12:20

Purging Notes and Observations:

### Sampling

- **Sample No:** 15-FVOC-5V41
- **Sampler Serial No:** 1513-AN-LU-023
- **Sample Start Date:** 11/19/15
- **Start Time:** 12:22
- **Sample End Date:** 11/22/15
- **End Time:** 14:20

Sampling Notes and Observations:

- **Duplicate Sample:** Yes
- **Sample No:** 15-FVOC-5V53
- **Sampler Serial No:** 1513-AN-LU-037
- **Time start = 12:23**
### PURGE VOLUME

<table>
<thead>
<tr>
<th>Inner Well Annulus</th>
<th>Outer Well Annulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>Boring Radius (in)</td>
</tr>
<tr>
<td>0.5</td>
<td>1.125</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Well Radius (in)</td>
<td>Well Radius (in)</td>
</tr>
<tr>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Well Depth (ft)</td>
<td>Sand Pack Height (ft)</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>0.62</td>
<td>0.156</td>
</tr>
<tr>
<td>= 1.55 liters</td>
<td>= 0.47 liters</td>
</tr>
</tbody>
</table>

- **(1)**: 0.47 liters
- **(2)**: 0.31 liters
- **(3)**: 0.16 liters

**Total Purge Volume**

- **(1)** - Total Well Annulus Volume: 1.71 liters
- **(2)** - Required # of Purge Volumes: 10
- **(3)** = 17.1 liters

### PURGING

- **Start Time:** 1450
- **Flow Rate:** 2 liters/min
- **End Time:** 1500

**Purging Notes and Observations:**

### SAMPLING

- **Sample No.:** 15-FVOC-5V42
- **Sampler Serial No.:** 1513-AW-2U-022
- **Sample Start Date:** 11/9/15
- **Start Time:** 1503
- **Sample End Date:** 11/22/15
- **End Time:** 1515

**Sampling Notes and Observations:**

**Duplicate Sample:** Yes

**If yes:**
- **Sample No.:**
- **Sampler Serial No.:**
### PURGE VOLUME

<table>
<thead>
<tr>
<th>Inner Well Annulus</th>
<th>Outer Well Annulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (m)</td>
<td>Boring Radius (m)</td>
</tr>
<tr>
<td>0.5</td>
<td>1.125</td>
</tr>
<tr>
<td>Well Radius (m)</td>
<td>Boring Radius (m)</td>
</tr>
<tr>
<td>0.5</td>
<td>1.125</td>
</tr>
<tr>
<td>Well Depth (m)</td>
<td>Sand Pack Height (m)</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>0.62</td>
<td>0.82</td>
</tr>
<tr>
<td>1.55 liters</td>
<td>0.47 liters</td>
</tr>
</tbody>
</table>

- \( \text{Volume 1} = 0.47 \) liters
- \( \text{Volume 2} = 0.31 \) liters
- \( \text{Total Purge Volume} = 0.16 \) liters

### PURGING

- **Start Time:** \( 14:00 \)  
- **End Time:** \( 14:10 \)
- **Flow Rate:** 2 liters/min

### SAMPLING

- **Sample No.:** K-FVOC-SV43  
- **Sample Start Date:** 11/19/15  
- **Sample End Date:** 11/22/15  
- **Sample Start Time:** 14:12  
- **End Time:** 14:36

### Duplicate Sample:
- **Yes:** No
### PURGE VOLUME

**Inner Well Annulus**

- Well Radius (in) $\times$
- Well Radius (in) $\times$
- Well Depth (ft) $\times$
- $0.11 = $ liters

**Outer Well Annulus**

- Drilling Radius (in) $\times$
- Drilling Radius (in) $\times$
- Sand Pack Height (ft) $\times$
- $0.186 = $ liters (1)

- Well Radius (in) $\times$
- Well Radius (in) $\times$
- Sand Pack Height (ft) $\times$
- $0.02 = $ liters (2)

Total Purge Volume: $1.71$ liters $\times$ Required # of Purge Volumes: $10 = 17.1$ liters

### PURGING

- Start Time: $1100$
- Flow Rate: $2$ liters/min
- End Time: $1110$

Purging Notes and Observations:

### SAMPLING

- Sample No: $16-FV0C-SV54$
- Sampler Serial No: $1520-AN-LU-069$

- Sample Start Date: $3/1/16$
- Start Time: $1115$
- Sample End Date: $3/1/16$
- End Time: $3/1/16$

Sampling Notes and Observations:

- Duplicate Sample: Yes $igcirc$ No

If yes:
- Sample No: $16-FV0C-SV54$
- Sampler Serial No: $1520-AN-LU-068$

- Start Time: $1120$
## Purge Volume

### Inner Well Annulus
\[
\text{Well Radius (in)} \times 0.5 \times \text{Well Radius (in)} \times 0.5 \times \text{Well Depth (ft)} \times 10 \times 0.12 = 1.55 \text{ liters}
\]

### Outer Well Annulus
\[
\text{Hole Radius (in)} \times 1.125 \times \text{Hole Radius (in)} \times 1.125 \times \text{Sand Pack Height (ft)} \times 2 \times 0.186 = 0.47 \text{ liters (1)}
\]
\[
\text{Well Radius (in)} \times 0.5 \times \text{Well Radius (in)} \times 0.5 \times \text{Sand Pack Height (ft)} \times 2 \times 0.62 = 0.31 \text{ liters (2)}
\]
\[
\text{(1)} - \text{(2)} = \frac{0.47}{0.31} = 0.16 \text{ liters (3)}
\]

### Total Purge Volume
\[
\frac{1.71}{10} = 0.17 \text{ liters}
\]

## Purging

- **Start Time:** 0855
- **Flow Rate:** 2 liters/min
- **End Time:** 0905
- **Purging Notes and Observations:**

## Sampling

- **Sample No.:** 16-FVOC-SV47
- **Sampler Serial No.:** 1520-AN-LU-067
- **Sample Start Date:** 3/11/16
- **Start Time:** 0905
- **Sample Start Date:**
- **End Time:**
- **Sampling Notes and Observations:**

**Duplicate Sample:** Yes

If yes:
- **Sample No.:**
- **Sampler Serial No.:**
## SOIL GAS WELL CONSTRUCTION and PASSIVE SOIL GAS SAMPLING LOG

### PURGE VOLUME

<table>
<thead>
<tr>
<th>Inner Well Annulus</th>
<th>Outer Well Annulus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Radius (in)</td>
<td>Well Radius (in)</td>
</tr>
<tr>
<td>Boring Radius (in)</td>
<td>Boring Radius (ft)</td>
</tr>
<tr>
<td>Well Radius (in)</td>
<td>Well Radius (ft)</td>
</tr>
</tbody>
</table>

\((1) \cdot \text{Total Well Annulus Volume} = 1.71 \text{ liters} \times \frac{10}{\text{Required # of Purge Volumes}} = 17.1 \text{ liters}\)

### PURGING

- **Start Time:** 1140
- **Flow Rate:** 2 \( \text{liters/min} \)
- **End Time:** 1150

Purging Rates and Observations:

### SAMPLING

- **Sample No:** 16-EVOC-SV45
- **Sampler Serial No:** 1520-AN-LU-070
- **Sample Start Date:** 3/11/16
- **Start Time:** 1140
- **Start Time:** 1155
- **Sample End Date:**
- **End Time:**

Sampling Notes and Observations:

**Duplicate Sample:**
- Yes \( \times \)
- No ^

If yes:
- **Sample No:**
- **Sampler Serial No:**
# Purge Volume

### Inner Well Annulus

\[
\text{Well Radius (in)} \times \text{Well Radius (in)} \times \text{Well Depth (ft)} \times 0.62 = \text{Litters (1)}
\]

### Outer Well Annulus

\[
\text{Borehole Radius (in)} \times \text{Borehole Radius (in)} \times \text{Sand Pack Height (ft)} \times 0.186 = \text{Litters (1)}
\]

\[
\text{Well Radius (in)} \times \text{Well Radius (in)} \times \text{Sand Pack Height (ft)} \times 0.82 = \text{Litters (2)}
\]

\[
\text{Total Purge Volume} = 1.71 \text{ liters} \times \text{Required No. of Purge Volumes} = 10 = 17.1 \text{ liters}
\]

# Purging

- **Start Time:** 0950
- **Flow Rate:** 2 liters/min
- **End Time:** 1000

Purging Notes and Observations:

# Sampling

- **Sample No.:** 16-FVOC5H6
- **Sampler Serial No.:** 1520-AN-LU-066
- **Sample Start Date:** 3/1/16
- **Start Time:** 1005

Sampling Notes and Observations:

- Insert temperature sensor in this well

Duplicate Sample: **Yes**

If yes:

- **Sample No.:**
- **Sampler Serial No.:**
**GROUNDWATER SAMPLING FORM**

**PROJECT NAME:** Fairview  
**WELL CONDITION:**  
**CLIENT:** ADEC  
**DATE:** 3/2/16  
**SITE:** Fairview  
**GEOLOGIST:** A Goldich  
**WEATHER/TEMPERATURE:** Clear 30°F  
**WIND:** No

**SAMPLE TYPE (GW, PRODUCT, OTHER):** GW

**SAMPLE COLLECTED WITH:** 
- [ ] Bailier  
- [X] Pump, Type: Check Valve  
- [ ] Other, Specify:  
**MADE OF:** 
- [X] Stainless Steel  
- [ ] PVC  
- [ ] Teflon  
- [ ] Disposable LDPE  
- [ ] Other, Specify: 

**SAMPLING DECON PROCEDURE:** 
- [ ] alkali water  
- [ ] other  

**SAMPLE DESCRIPTION:** 
large amount of sand/silt in sample

**FIELD WATER QUALITY PARAMETERS**

<table>
<thead>
<tr>
<th>Time</th>
<th>Flow Rate (mL/min)</th>
<th>Water Level</th>
<th>Draw Down</th>
<th>Temperature (°C)</th>
<th>Spec. Cond. (μS/cm²)</th>
<th>D.O. (N)</th>
<th>D.O. (mg/L)</th>
<th>pH</th>
<th>ORP (mV)</th>
<th>Turbidity (NTU)</th>
<th>Color</th>
<th>Odor</th>
</tr>
</thead>
</table>

**ANALYTICAL SAMPLE INFORMATION**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Time</th>
<th>Identification</th>
<th>Additional Sample</th>
<th>Time</th>
<th>Identification</th>
<th>Sampling Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>1110</td>
<td>16-FVOC - GW48</td>
<td>Duplicate</td>
<td>1200</td>
<td>No</td>
<td>No pump sampling</td>
</tr>
<tr>
<td>BDC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16-FVOC - GW55</td>
<td></td>
</tr>
<tr>
<td>MNA</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CSIA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Groundwater Sampling Form

**Project Name:** Fairview  
**Client:** ADEC  
**Date:** 3/1/16  
**Site:** Fairview  
**Geologist:** A. Ge. Lab  
**Weather/ Temperature:** Clear, 70°F  
**Wind:** N

**Well Condition:** —  
**Nominal Diameter:** 2"  
**Outside Diameter:** 2.375"  
**Inside Diameter:** 2.067"  
**Volume (Gal/lin ft):** 0.17

**Depth to Water (from top):** 65 ft  
**Depth to Base (from top):** 44.1 ft  
**Height of Water Column:** 8.38 ft  
**Well Volume:** 2.60

---

**Sample Type (GW, Product, Other):** GW  
**Sample Collected With:**  
- [X] Pump, Type: Check Valve  
- Other, Specify:  
**Made Of:**  
- [X] Stainless Steel  
- [ ] PVC  
- [ ] Disposable LDPE  
- Other, Specify:  
**Sampling Decon Procedure:**  
Alconox + Water

---

**Field Water Quality Parameters**

<table>
<thead>
<tr>
<th>Time</th>
<th>Flow Rate (gph/gal)</th>
<th>Water Level Draw Down</th>
<th>Temperature (°C)</th>
<th>Spec. Cond. (μS/cm)</th>
<th>D.O. (%)</th>
<th>B.O.D. (mg/l)</th>
<th>pH</th>
<th>ORP (mV)</th>
<th>Turbidity (NTU)</th>
<th>Color</th>
<th>Odor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Analytical Sample Information**

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Time</th>
<th>Identification</th>
<th>Additional Sample</th>
<th>Time</th>
<th>Identification</th>
<th>Sampling Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>VOC</td>
<td>1555</td>
<td>16-FlOC - GW-49</td>
<td>Duplicate</td>
<td></td>
<td></td>
<td>No pulse sampling</td>
</tr>
<tr>
<td>DHc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSIA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX E

LABORATORY RESULTS
12/11/2015
Ms. Samantha Fox
GeoSyntec Consultants
4101 Arctic Blvd.
Suite 206
Anchorage AK 99503

Project Name: Fairview
Project #: 20266.015.01
Workorder #: 1511467

Dear Ms. Samantha Fox

The following report includes the data for the above referenced project for sample(s) received on 11/30/2015 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: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner
Project Manager
## WORK ORDER #: 1511467

### Work Order Summary

**CLIENT:**  
Ms. Samantha Fox  
GeoSyntec Consultants  
4101 Arctic Blvd.  
Suite 206  
Anchorage, AK 99503

**BILL TO:**  
Accounts Payable  
AHTNA  
110 West 38th Ave  
Suite 200A  
Anchorage, AK 99503

**PHONE:**  
907-754-9679

**FAX:**

**DATE RECEIVED:**  
11/30/2015

**DATE COMPLETED:**  
12/11/2015

**P.O. #**  
20266.015.01

**PROJECT #**  
20266.015.01 Fairview

**CONTACT:**  
Kelly Buettner

<table>
<thead>
<tr>
<th>FRACTION #</th>
<th>NAME</th>
<th>TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>01A</td>
<td>15-FVOC-SV01</td>
<td>Passive S.E. WMS</td>
</tr>
<tr>
<td>02A</td>
<td>15-FVOC-SV05</td>
<td>Passive S.E. WMS</td>
</tr>
<tr>
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<td>15-FVOC-SV06</td>
<td>Passive S.E. WMS</td>
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<td>15-FVOC-SV09</td>
<td>Passive S.E. WMS</td>
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<tr>
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<td>Passive S.E. WMS</td>
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<tr>
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<td>15-FVOC-SV12</td>
<td>Passive S.E. WMS</td>
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<tr>
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<td>Passive S.E. WMS</td>
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<tr>
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<td>Passive S.E. WMS</td>
</tr>
<tr>
<td>09A</td>
<td>15-FVOC-SV16</td>
<td>Passive S.E. WMS</td>
</tr>
<tr>
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<td>15-FVOC-SV17</td>
<td>Passive S.E. WMS</td>
</tr>
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<td>15-FVOC-SV19</td>
<td>Passive S.E. WMS</td>
</tr>
<tr>
<td>13A</td>
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<td>Passive S.E. WMS</td>
</tr>
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<td>14A</td>
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<td>Passive S.E. WMS</td>
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<td>15-FVOC-SV23</td>
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<td>Passive S.E. WMS</td>
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</tr>
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<td>15-FVOC-SV30</td>
<td>Passive S.E. WMS</td>
</tr>
<tr>
<td>20A</td>
<td>15-FVOC-SV31</td>
<td>Passive S.E. WMS</td>
</tr>
<tr>
<td>21A</td>
<td>Lab Blank</td>
<td>Passive S.E. WMS</td>
</tr>
<tr>
<td>22A</td>
<td>LCS</td>
<td>Passive S.E. WMS</td>
</tr>
<tr>
<td>22AA</td>
<td>LCSD</td>
<td>Passive S.E. WMS</td>
</tr>
</tbody>
</table>

**CERTIFIED BY:**  
Technical Director  

**DATE:**  
12/11/15

---

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

Page 2 of 30
Twenty WMS-PH samples were received on November 30, 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:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>TO-17</th>
<th>ATL Modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Collection</td>
<td>Pump pulls measured air volume through sorbent tube</td>
<td>VOCs in air adsorbed onto sorbent bed passively through diffusion</td>
</tr>
<tr>
<td>Sample Preparation</td>
<td>Thermal extraction</td>
<td>Solvent extraction</td>
</tr>
<tr>
<td>Sorbent tube conditioning</td>
<td>Condition newly packed tubes prior to use</td>
<td>Charcoal-based sorbent is a single use media and conditioning is conducted by vendor.</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>Thermal desorption introduction system</td>
<td>Liquid injection introduction system</td>
</tr>
<tr>
<td>Internal Standard</td>
<td>Gas-phase internal standard introduced on the tube or focusing trap during analysis</td>
<td>Liquid-phase internal standard introduced on the tube at the time of extraction</td>
</tr>
<tr>
<td>Media and sample storage</td>
<td>&lt;4 deg C, 30 days</td>
<td>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.</td>
</tr>
<tr>
<td>Internal Standard Recovery</td>
<td>+/-40% of daily CCV area</td>
<td>-50% to +100% of daily CCV area</td>
</tr>
</tbody>
</table>

**Receiving Notes**

There were no receiving discrepancies.

**Analytical Notes**

To calculate ug/m3 concentrations in the Lab Blank, a sampling duration of 5675 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.

**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
Summary of Detected Compounds
VOC BY PASSIVE SAMPLER - GC/MS

Client Sample ID: 15-FVOC-SV01
Lab ID#: 1511467-01A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV05
Lab ID#: 1511467-02A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV06
Lab ID#: 1511467-03A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV09
Lab ID#: 1511467-04A

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>22</td>
<td>0.065</td>
<td>28</td>
</tr>
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</table>

Client Sample ID: 15-FVOC-SV10
Lab ID#: 1511467-05A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV12
Lab ID#: 1511467-06A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV13
Lab ID#: 1511467-07A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV15
Lab ID#: 1511467-08A
No Detections Were Found.
### Summary of Detected Compounds

**VOC BY PASSIVE SAMPLER - GC/MS**

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</thead>
<tbody>
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<td>4.4</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.4</td>
<td>0.076</td>
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</table>

Client Sample ID: 15-FVOC-SV16
Lab ID#: 1511467-09A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV17
Lab ID#: 1511467-10A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV18
Lab ID#: 1511467-11A

Client Sample ID: 15-FVOC-SV19
Lab ID#: 1511467-12A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV20
Lab ID#: 1511467-13A

Client Sample ID: 15-FVOC-SV21
Lab ID#: 1511467-14A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV22
Lab ID#: 1511467-15A
Summary of Detected Compounds
VOC BY PASSIVE SAMPLER - GC/MS

Client Sample ID: 15-FVOC-SV23
Lab ID#: 1511467-16A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV24
Lab ID#: 1511467-17A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV26
Lab ID#: 1511467-18A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV30
Lab ID#: 1511467-19A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV31
Lab ID#: 1511467-20A
No Detections Were Found.
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<tbody>
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<td>110</td>
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<td>1,1-Dichloroethene</td>
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<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>42</td>
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<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>23</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
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<td>Not Detected</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.7</td>
<td>Not Detected</td>
<td>Not Detected</td>
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Temperature = 44.6°F, duration time = 4405 minutes.

Container Type: WMS-PH

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<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
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<tr>
<td>Toluene-d8</td>
<td>103</td>
<td>70-130</td>
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## VOC BY PASSIVE SAMPLER - GC/MS

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<td>Not Detected</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>15</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>10</td>
<td>Not Detected</td>
<td>Not Detected</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>7.0</td>
<td>Not Detected</td>
<td>Not Detected</td>
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Temperature = 44.6°F, duration time = 5476 minutes.

**Container Type:** WMS-PH

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<td>Toluene-d8</td>
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<td>70-130</td>
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<tr>
<td>Vinyl Chloride</td>
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<td>110</td>
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<tr>
<td>1,1-Dichloroethene</td>
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<tr>
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<td>41</td>
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<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>17</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>22</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.6</td>
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</table>

Temperature = 44.6°F, duration time = 4474 minutes.

**Container Type: WMS-PH**

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<th>Method Limits</th>
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<tr>
<td>Toluene-d8</td>
<td>102</td>
<td>70-130</td>
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</table>
Client Sample ID: 15-FVOC-SV09  
Lab ID#: 1511467-04A  
VOC BY PASSIVE SAMPLER - GC/MS

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<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>100</td>
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<td>Not Detected</td>
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<td>1,1-Dichloroethene</td>
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<td>trans-1,2-Dichloroethene</td>
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<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>17</td>
<td>Not Detected</td>
<td>Not Detected</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>22</td>
<td>0.065</td>
<td>28</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>12</td>
<td>Not Detected</td>
<td>Not Detected</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.3</td>
<td>Not Detected</td>
<td>Not Detected</td>
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Temperature = 44.6°F, duration time = 4621 minutes.  
**Container Type: WMS-PH**

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<th>% Recovery</th>
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<tr>
<td>Toluene-d8</td>
<td>105</td>
<td>70-130</td>
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</tr>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>95</td>
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<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>40</td>
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<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>17</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>22</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>18</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>12</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.4</td>
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</table>

Temperature = 44.6F, duration time = 4587 minutes.

Container Type: WMS-PH

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<th>Method Limits</th>
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<td>Toluene-d8</td>
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<td>70-130</td>
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<td>---------------------------</td>
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</tr>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
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<tr>
<td>1,1-Dichloroethene</td>
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<td>77</td>
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<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>33</td>
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<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>14</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>15</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>10</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>6.8</td>
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</table>

Temperature = 44.6F, duration time = 5614 minutes.

**Container Type: WMS-PH**

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<th>% Recovery</th>
<th>Method Limits</th>
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<tbody>
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<td>70-130</td>
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</table>
Client Sample ID: 15-FVOC-SV13
Lab ID#: 1511467-07A
VOC BY PASSIVE SAMPLER - GC/MS

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<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>87</td>
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<tr>
<td>1,1-Dichloroethene</td>
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</tr>
<tr>
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<td>Not Detected</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
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</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>15</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>10</td>
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<tr>
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<td>0.050</td>
<td>6.9</td>
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Temperature = 44.6F, duration time = 5575 minutes.
Container Type: WMS-PH

<table>
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<th>Method Limits</th>
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<tr>
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<td>70-130</td>
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<tr>
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</tr>
<tr>
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<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>18</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
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</tr>
<tr>
<td>Carbon Tetrachloride</td>
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<td>19</td>
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<tr>
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Temperature = 44.6°F, duration time = 4416 minutes.

Container Type: WMS-PH

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Lab ID#: 1511467-09A  
VOC BY PASSIVE SAMPLER - GC/MS

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<td>0.20</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
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<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
<td>Not Detected</td>
<td>Not Detected</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
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<td>Not Detected</td>
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Temperature = 44.6F, duration time = 4368 minutes.

**Container Type: WMS-PH**

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<tbody>
<tr>
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</table>
Client Sample ID: 15-FVOC-SV17  
Lab ID#: 1511467-10A  
VOC BY PASSIVE SAMPLER - GC/MS

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<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
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<td>Not Detected</td>
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<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>99</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>42</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
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<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
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<td>23</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
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<tr>
<td>Trichloroethene</td>
<td>0.050</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.8</td>
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Temperature = 44.6°F, duration time = 4370 minutes.  
Container Type: WMS-PH

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<tr>
<th>Surrogates</th>
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<th>Method Limits</th>
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<tr>
<td>Toluene-d8</td>
<td>103</td>
<td>70-130</td>
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<td>------------------------</td>
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</tr>
<tr>
<td>Vinyl Chloride</td>
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<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>77</td>
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<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>33</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>14</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
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<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
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<tr>
<td>Trichloroethene</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Temperature = 44.6°F, duration time = 5675 minutes.

Container Type: WMS-PH

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<tr>
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<th>Method Limits</th>
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<tr>
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VOC BY PASSIVE SAMPLER - GC/MS

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<td>1,1-Dichloroethene</td>
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<td>trans-1,2-Dichloroethene</td>
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<td>Not Detected</td>
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<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
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<td>Not Detected</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
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<td>Not Detected</td>
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<tr>
<td>Carbon Tetrachloride</td>
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<td>15</td>
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<td>Not Detected</td>
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<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>10</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
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<td>Not Detected</td>
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</table>

Temperature = 44.6F, duration time = 5643 minutes.

**Container Type:** WMS-PH

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<td>Toluene-d8</td>
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<td>70-130</td>
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VOC BY PASSIVE SAMPLER - GC/MS

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Temperature = 44.6°F, duration time = 4656 minutes.

Container Type: WMS-PH

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<tbody>
<tr>
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<td>70-130</td>
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<tr>
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<tr>
<td>Vinyl Chloride</td>
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<tr>
<td>1,1-Dichloroethene</td>
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<td>77</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>33</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>14</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>15</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>10</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>6.8</td>
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</table>

Temperature = 44.6°F, duration time = 5630 minutes.

Container Type: WMS-PH

**Surrogates**

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<th>Method Limits</th>
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Client Sample ID: 15-FVOC-SV22  
Lab ID#: 1511467-15A  
VOC BY PASSIVE SAMPLER - GC/MS  

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<td>Not Detected</td>
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<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
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</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
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<td>Carbon Tetrachloride</td>
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<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>12</td>
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<td>0.050</td>
<td>8.4</td>
<td>0.076</td>
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</table>

Temperature = 44.6°F, duration time = 4563 minutes.  
Container Type: WMS-PH  

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<tr>
<td>Vinyl Chloride</td>
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</tr>
<tr>
<td>1,1-Dichloroethene</td>
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<td>trans-1,2-Dichloroethene</td>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>22</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>12</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
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</table>

Temperature = 44.6F, duration time = 4525 minutes.

Container Type: WMS-PH

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<th>Method Limits</th>
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<td>Toluene-d8</td>
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<td>70-130</td>
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**Client Sample ID:** 15-FVOC-SV24  
**Lab ID#:** 1511467-17A  
**VOC BY PASSIVE SAMPLER - GC/MS**

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<tr>
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<td>110</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
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<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
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<tr>
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<td>8.6</td>
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Temperature = 44.6°F, duration time = 4495 minutes.  
**Container Type:** WMS-PH

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<td>70-130</td>
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Client Sample ID: 15-FVOC-SV26  
Lab ID#: 1511467-18A  
VOC BY PASSIVE SAMPLER - GC/MS

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<tr>
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<tr>
<td>1,1,1-Trichloroethane</td>
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<td>Carbon Tetrachloride</td>
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<tr>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
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Temperature = 44.6F, duration time = 5670 minutes.
Container Type: WMS-PH

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<th>Method Limits</th>
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<td>70-130</td>
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Client Sample ID: 15-FVOC-SV30
Lab ID#: 1511467-19A
VOC BY PASSIVE SAMPLER - GC/MS

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<tr>
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<tr>
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<tr>
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<tr>
<td>Trichloroethene</td>
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Temperature = 44.6F, duration time = 4327 minutes.
Container Type: WMS-PH

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<tr>
<td>Toluene-d8</td>
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<td>70-130</td>
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</table>
## VOC BY PASSIVE SAMPLER - GC/MS

**Client Sample ID:** 15-FVOC-SV31  
**Lab ID#:** 1511467-20A  
**File Name:** c121043sim  
**Dil. Factor:** 1.00

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<tr>
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<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>23</td>
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</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
<td>Not Detected</td>
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<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
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Temperature = 44.6°F, duration time = 4384 minutes.  
**Container Type:** WMS-PH

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</tr>
<tr>
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<td>86</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>77</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
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</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
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<td>14</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>15</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
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<tr>
<td>Tetrachloroethene</td>
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<td>6.8</td>
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Temperature = 44.6F, duration time = 5675 minutes.

Container Type: WMS-PH

<table>
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<th>Method Limits</th>
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Lab ID#: 1511467-22A  

**VOC BY PASSIVE SAMPLER - GC/MS**

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**Notes:**

- L4.5 F

**Sample Site Air Temperature:**

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- 2/1
- 1/1

**Field:**

- 190 Blue Raving Road, Suite B

**Phone:** 607-754-9679

**Fax:** 607-754-9678

**Address:** 10 W. 34th Ave, Ansonia, MA 06401

**Company:** Chain of Custody Record

**Project Manager:** Ron Pusateri, Sr. Engr.

**Project Name:** Air

**Project #: 2026-01-05-1**
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12/11/2015
Ms. Samantha Fox
GeoSyntec Consultants
4101 Arctic Blvd.
Suite 206
Anchorage AK 99503

Project Name: Fairview
Project #: 20266.015.01
Workorder #: 1511468

Dear Ms. Samantha Fox

The following report includes the data for the above referenced project for sample(s) received on 11/30/2015 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: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner
Project Manager
**WORK ORDER #: 1511468**

**Work Order Summary**

| CLIENT: | Ms. Samantha Fox  
| GeoSyntec Consultants  
| 4101 Arctic Blvd.  
| Suite 206  
| Anchorage, AK 99503 |
| BILL TO: | Accounts Payable  
| AHTNA  
| 110 West 38th Ave  
| Suite 200A  
| Anchorage, AK 99503 |
| PHONE: | 907-754-9679 |
| FAX: | 
| DATE RECEIVED: | 11/30/2015 |
| DATE COMPLETED: | 12/11/2015 |
| FRACTION # | NAME | TEST |
| 01A | 15-FVOC-SV32 | Passive S.E. WMS |
| 02A | 15-FVOC-SV33 | Passive S.E. WMS |
| 03A | 15-FVOC-SV36 | Passive S.E. WMS |
| 04A | 15-FVOC-SV37 | Passive S.E. WMS |
| 05A | 15-FVOC-SV38 | Passive S.E. WMS |
| 06A | 15-FVOC-SV41 | Passive S.E. WMS |
| 07A | 15-FVOC-SV42 | Passive S.E. WMS |
| 08A | 15-FVOC-SV43 | Passive S.E. WMS |
| 09A | 15-FVOC-SV50 | Passive S.E. WMS |
| 10A | 15-FVOC-SV51 | Passive S.E. WMS |
| 11A | 15-FVOC-SV52 | Passive S.E. WMS |
| 12A | 15-FVOC-SV53 | Passive S.E. WMS |
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| 14A | Lab Blank | Passive S.E. WMS |
| 15A | LCS | Passive S.E. WMS |
| 15AA | LCSD | Passive S.E. WMS |

**CERTIFIED BY:**  
[Signature]  
Technical Director  

**DATE:** 12/11/15  

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180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563  
(916) 985-1000, (800) 985-5955, FAX (916) 985-1020  
Page 2 of 22
Thirteen WMS-PH samples were received on November 30, 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:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>TO-17</th>
<th>ATL Modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Collection</td>
<td>Pump pulls measured air volume through sorbent tube</td>
<td>VOCs in air adsorbed onto sorbent bed passively through diffusion</td>
</tr>
<tr>
<td>Sample Preparation</td>
<td>Thermal extraction</td>
<td>Solvent extraction</td>
</tr>
<tr>
<td>Sorbent tube conditioning</td>
<td>Condition newly packed tubes prior to use</td>
<td>Charcoal-based sorbent is a single use media and conditioning is conducted by vendor.</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>Thermal desorption introduction system</td>
<td>Liquid injection introduction system</td>
</tr>
<tr>
<td>Internal Standard</td>
<td>Gas-phase internal standard introduced on the tube or focusing trap during analysis</td>
<td>Liquid-phase internal standard introduced on the tube at the time of extraction</td>
</tr>
<tr>
<td>Media and sample storage</td>
<td>&lt;4 deg C, 30 days</td>
<td>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.</td>
</tr>
<tr>
<td>Internal Standard Recovery</td>
<td>+/-40% of daily CCV area</td>
<td>-50% to +100% of daily CCV area</td>
</tr>
</tbody>
</table>

**Receiving Notes**

There were no receiving discrepancies.

**Analytical Notes**

To calculate ug/m3 concentrations in the Lab Blank, a sampling duration of 5670 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.

**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
### Summary of Detected Compounds

**VOC BY PASSIVE SAMPLER - GC/MS**

<table>
<thead>
<tr>
<th>Client Sample ID: 15-FVOC-SV32</th>
<th>Lab ID#: 1511468-01A</th>
<th>No Detections Were Found.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID: 15-FVOC-SV33</th>
<th>Lab ID#: 1511468-02A</th>
<th>No Detections Were Found.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID: 15-FVOC-SV36</th>
<th>Lab ID#: 1511468-03A</th>
<th>No Detections Were Found.</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID: 15-FVOC-SV37</th>
<th>Lab ID#: 1511468-04A</th>
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</thead>
</table>

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.8</td>
<td>0.060</td>
<td>10</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID: 15-FVOC-SV38</th>
<th>Lab ID#: 1511468-05A</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.6</td>
<td>0.067</td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID: 15-FVOC-SV41</th>
<th>Lab ID#: 1511468-06A</th>
<th>No Detections Were Found.</th>
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</table>

<table>
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<tr>
<th>Client Sample ID: 15-FVOC-SV42</th>
<th>Lab ID#: 1511468-07A</th>
<th>No Detections Were Found.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Client Sample ID: 15-FVOC-SV43</th>
<th>Lab ID#: 1511468-08A</th>
</tr>
</thead>
</table>
Summary of Detected Compounds
VOC BY PASSIVE SAMPLER - GC/MS

Client Sample ID: 15-FVOC-SV43
Lab ID#: 1511468-08A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV50
Lab ID#: 1511468-09A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV51
Lab ID#: 1511468-10A
No Detections Were Found.

Client Sample ID: 15-FVOC-SV52
Lab ID#: 1511468-11A

<table>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>6.8</td>
<td>0.059</td>
<td>8.0</td>
</tr>
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</table>

Client Sample ID: 15-FVOC-SV53
Lab ID#: 1511468-12A
No Detections Were Found.

Client Sample ID: 15-FVOC-TB01
Lab ID#: 1511468-13A
No Detections Were Found.
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</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>86</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>77</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>33</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>14</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>15</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>10</td>
<td>Not Detected</td>
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</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>6.8</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
</tbody>
</table>

Temperature = 44.5°F, duration time = 5644 minutes.

**Container Type:** WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>104</td>
<td>70-130</td>
</tr>
</tbody>
</table>
Client Sample ID: 15-FVOC-SV33
Lab ID#: 1511468-02A

VOC BY PASSIVE SAMPLER - GC/MS

File Name: c121007sim
Dil. Factor: 1.00

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>100</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>93</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>40</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>17</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>21</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>12</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.2</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
</tbody>
</table>

Temperature = 44.5F , duration time = 4669 minutes.

Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>104</td>
<td>70-130</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>100</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>43</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>18</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>23</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>20</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Temperature = 44.5F, duration time = 4329 minutes.

Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>104</td>
<td>70-130</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-----------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>99</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>42</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>18</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>23</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Temperature = 44.5°F, duration time = 4373 minutes.

Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>105</td>
<td>70-130</td>
</tr>
</tbody>
</table>
## VOC BY PASSIVE SAMPLER - GC/MS

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>97</td>
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<td>41</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>17</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>22</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.6</td>
<td>0.067</td>
<td>12</td>
</tr>
</tbody>
</table>

Temperature = 44.5F, duration time = 4472 minutes.

**Container Type:** WMS-PH

### Surrogates

<table>
<thead>
<tr>
<th>Surrogate</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>110</td>
<td>70-130</td>
</tr>
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</table>
VOC by Passive Sampler - GC/MS

<table>
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</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>98</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>42</td>
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</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>18</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
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<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
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<td>Not Detected</td>
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<tr>
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<td>8.7</td>
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</table>

Temperature = 44.5°F, duration time = 4438 minutes.
Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>102</td>
<td>70-130</td>
</tr>
</tbody>
</table>
### VOC BY PASSIVE SAMPLER - GC/MS

- **File Name:** c121012sim
- **Dil. Factor:** 1.00
- **Date of Collection:** 11/22/15 3:15:00 PM
- **Date of Analysis:** 12/10/15 11:56 AM
- **Date of Extraction:** 12/10/15

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>100</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>43</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
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<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
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<td>23</td>
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</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>20</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
<td>Not Detected</td>
<td>Not Detected</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.9</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
</tbody>
</table>

Temperature = 44.5°F, duration time = 4332 minutes.

**Container Type:** WMS-PH

<table>
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<th>%Recovery</th>
<th>Method Limits</th>
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</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>104</td>
<td>70-130</td>
</tr>
</tbody>
</table>
VOC BY PASSIVE SAMPLER - GC/MS

File Name: c121013sim  Date of Collection: 11/22/15 2:36:00 PM
Dil. Factor: 1.00  Date of Analysis: 12/10/15 12:20 PM

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>100</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>43</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>23</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>20</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.8</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
</tbody>
</table>

Temperature = 44.5F, duration time = 4344 minutes.

Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>104</td>
<td>70-130</td>
</tr>
</tbody>
</table>
Client Sample ID: 15-FVOC-SV50
Lab ID#: 1511468-09A
VOC BY PASSIVE SAMPLER - GC/MS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>98</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>42</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>23</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.7</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
</tbody>
</table>

Temperature = 44.5F, duration time = 4416 minutes.

Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>101</td>
<td>70-130</td>
</tr>
</tbody>
</table>
Client Sample ID: 15-FVOC-SV51  
Lab ID#: 1511468-10A  
VOC BY PASSIVE SAMPLER - GC/MS

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
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<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>77</td>
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<td>Not Detected</td>
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<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>33</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>14</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>15</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>10</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>6.8</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
</tbody>
</table>

Temperature = 44.5F, duration time = 5630 minutes.  
Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>105</td>
<td>70-130</td>
</tr>
</tbody>
</table>
VOC BY PASSIVE SAMPLER - GC/MS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>86</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>77</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>33</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>14</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>15</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>10</td>
<td>Not Detected</td>
<td>Not Detected</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>6.8</td>
<td>0.059</td>
<td>8.0</td>
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</table>

Temperature = 44.5F, duration time = 5670 minutes.

**Container Type: WMS-PH**

<table>
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<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
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</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>101</td>
<td>70-130</td>
</tr>
</tbody>
</table>

Page 17 of 22
**VOC BY PASSIVE SAMPLER - GC/MS**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>98</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>42</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>22</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>13</td>
<td>Not Detected</td>
<td>Not Detected</td>
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<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>8.7</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
</tbody>
</table>

Temperature = 44.5°F, duration time = 4438 minutes.

**Container Type: WMS-PH**

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
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</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>103</td>
<td>70-130</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>100</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
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<td>43</td>
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<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>18</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>23</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>20</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
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<tr>
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<td>0.050</td>
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</tbody>
</table>

Temperature = 44.5°F, duration time = 4320 minutes.
Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>103</td>
<td>70-130</td>
</tr>
</tbody>
</table>
Client Sample ID: Lab Blank
Lab ID#: 1511468-14A

VOC BY PASSIVE SAMPLER - GC/MS

<table>
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<tbody>
<tr>
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<td>86</td>
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<tr>
<td>1,1-Dichloroethene</td>
<td>0.20</td>
<td>77</td>
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<td>Not Detected</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>0.10</td>
<td>33</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>0.050</td>
<td>14</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>0.050</td>
<td>18</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>15</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>0.050</td>
<td>10</td>
<td>Not Detected</td>
<td>Not Detected</td>
</tr>
<tr>
<td>Tetrachloroethene</td>
<td>0.050</td>
<td>6.8</td>
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<td>Not Detected</td>
</tr>
</tbody>
</table>

Temperature = 44.5F, duration time = 5670 minutes.
Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
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</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>105</td>
<td>70-130</td>
</tr>
</tbody>
</table>
Client Sample ID: LCS  
Lab ID#: 1511468-15A  
VOC BY PASSIVE SAMPLER - GC/MS  

<table>
<thead>
<tr>
<th>Compound</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>91</td>
<td>50-140</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>102</td>
<td>70-130</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>94</td>
<td>70-130</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>94</td>
<td>70-130</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>100</td>
<td>70-130</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>98</td>
<td>70-130</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>103</td>
<td>70-130</td>
</tr>
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<td>Tetrachloroethene</td>
<td>88</td>
<td>70-130</td>
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Container Type: WMS-PH

<table>
<thead>
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<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>104</td>
<td>70-130</td>
</tr>
</tbody>
</table>
Client Sample ID: LCSD
Lab ID#: 1511468-15AA

VOC BY PASSIVE SAMPLER - GC/MS

<table>
<thead>
<tr>
<th>Compound</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>92</td>
<td>50-140</td>
</tr>
<tr>
<td>1,1-Dichloroethene</td>
<td>102</td>
<td>70-130</td>
</tr>
<tr>
<td>trans-1,2-Dichloroethene</td>
<td>86</td>
<td>70-130</td>
</tr>
<tr>
<td>cis-1,2-Dichloroethene</td>
<td>92</td>
<td>70-130</td>
</tr>
<tr>
<td>1,1,1-Trichloroethane</td>
<td>107</td>
<td>70-130</td>
</tr>
<tr>
<td>Carbon Tetrachloride</td>
<td>104</td>
<td>70-130</td>
</tr>
<tr>
<td>Trichloroethene</td>
<td>99</td>
<td>70-130</td>
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<tr>
<td>Tetrachloroethene</td>
<td>90</td>
<td>70-130</td>
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Container Type: WMS-PH

<table>
<thead>
<tr>
<th>Surrogates</th>
<th>%Recovery</th>
<th>Method Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toluene-d8</td>
<td>103</td>
<td>70-130</td>
</tr>
<tr>
<td>Lab I.D.</td>
<td>Field Sample I.D. (Location)</td>
<td>Sampler #</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------</td>
<td>-----------</td>
</tr>
</tbody>
</table>
3/18/2016
Ms. Samantha Fox
GeoSyntec Consultants
4101 Arctic Blvd.
Suite 206
Anchorage AK 99503

Project Name: Fairview
Project #: 20266.015.01
Workorder #: 1603160

Dear Ms. Samantha Fox

The following report includes the data for the above referenced project for sample(s) received on 3/7/2016 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: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

[Signature]
Kelly Buettner
Project Manager
## Work Order Summary

### Contact Information

**CLIENT:**
Ms. Samantha Fox  
GeoSyntec Consultants  
4101 Arctic Blvd.  
Suite 206  
Anchorage, AK 99503

**BILL TO:**
Accounts Payable  
AHTNA  
110 West 38th Ave  
Suite 200A  
Anchorage, AK 99503

**PHONE:**
907-754-9679

**FAX:**

**DATE RECEIVED:**
03/07/2016

**DATE COMPLETED:**
03/18/2016

**FRACTION #** | **NAME** | **TEST**
---|---|---
01A | 16-FVOC-SV46 | Passive S.E. WMS
02A | 16-FVOC-SV47 | Passive S.E. WMS
03A | 16-FVOC-SV45 | Passive S.E. WMS
04A | 16-FVOC-SV44 | Passive S.E. WMS
05A | 16-FVOC-SV54 | Passive S.E. WMS
06A | Lab Blank | Passive S.E. WMS
07A | LCS | Passive S.E. WMS
07AA | LCSD | Passive S.E. WMS

**CERTIFIED BY:**  
[Signature]  
Heidi Myers  
Technical Director  

**DATE:**  
03/18/16
Five WMS-PH samples were received on March 07, 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:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>TO-17</th>
<th>ATL Modifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample Collection</td>
<td>Pump pulls measured air volume through sorbent tube</td>
<td>VOCs in air adsorbed onto sorbent bed passively through diffusion</td>
</tr>
<tr>
<td>Sample Preparation</td>
<td>Thermal extraction</td>
<td>Solvent extraction</td>
</tr>
<tr>
<td>Sorbent tube conditioning</td>
<td>Condition newly packed tubes prior to use</td>
<td>Charcoal-based sorbent is a single use media and conditioning is conducted by vendor.</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>Thermal desorption introduction system</td>
<td>Liquid injection introduction system</td>
</tr>
<tr>
<td>Internal Standard</td>
<td>Gas-phase internal standard introduced on the tube or focusing trap during analysis</td>
<td>Liquid-phase internal standard introduced on the tube at the time of extraction</td>
</tr>
<tr>
<td>Media and sample storage</td>
<td>&lt;4 deg C, 30 days</td>
<td>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.</td>
</tr>
<tr>
<td>Internal Standard Recovery</td>
<td>+/-40% of daily CCV area</td>
<td>-50% to +100% of daily CCV area</td>
</tr>
</tbody>
</table>

**Receiving Notes**

There were no receiving discrepancies.

**Analytical Notes**

To calculate ug/m3 concentrations in the Lab Blank, a sampling duration of 4515 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.

**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
Summary of Detected Compounds
VOC BY PASSIVE SAMPLER - GC/MS

**Client Sample ID: 16-FVOC-SV46**
Lab ID#: 1603160-01A
No Detections Were Found.

**Client Sample ID: 16-FVOC-SV47**
Lab ID#: 1603160-02A
No Detections Were Found.

**Client Sample ID: 16-FVOC-SV45**
Lab ID#: 1603160-03A

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Tetrachloride</td>
<td>0.050</td>
<td>19</td>
<td>0.55</td>
<td>210</td>
</tr>
</tbody>
</table>

**Client Sample ID: 16-FVOC-SV44**
Lab ID#: 1603160-04A
No Detections Were Found.

**Client Sample ID: 16-FVOC-SV54**
Lab ID#: 1603160-05A
No Detections Were Found.
Client Sample ID: 16-FVOC-SV46  
Lab ID#: 1603160-01A  
VOC BY PASSIVE SAMPLER - GC/MS

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vinyl Chloride</td>
<td>0.20</td>
<td>110</td>
<td>Not Detected</td>
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<tr>
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<tr>
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Temperature = 37.4°F, duration time = 4470 minutes.

Container Type: WMS-PH

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**Client Sample ID:** 16-FVOC-SV47  
**Lab ID#:** 1603160-02A  
**VOC BY PASSIVE SAMPLER - GC/MS**

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<tr>
<td>Trichloroethene</td>
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Temperature = 37.4°F, duration time = 4515 minutes.  
**Container Type:** WMS-PH

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Lab ID#: 1603160-03A  
VOC BY PASSIVE SAMPLER - GC/MS

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Temperature = 37.4F, duration time = 4385 minutes.
Container Type: WMS-PH

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**Lab ID#:** 1603160-04A  
**VOC BY PASSIVE SAMPLER - GC/MS**

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Temperature = 37.4°F, duration time = 4415 minutes.  
**Container Type:** WMS-PH

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<tr>
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<td>1,1-Dichloroethene</td>
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<tr>
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Temperature = 37.4°F, duration time = 4405 minutes.

**Container Type:** WMS-PH

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Lab ID#: 1603160-06A
VOC BY PASSIVE SAMPLER - GC/MS

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Temperature = 37.4F, duration time = 4515 minutes.
Container Type: WMS-PH

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**Surrogates**

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### VOC BY PASSIVE SAMPLER - GC/MS

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**Container Type: NA - Not Applicable**

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## Sample Transportation Notice

Relinquishing signature on this document indicates that sample is being shipped in compliance with all applicable local, State, Federal, national, and international laws, regulations and ordinances of any kind. Air Toxics Limited assumes no liability with respect to the collection, handling or shipping of these samples. Relinquishing signature also indicates agreement to hold harmless, defend, and indemnify Air Toxics Limited against any claim, demand, or action, of any kind, related to the collection, handling, or shipping of samples. D.O.T. Hotline (800) 467-4922.

### Project Info:
- **Project #:** 20Z6, 015-01
- **Project Name:** Fairview
- **P.O. #:**

### Table:

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### Other Information:
- **Sample Site Air Temperature:** 2.75°C
- **Notes:**

### Laboratory Information:

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March 9, 2016

Sam Fox
Ahtna Environmental, Inc.
110 West 38th Avenue, Suite 200B
Anchorage, AK 99503

Re: Analytical Data for Project 20266.015.01
Laboratory Reference No. 1603-040

Dear Sam:

Enclosed are the analytical results and associated quality control data for samples submitted on March 3, 2016.

CS Laboratory Approval Number: UST-039

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures
Case Narrative

Samples were collected on March 1, 2016 and received by the laboratory on March 3, 2016. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Volatiles EPA 8260C Analysis

Due to the levels of sediment present in the VOAs provided for samples 16-FVOC-GW48 and 16-FVOC-GW55, the aqueous layers from two VOAs for each sample were combined to perform the requested analysis. Some loss of volatiles may have occurred.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.
Date of Report: March 9, 2016  
Samples Submitted: March 3, 2016  
Laboratory Reference: 1603-040  
Project: 20266.015.01

Analyst's Signature

Stacey Duran, GC/MS Volatiles Chemist

3-9-16  
Date

OnSite Environmental, Inc.  14648 NE 95th Street, Redmond, WA  98052  (425) 883-3881

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.
This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

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<th>Method</th>
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**Surrogate:**

- **Dibromofluoromethane**: 98%, Control Limits: 71-131
- **Toluene-d8**: 98%, Control Limits: 80-120
- **4-Bromofluorobenzene**: 89%, Control Limits: 80-120
Date of Report: March 9, 2016
Samples Submitted: March 3, 2016
Laboratory Reference: 1603-040
Project: 20266.015.01

VOLATILES EPA 8260C/SIM

Matrix: Water
Units: ug/L

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<th>Analyte</th>
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<th>Method</th>
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Date of Report: March 9, 2016  
Samples Submitted: March 3, 2016  
Laboratory Reference: 1603-040  
Project: 20266.015.01

VOLATILES EPA 8260C/SIM

Matrix: Water  
Units: ug/L

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Date of Report: March 9, 2016  
Samples Submitted: March 3, 2016  
Laboratory Reference: 1603-040  
Project: 20266.015.01

VOLATILES EPA 8260C/SIM

Matrix: Water  
Units: ug/L

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Surrogate:  

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Date of Report: March 9, 2016  
Samples Submitted: March 3, 2016  
Laboratory Reference: 1603-040  
Project: 20266.015.01

**VOLATILES by EPA 8260C/SIM**  
**METHOD BLANK QUALITY CONTROL**

Matrix: Water  
Units: ug/L  

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Date of Report: March 9, 2016  
Samples Submitted: March 3, 2016  
Laboratory Reference: 1603-040  
Project: 20266.015.01

**VOLATILES by EPA 8260C/SIM**  
**SB/SBD QUALITY CONTROL**

Matrix: Water  
Units: ug/L

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<td>90 93  80-120</td>
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</table>
Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

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

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1 - Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C/SIM, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL

PQL - Practical Quantitation Limit

RPD - Relative Percent Difference
# Chain of Custody

**Laboratory Number:** 03-040

<table>
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<tr>
<th>Lab ID</th>
<th>Sample Identification</th>
<th>Date Sampled</th>
<th>Time Sampled</th>
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**Comments/Special Instructions:**

16-FVOC-TB01 = Trip blank

**Data Package:**

- Standard: X
- Level III: □
- Level IV: □
- Electronic Data Deliverables (EDDs): □

**Chromatograms with final report:** □
APPENDIX F

ADEC DATA QUALITY REVIEW CHECKLISTS
**Laboratory Data Review Checklist for Air Samples**

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<tr>
<th>Completed by:</th>
<th>Sam Fox</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td>Junior Engineer</td>
</tr>
<tr>
<td>Date:</td>
<td>3/24/2016</td>
</tr>
<tr>
<td>CS Report Name:</td>
<td>Fairview Chlorinated Solvents Investigation</td>
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<tr>
<td>Report Date:</td>
<td>April 2016</td>
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<td>Ahtna Engineering Services, LLC (partnered with Geosyntec Consultants)</td>
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<tr>
<td>Laboratory Name:</td>
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1. **Laboratory**
   
   a. Did a NELAP certified laboratory receive and perform all of the submitted sample analyses?
      
      | ☐ Yes | ☐ No | ☐ NA (Please explain.) | Comments: |
      |
   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses NELAP approved?
      
      | ☐ Yes | ☐ No | ☐ NA (Please explain.) | Comments: |
      | Not transferred to separate laboratory. |

2. **Chain of Custody (COC)**
   
   a. COC information completed, signed, and dated (including released/received by)?
      
      | ☐ Yes | ☐ No | ☐ NA (Please explain.) | Comments: |
      |
   b. Correct analyses requested?
      
      | ☐ Yes | ☐ No | ☐ NA (Please explain) | Comments: |
      |

3. **Laboratory Sample Receipt Documentation**
   
   a. Sample condition documented - Samples collected in gas tight, opaque/dark Summa canisters or other ADEC approved container? Canister vacuum/pressure checked, recorded upon receipt and contained no open valves?
      
      | ☐ Yes | ☐ No | ☐ NA (Please explain) | Comments: |
      |
b. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, canister not holding a vacuum etc.?

- Yes
- No
- NA (Please explain)

Comments:
"No receiving discrepancies." noted in Lab Report

4. Case Narrative
a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:
No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- Yes
- No
- NA (Please explain)

Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

- Yes
- No
- NA (Please explain)

Comments:
d. Data quality or usability affected?  
Comments: No

6. QC Samples  
a. Method Blank  
i. One method blank reported per analysis and 20 samples?  
Comments:  

ii. All method blank results less than PQL?  
Comments:  

iii. If above PQL, what samples are affected?  
Comments: Not applicable  

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?  
Comments:  

v. Data quality or usability affected? (Please explain.)  
Comments: No impacts to data quality or usability.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)  
i. One LCS/LCSD or one LCS and a sample/sample duplicate pair reported per analysis and 20 samples?  
Comments:  

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.  
Comments:  

iii. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable.  
Comments: RPD is not reported for LCS/LCSD results.
iv. If %R or RPD is outside of acceptable limits, what samples are affected?

☐ Yes ☐ No ☐ NA (Please explain)  Comments:  

%R not outside acceptable limits. RPD not reported

v. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

☐ Yes ☐ No ☐ NA (Please explain)  Comments:  

No affected samples.

vi. Data quality or usability affected? (Please explain.)

Comments:  

No impacts to data quality or usability.

c. Surrogates

i. Are surrogate recoveries reported for field, QC and laboratory samples?

☐ Yes ☐ No ☐ NA (Please explain)  Comments:  

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.

☐ Yes ☐ No ☐ NA (Please explain)  Comments:  

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

☐ Yes ☐ No ☐ NA (Please explain)  Comments:  

No failed surrogate recoveries.

iv. Data quality or usability affected? (Please explain.)

Comments:  

No impacts to data quality or usability.

d. Field Duplicate

i. One field duplicate submitted per analysis and 10 type (soil gas, indoor air etc.) samples?

☐ Yes ☐ No ☐ NA (Please explain)  Comments:  

Duplicates are on the second lab report from these samples.

ii. Submitted blind to lab?

☐ Yes ☐ No ☐ NA (Please explain)  Comments:  

Duplicates are on the second lab report from these samples.
iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 25 %)

\[
\text{RPD} \, (\%) = \frac{\text{Absolute Value of (}} \frac{\text{R}_1 - \text{R}_2}{(\text{R}_1 + \text{R}_2)/2} \times 100
\]

Where \( \text{R}_1 \) = Sample Concentration
\( \text{R}_2 \) = Field Duplicate Concentration

☑ Yes ☐ No ☐ NA (Please explain)  Comments:
Duplicates are on the second lab report from these samples.

iv. Data quality or usability affected? (Please explain.)

Comments:
No impacts to data quality or usability.

e. Field Blank (If not used explain why).

☑ Yes ☐ No ☐ NA (Please explain)  Comments:
Trip blank is on the second lab report from these samples

i. All results less than PQL?

☑ Yes ☐ No ☐ NA (Please explain)  Comments:
Trip blank is on the second lab report from these samples

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? (Please explain.)

Comments:
No impacts to data quality or usability.

7. Other Data Flags/Qualifiers
a. Defined and appropriate?

☑ Yes ☐ No ☐ NA (Please explain)  Comments:
# Laboratory Data Review Checklist for Air Samples

<table>
<thead>
<tr>
<th>Completed by:</th>
<th>Sam Fox</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td>Junior Engineer</td>
</tr>
<tr>
<td>Date:</td>
<td>3/24/2016</td>
</tr>
<tr>
<td>CS Report Name:</td>
<td>Fairview Chlorinated Solvents Investigation</td>
</tr>
<tr>
<td>Report Date:</td>
<td>April 2016</td>
</tr>
<tr>
<td>Consultant Firm:</td>
<td>Ahtna Engineering Services, LLC (partnered with Geosyntec Consultants)</td>
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<tr>
<td>Laboratory Name:</td>
<td>Eurofins Air Toxics</td>
</tr>
<tr>
<td>Laboratory Report Number:</td>
<td>1511468</td>
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</tr>
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<td>ADEC Haz ID:</td>
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</tr>
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## 1. Laboratory

a. Did a NELAP certified laboratory receive and **perform** all of the submitted sample analyses?

- ☐ Yes
- ☐ No
- ☐ NA (Please explain.)

**Comments:**

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses NELAP approved?

- ☐ Yes
- ☐ No
- ☐ NA (Please explain.)

**Comments:** Not transferred to separate laboratory.

## 2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

- ☐ Yes
- ☐ No
- ☐ NA (Please explain.)

**Comments:**

b. Correct analyses requested?

- ☐ Yes
- ☐ No
- ☐ NA (Please explain)

**Comments:**

## 3. Laboratory Sample Receipt Documentation

a. Sample condition documented -Samples collected in gas tight, opaque/dark Summa canisters or other ADEC approved container? Canister vacuum/pressure checked, recorded upon receipt and contained no open valves?

- ☐ Yes
- ☐ No
- ☐ NA (Please explain)

**Comments:**
b. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, canister not holding a vacuum etc.?

☐ Yes  ☐ No  ☐ NA (Please explain) Comments:

"No receiving discrepancies." noted in Lab Report

4. Case Narrative

a. Present and understandable?

☐ Yes  ☐ No  ☐ NA (Please explain) Comments:

b. Discrepancies, errors or QC failures identified by the lab?

☐ Yes  ☐ No  ☐ NA (Please explain) Comments:

No discrepancies, errors, or QC failures noted.

c. Were all corrective actions documented?

☐ Yes  ☐ No  ☐ NA (Please explain) Comments:

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

☐ Yes  ☐ No  ☐ NA (Please explain) Comments:

b. Samples analyzed within 30 days of collection or within the time required by the method?

☐ Yes  ☐ No  ☐ NA (Please explain) Comments:

c. Are the reported PQLs less than the Target Screening Level or the minimum required detection level for the project?

☐ Yes  ☐ No  ☐ NA (Please explain) Comments:

Vinyl Chloride is the only exception and this was documented in the work plan.
d. Data quality or usability affected? Comments: 
No

6. QC Samples
a. Method Blank
i. One method blank reported per analysis and 20 samples?
   - Yes
   - No
   - NA (Please explain)
   Comments:

ii. All method blank results less than PQL?
   - Yes
   - No
   - NA (Please explain)
   Comments:

iii. If above PQL, what samples are affected?
   Comments:
   Not applicable

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?
   - Yes
   - No
   - NA (Please explain)
   Comments:
   All samples are not detected

v. Data quality or usability affected? (Please explain.)
   Comments:
   No impacts to data quality or usability.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)
i. One LCS/LCSD or one LCS and a sample/sample duplicate pair reported per analysis and 20 samples?
   - Yes
   - No
   - NA (Please explain)
   Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.
   - Yes
   - No
   - NA (Please explain)
   Comments:

iii. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable.
   - Yes
   - No
   - NA (Please explain)
   Comments:
   RPD is not reported for LCS/LCSD results.
iv. If %R or RPD is outside of acceptable limits, what samples are affected?

☐ Yes  ☐ No  ☑ NA (Please explain)  Comments:

%R not outside acceptable limits. RPD not reported.

v. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

☐ Yes  ☐ No  ☑ NA (Please explain)  Comments:

No affected samples.

vi. Data quality or usability affected? (Please explain.)

Comments:

No impacts to data quality or usability.

c. Surrogates

i. Are surrogate recoveries reported for field, QC and laboratory samples?

☑ Yes  ☐ No  ☑ NA (Please explain)  Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.

☑ Yes  ☐ No  ☑ NA (Please explain)  Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

☐ Yes  ☐ No  ☑ NA (Please explain)  Comments:

No failed surrogate recoveries.

iv. Data quality or usability affected? (Please explain.)

Comments:

No impacts to data quality or usability.

d. Field Duplicate

i. One field duplicate submitted per analysis and 10 type (soil gas, indoor air etc.) samples?

☑ Yes  ☐ No  ☑ NA (Please explain)  Comments:

Duplicates are also for the first lab report from these samples.

ii. Submitted blind to lab?

☑ Yes  ☐ No  ☑ NA (Please explain)  Comments:

Duplicates are also for the first lab report from these samples.
iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 25 %)

\[
\text{RPD (\%)} = \text{Absolute Value of: } \frac{(R_1 - R_2) \times 100}{\left(\frac{R_1 + R_2}{2}\right)}
\]

Where \( R_1 \) = Sample Concentration
\( R_2 \) = Field Duplicate Concentration

- Yes
- No
- NA (Please explain)
Comments:

iv. Data quality or usability affected? (Please explain.)
Comments:
No impacts to data quality or usability.

e. Field Blank (If not used explain why).

- Yes
- No
- NA (Please explain)
Comments:
Trip blank submitted with samples

i. All results less than PQL?

- Yes
- No
- NA (Please explain)
Comments:

ii. If above PQL, what samples are affected?
Comments:

iii. Data quality or usability affected? (Please explain.)
Comments:
No impacts to data quality or usability.

7. Other Data Flags/Qualifiers

a. Defined and appropriate?

- Yes
- No
- NA (Please explain)
Comments:
Laboratory Data Review Checklist for Air Samples

Completed by: Sam Fox

Title: Junior Engineer Date: 3/24/2016

CS Report Name: Fairview Chlorinated Solvents Investigation Report Date: April 2016

Consultant Firm: Ahtna Engineering Services, LLC (partnered with Geosyntec Consultants)

Laboratory Name: Eurofins Air Toxics Laboratory Report Number: 1603160

ADEC File Number: N/A ADEC Haz ID: N/A

1. Laboratory

   a. Did a NELAP certified laboratory receive and perform all of the submitted sample analyses?

      ☐ Yes ☐ No ☐ NA (Please explain.) Comments:

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses NELAP approved?

      ☐ Yes ☐ No ☐ NA (Please explain.) Comments:

      Not transferred to separate laboratory.

2. Chain of Custody (COC)

   a. COC information completed, signed, and dated (including released/received by)?

      ☐ Yes ☐ No ☐ NA (Please explain.) Comments:

   b. Correct analyses requested?

      ☐ Yes ☐ No ☐ NA (Please explain) Comments:

3. Laboratory Sample Receipt Documentation

   a. Sample condition documented - Samples collected in gas tight, opaque/dark Summa canisters or other ADEC approved container? Canister vacuum/pressure checked, recorded upon receipt and contained no open valves?

      ☐ Yes ☐ No ☐ NA (Please explain) Comments:
b. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, canister not holding a vacuum etc.?

- [ ] Yes
- [ ] No
- [ ] NA (Please explain)

Comments:

"No receiving discrepancies." noted in Lab Report

---

c. Data quality or usability affected? (Please explain.)

- [ ] Yes
- [ ] No
- [ ] NA (Please explain)

Comments:

---

4. Case Narrative

a. Present and understandable?

- [ ] Yes
- [ ] No
- [ ] NA (Please explain)

Comments:

---

b. Discrepancies, errors or QC failures identified by the lab?

- [ ] Yes
- [ ] No
- [ ] NA (Please explain)

Comments:

No discrepancies, errors, or QC failures noted.

---

c. Were all corrective actions documented?

- [ ] Yes
- [ ] No
- [ ] NA (Please explain)

Comments:

---

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Data quality is sufficient and data is usable.

---

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

- [ ] Yes
- [ ] No
- [ ] NA (Please explain)

Comments:

---

b. Samples analyzed within 30 days of collection or within the time required by the method?

- [ ] Yes
- [ ] No
- [ ] NA (Please explain)

Comments:

---

c. Are the reported PQLs less than the Target Screening Level or the minimum required detection level for the project?

- [ ] Yes
- [ ] No
- [ ] NA (Please explain)

Comments:

Vinyl Chloride is the only exception and this was documented in the work plan.
6. QC Samples

a. Method Blank

i. One method blank reported per analysis and 20 samples?

- Yes
- No
- NA (Please explain)

Comments:


ii. All method blank results less than PQL?

- Yes
- No
- NA (Please explain)

Comments:


iii. If above PQL, what samples are affected?

- Not applicable

Comments:


iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

- Yes
- No
- NA (Please explain)

All samples are not detected

Comments:


v. Data quality or usability affected? (Please explain.)

- No impacts to data quality or usability.

Comments:

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. One LCS/LCSD or one LCS and a sample/sample duplicate pair reported per analysis and 20 samples?

- Yes
- No
- NA (Please explain)

Comments:


ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.

- Yes
- No
- NA (Please explain)

Comments:


iii. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable.

- Yes
- No
- NA (Please explain)

RPD is not reported for LCS/LCSD results.

Comments:
iv. If %R or RPD is outside of acceptable limits, what samples are affected?

- Yes  - No  - NA (Please explain)  

%R not outside acceptable limits. RPD not reported

Comments:

v. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

- Yes  - No  - NA (Please explain)  

No affected samples.

Comments:

vi. Data quality or usability affected? (Please explain.)

- No impacts to data quality or usability.

Comments:

c. Surrogates

i. Are surrogate recoveries reported for field, QC and laboratory samples?

- Yes  - No  - NA (Please explain)  

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable.

- Yes  - No  - NA (Please explain)  

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

- Yes  - No  - NA (Please explain)  

No failed surrogate recoveries.

iv. Data quality or usability affected? (Please explain.)

- No impacts to data quality or usability.

Comments:

d. Field Duplicate

i. One field duplicate submitted per analysis and 10 type (soil gas, indoor air etc.) samples?

- Yes  - No  - NA (Please explain)  

ii. Submitted blind to lab?

- Yes  - No  - NA (Please explain)  

Comments:
iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 25 %)

\[
\text{RPD} \, (\%) = \frac{\text{Absolute Value of: } (R_1 - R_2) \times 100}{((R_1 + R_2)/2)}
\]

Where \( R_1 \) = Sample Concentration

\( R_2 \) = Field Duplicate Concentration

- ☐ Yes
- ☐ No
- ☐ NA (Please explain)

Comments:

iv. Data quality or usability affected? (Please explain.)

Comments:

No impacts to data quality or usability.

e. Field Blank (If not used explain why).

- ☐ Yes
- ☐ No
- ☐ NA (Please explain)

Insufficient samplers available for both field duplicate and field blank.

i. All results less than PQL?

- ☐ Yes
- ☐ No
- ☐ NA (Please explain)

Comments:

No field blank submitted for these samples.

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? (Please explain.)

Comments:

Since four of five samples were all non-detect, assumed no cross-contamination even though no trip blank.

7. Other Data Flags/Qualifiers
   a. Defined and appropriate?

- ☐ Yes
- ☐ No
- ☐ NA (Please explain)

Comments:
Laboratory Data Review Checklist

Completed by: Sam Fox

Title: Junior Engineer

Date: 3/24/2016

CS Report Name: Fairview Chlorinated Solvents Investigation

Report Date: April 2016

Consultant Firm: Ahtna Engineering Services, LLC (partnered with Geosyntec Consultants)

Laboratory Name: Eurofins Air Toxics

Laboratory Report Number: 1603-040

ADEC File Number: N/A

ADEC RecKey Number: N/A

1. Laboratory

   a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?
      ○ Yes  ○ No  ○ NA (Please explain.)  Comments:

   b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?
      ○ Yes  ○ No  ○ NA (Please explain)  Comments:
      Samples were not transferred.

2. Chain of Custody (COC)

   a. COC information completed, signed, and dated (including released/received by)?
      ○ Yes  ○ No  ○ NA (Please explain)  Comments:

   b. Correct analyses requested?
      ○ Yes  ○ No  ○ NA (Please explain)  Comments:

3. Laboratory Sample Receipt Documentation

   a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?
      ○ Yes  ○ No  ○ NA (Please explain)  Comments:
b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

- Yes
- No
- NA (Please explain)

Comments:

C. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

- Yes
- No
- NA (Please explain)

Comments:

Sediment was noted inside vials for two samples.

e. Data quality or usability affected? (Please explain)

The data is likely biased low due to laboratory combination of vials due to sediment

4. Case Narrative

a. Present and understandable?

- Yes
- No
- NA (Please explain)

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

- Yes
- No
- NA (Please explain)

Comments:

c. Were all corrective actions documented?

- Yes
- No
- NA (Please explain)

Comments:

d. What is the effect on data quality/usability according to the case narrative?

The data is likely biased low due to laboratory combination of vials due to sediment
5. **Samples Results**

a. Correct analyses performed/reported as requested on COC?
   - Yes  ☐  No  ☐  NA (Please explain)  Comments:

b. All applicable holding times met?
   - Yes  ☐  No  ☐  NA (Please explain)  Comments:

c. All soils reported on a dry weight basis?
   - Yes  ☐  No  ☐  NA (Please explain)  Comments:
   No soil submitted to laboratory.

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?
   - Yes  ☐  No  ☐  NA (Please explain)  Comments:

e. Data quality or usability affected? (Please explain)
   Comments:
   Data quality and usability were not impacted.

6. **QC Samples**

a. Method Blank
   i. One method blank reported per matrix, analysis and 20 samples?
      - Yes  ☐  No  ☐  NA (Please explain)  Comments:

   ii. All method blank results less than PQL?
      - Yes  ☐  No  ☐  NA (Please explain)  Comments:

   iii. If above PQL, what samples are affected?  Comments:
iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

☐ Yes  ☐ No  ☐ NA (Please explain)  

Comments: 

No method blank results exceeded detection limits.

v. Data quality or usability affected? (Please explain)  

Comments: 

Data quality and usability were not impacted.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

☐ Yes  ☐ No  ☐ NA (Please explain)  

Comments: 

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

☐ Yes  ☐ No  ☐ NA (Please explain)  

Comments: 

No metal or inorganic analyses requested.

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

☐ Yes  ☐ No  ☐ NA (Please explain)  

Comments: 

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/DMSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

☐ Yes  ☐ No  ☐ NA (Please explain)  

Comments: 

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments: 

No information is outside acceptable limits.
vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

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No affected samples.

vii. Data quality or usability affected? (Please explain)

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<td>Data quality and usability were not impacted.</td>
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c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

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ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

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iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

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iv. Data quality or usability affected? (Use the comment box to explain.).

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<td>Data quality and usability were not impacted.</td>
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d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

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ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

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iii. All results less than PQL?

- Yes
- No
- NA (Please explain.)

Comments:

iv. If above PQL, what samples are affected?

Comments:

Not applicable.

v. Data quality or usability affected? (Please explain.)

Comments:

Data quality and usability were not impacted.

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

- Yes
- No
- NA (Please explain)

Comments:

ii. Submitted blind to lab?

- Yes
- No
- NA (Please explain)

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs?

(Recommended: 30% water, 50% soil)

\[
\text{RPD} \, (\%) = \text{Absolute Value of: } \left( \frac{R_1 - R_2}{(R_1 + R_2)/2} \right) \times 100
\]

Where \( R_1 \) = Sample Concentration
\( R_2 \) = Field Duplicate Concentration

- Yes
- No
- NA (Please explain)

Comments:

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

- Yes
- No
- NA (Please explain)

Comments:

Data quality and usability were not impacted. Original sample and field duplicate were all not detected.
f. Decontamination or Equipment Blank (if applicable)

☐ Yes    ☐ No    ☐ NA (Please explain)    Comments:

i. All results less than PQL?

☐ Yes    ☐ No    ☐ NA (Please explain)    Comments:

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? (Please explain.)

Comments:

Data quality and usability were not impacted.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

☐ Yes    ☐ No    ☐ NA (Please explain)    Comments: