SFY 2016 GAFFNEY WEST

SOIL GAS MONITORING AND OPERATIONS, MAINTENANCE, AND EVALUATION OF REMEDIATION SYSTEM REPORT

FINAL

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ALASKA Department of Environmental Conservation

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APPROVAL PAGE

This report on soil gas monitoring and operation, maintenance and evaluation of the remediation system at the Gaffney Road West site in Fairbanks, Alaska has been prepared for the Alaska Department of Environmental Conservation (ADEC) by Ahtna Engineering Services, LLC, with support from their teaming partner Geosyntec Consultants, Inc.

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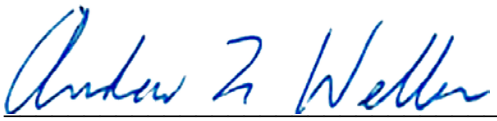

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ACRONYMS AND ABBREVIATIONS

°F.....degree Fahrenheit
AAC.....Alaska Administrative Code
ADEC.....Alaska Department of Environmental Conservation
Ahtna.....Ahtna Engineering Services, LLC
bgs.....below ground surface
cDCE.....cis-1,2-dichloroethene
cfm.....cubic feet per minute
COC.....contaminant of concern
CSM.....Conceptual Site Model
DCE.....dichloroethene
ERM.....ERM Alaska, Inc.
ft.....foot or feet
Gaffney West .Gaffney Road West
GNBBS.....Good News Bible and Book Store
hr.....hour
IDW.....investigation derived waste
inWC.....inches of water column
J.....concentration is an estimated value
mg/kg.....milligram per kilogram
ml.....milliliters
ml/min.....milliliters per minute
ND.....not detected
NTP.....Notice to Proceed
OASIS.....OASIS Environmental, Inc.
OEA.....Office of Environmental Assessment
OM&M.....operations, maintenance, & monitoring
PCE.....tetrachloroethene
RAO.....Remedial Action Objective
ROW.....right of way
RSI.....remedial system installation
SAA.....Satellite Accumulation Area
SE.....solvent extraction
SFY.....State Fiscal Year
SSD.....sub-slab depressurization
SVE.....soil vapor extraction
TCE.....trichloroethene
tDCE.....trans-1,2-dichloroethene
TWA.....time-weighted average
µg/m^3.....micrograms per cubic meter
USEPA.....United States Environmental Protection Agency
USGS.....United States Geological Survey
VC.....vinyl chloride
VI.....vapor intrusion
VMPs.....vapor monitoring point
WMS.....Waterloo Membrane Sampler®

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1.0 INTRODUCTION

Ahtna Engineering Services, LLC (Ahtna) performed soil gas monitoring and operation, maintenance, and monitoring (OM&M) of a sub-slab depressurization / soil vapor extraction (SSD/SVE) system at the Gaffney Road West (Gaffney West) site from July 2014 to January 2016. Work was performed under contract to the Alaska Department of Environmental Conservation (ADEC) in State Fiscal Year (SFY) 2016 as an addendum to activities performed in SFY 2014 and 2015 (Notice to Proceed [NTP] 18-8036-01-004F, Contract Number 160000979). The Gaffney West site has a Hazard ID of 4503 and an ADEC file number of 102.38.084. This report describes field activities, sample results, OM&M findings, a SSD/SVE system evaluation, and recommendations for future site management.

1.1 Site Summary

The Gaffney West site is located on the west side of the Gaffney Road and Cushman Street intersection in Fairbanks and extends northwest towards the Chena River (Figure 1). The Gaffney West site is impacted by three suspected release sources of tetrachloroethene (PCE): a former dry cleaning operations at the former Royal Master's Launderette at 619 Gaffney Road (now Good News Bible and Book Store [GNBBS]); a former underground storage tank which was located midway between the office building at 1326 Cushman Street (Former Park'N'Sell office) and GNBBS; and leaks from the wood-stave sanitary sewer network leading from the former Royal Master's Launderette and another source on the east side of Gaffney Road.

These multiple sources have resulted in a groundwater plume of chlorinated ethenes extending from the west side of the Airport Way/Cushman Street intersection to approximately 3,000 feet (ft) to the northwest. The toe of the plume is approximately 1,000 ft upgradient from the Golden Heart Utilities well field. Degradation of PCE is occurring as trichloroethene (TCE) and to a lesser extent, cis-1,2-dichloroethene (cDCE) and trans-1,2-dichloroethene (tDCE) are present in downgradient wells; however, vinyl chloride (VC) has not been detected in site groundwater in 15 years of monitoring.

A combined SSD/SVE system began operation in January 2010 at GNBBS to mitigate the movement of contaminant vapors into the commercial building and remove vapor phase contaminants from the source area vadose zone. The vapor intrusion (VI) pathway presents a risk for exposure to the contaminants of concern (COCs). Well surveys conducted in 1999 and 2011 have demonstrated that no drinking water wells apparently remain within the contaminant plume boundaries.

1.2 Project Organization

ADEC contracted Ahtna to manage and execute this project. Laboratory analytical services and waste disposal were subcontracted. Project organization included the following entities:

- Third-party environmental consultant: Ahtna Engineering Services, LLC., Fairbanks and Anchorage, AK (Ahtna is teamed with Geosyntec Consultants of Anchorage);
- Laboratory subcontractor for air sample analyses: Eurofins Air Toxics, Inc., Folsom, California.

1.3 Scope of Work

The scope of work for SFY 2016 for the Gaffney West site is listed in *Gaffney Road West, Work Plan Addendum* (Ahtna, 2015), and includes the following activities:

- Operate the SVE system during the summer months only.
- Operate the SSD system for the entire year.
- Install seven vapor monitoring points (VMPs) in the mid-plume area and sample soil gas from this network to monitor potential risk from the VI pathway.
- Maintenance of monitoring wells and VMPs as described in the *Gaffney West Groundwater Monitoring and Operations and Maintenance of Remediation System* (Ahtna, 2013).

2.0 BACKGROUND

2.1 Environmental Setting

The Gaffney West environmental setting section is based on information from various regional reports by the United States Geological Survey (USGS) and is found in previous Gaffney Road East and West reports by OASIS Environmental, Inc. (OASIS).

The site is situated on the collective floodplain of the Tanana and Chena rivers. The surficial geology consists of unconsolidated silt, sand, and gravel of the Chena Alluvium from the Pleistocene and Holocene ages. The Chena Alluvium is characterized by well-stratified layers of unconsolidated coarse sand and gravel, interceded with poorly stratified layers and lenses of unconsolidated silt and sandy silt. The poorly stratified sediments are present in sinuous swale and slough deposits, while the unconsolidated coarse sand and gravel are ubiquitous within the Tanana-Chena floodplain. Collectively, these unconsolidated deposits are more than 300 ft thick in the Tanana and Chena river valleys (Péwé et al., 1976).

Discontinuous permafrost of generally low ice content is characteristic of Chena Alluvium sediments. However, swale and slough deposits commonly have moderate-to-high ice (permafrost) content in the form of seams and lenses. The low ice content of the coarse sand and gravel deposits are present in pore spaces and/or very thin seams. Typically, the depth to permafrost is less in the finer-grained sediments of the swale and slough deposits, and the ice content is greater in the older swale and slough deposits than in the younger swale and slough deposits. Locally, both deposits are perennially frozen; where present, permafrost ranges in depth from 2 ft to 40 ft below ground surface (bgs) (Péwé et al., 1976).

The unconfined, alluvial-plain Chena Alluvium aquifer is capable of yielding significant quantities of water in wells. The aquifer may seasonally exhibit confined conditions over localized areas from seasonal frosts. Also, where discontinuous permafrost is present, confined conditions may exist in sub-permafrost groundwater within the alluvial plain aquifer (Péwé et al., 1976).

Recharge to the alluvial-plain aquifer occurs from the Tanana and Chena rivers, with a relatively small amount resulting from infiltration of precipitation. Groundwater levels in the alluvial-plain aquifer respond relatively quickly to increases in stages of the Tanana and Chena rivers. Wells completed in the alluvial-plain aquifer within 0.5 miles of either river show the greatest elevation increases due to increased river flow (Glass, Lilly, and Meyer, 1996).

Data gathered during previous groundwater assessments at the site indicate that groundwater flow in the unconfined alluvial-plain aquifer is northwest, with localized variations shifting the flow north or west. In general, the elevation of the water table in the alluvial-plain aquifer varies from 420 ft to 427 ft above mean sea level with an average horizontal gradient of 10^{-4} ft/ft. These elevation data are consistent with those presented by the USGS for the regional aquifer (Glass, Lilly, and Meyer, 1996).

2.2 Previous Investigations

Investigative work at the Gaffney Road area was a result of the discovery of chlorinated ethene groundwater contamination in 1993 (Dames and Moore, 1993) while investigating a nearby site. Most of the site characterization, mitigation, and remedial activities have been state-lead since 1997. By 2007, two chlorinated ethene release areas and resultant contaminant groundwater plumes were mostly defined. Vadose zone contamination resulting from surface spills and sewer releases of PCE were centered in two locations: one immediately south of the current GNBBS on the west side of Cushman Street and another near the fourplex on the east side of Cushman Street. In 2010, ADEC administratively split the Gaffney Road Area-Wide site into the Gaffney Road East and West Sites.

The VI pathway was evaluated at the Gaffney West site from 2006 through 2010, then again in 2013. The pathway was deemed complete at several site buildings. The SSD/SVE system began operation in 2010 to mitigate chlorinated ethene vapors migrating from the subsurface into GNBBS and remove contaminant mass in the vapor phase. A summary of activities and the associated findings since 2006 is in Table 2-1.

TABLE 2-1: GAFFNEY WEST SITE ACTIVITIES (2006 TO 2014)

Year	Consultant	Activities	Findings
2006	OASIS	Well replacement. Groundwater monitoring. Natural attenuation analysis. VI assessment.	Groundwater analysis shows that West PCE Plume appears to lack geochemical conditions that promote natural attenuation. VI assessment shows that GNBBS and 1301 Turner Street have complete VI pathways during winter heating season. The VI pathway at Meyeres Real Estate (627 Gaffney Road) appears to be incomplete.
2007	OASIS	Passive soil gas analysis along sewer line on Turner Street. Installed 70 test borings in West PCE Plume. Installed 4 monitoring wells in West PCE Plume. Groundwater Monitoring. VI assessments at seven buildings in West PCE Plume.	Source area in West PCE Plume extends across Stacia Street from GNBBS to office building at 1326 Cushman (Former Park'N'Sell office) Street and south along sewer line to the south side of Airport Way. No change in status of groundwater plumes. VI assessment shows complete pathway for GNBBS, but an incomplete pathway for 1301 Turner Street during the summer.
2008	OASIS	Exterior soil gas sampling at three buildings south of Airport Way. Installed five test borings south of Airport Way. VI assessments at two buildings in West PCE Plume. Installed six soil borings at former Park'N'Sell lot. Performed treatability study for source area near GNBBS.	VI pathway possibly complete at all assessed locations. Verified VI at State Farm Insurance and performed another round of air sampling at GNBBS. Estimated the extent of the solvent plumes on the south side of Airport Way. Delineated a separate release of PCE on the 1326 Cushman Street property along with possible release mechanisms and potentially responsible parties. Delineated the East PCE Plume and confirmed a source area near Coin King Laundromat. Treatability study showed that SVE is a viable alternative to reduce vadose-zone contaminants, mitigate VI into GNBBS, and not inhibit bioremediation of contaminated groundwater.

Year	Consultant	Activities	Findings
2009	OASIS	VI assessment at GNBBS.	Confirmed there has been no change in air concentrations at GNBBS.
2010	OASIS	Designed, installed, and began operation of an SSD/SVE system behind GNBBS. Groundwater monitoring. VI assessments at GNBBS, suite currently occupied by Allstate Insurance, 1326 Cushman Street office building, and State Farm Insurance.	SSD system has reduced indoor air PCE concentrations below ADEC target levels in GNBBS. SVE system is removing vadose zone contamination while not altering subsurface reductive dechlorinating environments. VI pathway at State Farm Insurance is complete although PCE concentrations in the workspace are below target levels.
2011	OASIS	Continued OM&M of SSD/SVE system behind GNBBS including replacement of seven SVE wells. VI assessments at GNBBS, suite currently occupied by Allstate Insurance, and State Farm Insurance.	SSD system continues to keep indoor air chlorinated solvent concentrations below ADEC targets in GNBBS. Suite currently occupied by Allstate Insurance had COC concentrations below ADEC targets in Sept. 2011. SVE well replacement increased total SVE system flow rate.
2012	OASIS	Continued OM&M of SSD/SVE system behind GNBBS. ADEC issues new VI Guidance in October with revised targets. SVE rebound test. Installation of seven monitoring wells.	Negative pressure envelope continues to mitigate chlorinated solvent vapor migration into GNBBS. Exhaust stack effluent samples confirm chlorinated solvent mass removal from SSD/SVE system. Soil gas concentrations above ADEC targets after SVE rebound test.
2013	ERM Alaska, Inc. / Ahtna	VI assessments at The Donut Shoppe and GNBBS. Groundwater sampling for chlorinated ethenes, geochemical parameters, and compound specific isotope analysis. Two SVE rebound tests. One SSD rebound test.	Chlorinated ethene vapor concentrations below ADEC targets in the Donut Shoppe and GNBBS while SVE/SSD system in operation. Groundwater concentrations within area of influence of SVE appear to have decreased. SVE rebound tests show exterior soil gas COC concentrations above targets when no SVE influence. SSD rebound test show indoor air COC concentrations below targets with no SSD influence – one sub-slab location above target.
2014	Ahtna	Continue operating SSD/SVE system. Sample four source area wells for VOCs and SVE rebound test in Spring 2014.	Rebound soil gas COC concentrations above targets, all source area wells within the influence of the SVE show a decreasing contaminant concentration trend by Mann-Kendall analysis.

Selected results from previous investigations are shown in Appendix A, including cumulative site groundwater results, a figure showing the contaminant plume extents from 2013 sampling results, and cumulative SSD/SVE system results.

2.3 Regulatory Framework

The regulatory framework for this project has been developed by consideration of the following regulations and guidance documents.

1. 18 Alaska Administrative Code (AAC) 75, Oil and Other Hazardous Substances Pollution Control, January 1, 2016.
2. *Policy Guidance on Developing Conceptual Site Models*, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, October 2010.

3. *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites*, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, September 23, 2009.
4. *Draft Field Sampling Guidance*, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, May 2010.
5. *Vapor Intrusion Guidance for Contaminated Sites*, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, October 2012.
6. *U.S. Environmental Protection Agency Region 10 Office of Environmental Assessment (OEA) Recommendations Regarding Trichloroethylene Toxicity in Human Health Risk Assessments*, (USEPA) Region 10, December 2012.
7. *Fact Sheet: Additional Information about Exposure to TCE*, ADEC Division of Spill Prevention and Response. Contaminated Sites Program, January 8, 2014.

Table 2-2 shows soil gas target levels for site COCs, as seen in the ADEC VI Guidance, Appendicies E and F.

TABLE 2-2: SOIL GAS AND TARGET LEVELS FOR CONTAMINANTS OF CONCERN

Compound	Vapor Intrusion Target Levels			
	Deep Soil Gas (µg/m^3)		Shallow Soil Gas (µg/m^3)	
	Residential	Commercial	Residential	Commercial
PCE	4,200	18,000	420	1,800
TCE[1]	200[1]	840[1]	20[1]	84[1]
cDCE	730	3,100	73	310
tDCE	6,300	26,000	630	2,600
1,1-DCE	21,000	88,000	2,100	8,800
VC	160	2,800	16	280

µg/m^3 = micrograms per cubic meter
[1] extrapolated from December 2012 USEPA TCE memo and 2014 ADEC Fact Sheet on TCE

2.4 Conceptual Site Model

A human health conceptual site model (CSM) was developed in the *State Fiscal Year 2013, Operations and Maintenance of Remediation System and Additional Characterization Report* (ERM, 2013). The original CSM can be found in Section 2.4 and Appendix A of the above referenced report. Section 6.6 of this report provides an updated CSM specific to current SVE operations and strategy.

3.0 FIELD ACTIVITIES

Gaffney West field activities occurred from July 2014 through January 2016 and followed plans outlined in *Gaffney Road West, Work Plan Addendum* (Ahtna, 2015) and *Gaffney West Groundwater Monitoring and Operations and Maintenance of Remediation System* (Ahtna, 2013). The following field activities occurred and are described in the following subsections:

- Operation and maintenance activities for the SSD/SVE remediation system,
- Maintenance of the groundwater and soil vapor monitoring well network, and
- Soil vapor monitoring point installation and sampling.

Field notes and photographs are included in Appendix B and Appendix C, respectively.

Maintenance for groundwater monitoring wells and VMPs was completed in September 2014. Additional VMPs installed along the midline of the contaminant groundwater plume in July 2015. These newly installed VMPs were sampled in September 2015.

3.1 SSD/SVE Operations and Maintenance

Maintenance activities and operating procedures for the SSD/SVE system were conducted in accordance with the *Gaffney West Groundwater Monitoring and Operations and Maintenance of Remediation System Work Plan* (Ahtna, 2013). The SSD system operated continuously. The SVE system was turned off for periods in early 2015 during saturated ground conditions generally associated with spring melt. Beginning July 1, 2015, the SVE system was operated using a pulsed schedule of 12-hours on, 12-hours off. On October 30, 2015, the SVE system was turned off for the winter. On April 2, 2016, the SVE system was turned back on using a 12-hours on, 12-hours off pulsing schedule.

Quarterly maintenance checks were performed on the SSD/SVE system. Blower speeds, blower vacuums, manifold vacuums, individual well flow rates, total flow, operating hours, blower temperatures, and differential pressures at the outdoor VMPs and sub-slab monitoring points were recorded. In addition, minor system maintenance such as cleaning rotameters and adjusting doors was performed.

During the October 2015 quarterly maintenance check, an SVE exhaust stack sample was collected to monitor current concentrations and removal rates of chlorinated ethenes from the subsurface. The SVE exhaust stack sample was collected on October 29, 2015 after the SVE system had been running for 10 hours of its pulsed schedule. A sample volume of 100 milliliters (ml) of SVE exhaust was pulled through a TO-17 tube at a rate of approximately 25 ml/minute (min). The sample was submitted to Eurofins/Air Toxics of Folsom, California, for analysis of chlorinated ethenes by modified USEPA method TO-17.

Another SVE exhaust stack sample was obtained 15 minutes after startup on April 22, 2016 to identify the rebound removal concentration. The sample volume and method were the same as the October 2015 sample.

3.2 Well Maintenance

Monitoring well MW-18D was decommissioned, and three groundwater monitoring wells (MW-27, MW-29S, and TW-46) and one vapor monitoring well (VMP-2) received maintenance and repair in September 2014.

- MW-18D was decommissioned because the well cover and cap were compromised, and the well had become packed with gravel to 13 ft bgs. Ahtna removed the top 5 ft of casing and backfilled with hydrated bentonite grout to 1 ft bgs. The top foot was backfilled with native gravel.
- The cracked/broken well covers for MW-27, MW-29S, and VMP-2 were removed and were replaced with eight new 8 inch diameter traffic-rated steel well covers which were set in concrete.
- The top of casing for TW-46 was trimmed approximately two inches because the well had heaved and the well cover was not sitting securely.

3.3 VMP Installation and Sampling

In July 2015, seven VMPs were installed in City of Fairbanks' rights-of-way between 11th and 5th Avenues and between Turner and Kellum Streets. In early July 2015, the AK Digline, Golden Valley Electric Association, Golden Heart Utilities, and Aurora Energy identified nearby buried utilities in the vicinity of the prospective locations. The VMPs were installed on July 23 and 24, 2015. Figure 2 shows the locations of the VMPs. Appendix D shows the City of Fairbanks' permits and associated fees.

The VMPs were installed by GeoTek Alaska using a Geoprobe 6610 direct-push rig. Great Northwest provided traffic control and signage. A direct-push drilling rig was used to obtain 1.5-inch diameter cores (2.25-inch diameter borings) to 15 ft bgs at each location. The depth of groundwater was determined by core examination. Boring logs are included in Appendix E. One-inch diameter, Schedule 80 polyvinyl chloride pipe with threaded bottom caps, were used as casings. All joints were threaded and contained O-rings. The bottom six-inches of each casing were perforated with 64 total, 1/8-inch diameter holes. The bottoms of the VMPs are between 8 and 12 ft bgs, approximately two ft above the July 2015 groundwater table at each location. Sand was placed in the lower annular sections so that it was one to two ft above the tops of the screens. The middle annular sections were backfilled with bentonite crumbles and hydrated to create seals between the atmosphere and perforated sections. Sand was placed in the top ft of the annular sections. Vapor extraction compression well caps were placed on the tops of the casings. The tops of the casings were approximately 6-inches bgs and are protected by 8-inch diameter steel covers with 12-inch skirts. The tops of the covers were placed approximately ½-inch below grade to avoid contact with snow removal blades and were cemented into place. String was connected to the inside of the well caps to allow suspension of Waterloo Membrane Sampler® (WMS) passive samplers within the screened section of the vapor wells. In addition, dedicated Teflon tubing was connected to the inside of the vapor extraction plug and extended to the perforated section of the VMPs. On July 27 through 29, the wells were purged of 10 times the volume of casing and sand pack volumes to evacuate ambient air introduced into the subsurface during drilling.

The VMPs were sampled between September 18 and 25, 2015 using both active and passive sampling techniques as outlined in the *Gaffney Road West, Work Plan Addendum* (Ahtna, 2015). The following procedures were followed:

- Connected a leak hood, vacuum gauge manifold, sample canister, and flow controller using dedicated Teflon tubing to the sampling port on the outside of the vapor extraction well plug, and conducted a vacuum leak check and a purge of the annulus and leak test of the well plug and bentonite seal by applying industrial-grade helium to the leak hood.
- Purging occurred at 50 ml/min and helium was maintained under the hood at a minimum concentration of 50 percent during the purging process. Purged soil gas was collected in a Tedlar bag.
- The volume purged was one total volume of the casing and sand pack for each well, which ranged from 1.4 to 3.0 liters.
- At the end of the purge, the Tedlar bag of soil gas effluent was tested for the presence of helium. A helium concentration of less than 10 percent of was considered acceptable. See Section 3.5 for details when helium was greater than 10 percent.
- Removed the well plug and secured the WMS passive sampler to the string so that the WMS was suspended in the perforated section of the well. Care was taken to be expedient in this step to avoid introducing atmospheric air into the casing.
- Replaced the well plug, removed the vacuum gauge, and reconnected the stainless steel canister to the outside of the well plug using the dedicated Teflon tubing.
- Opened the valve on the canister and documented the time, date, initial vacuum, canister identification, and WMS serial number.

Duplicate canister and WMS samples were collected from VMP-4. All samples were submitted to Eurofins/Air Toxics of Folsom, California, for analysis of COCs by USEPA method TO-15 for the canisters and solvent extraction (SE) by carbon disulfide followed by injection into a gas chromatograph/mass spectrometer for the WMS.

Sampling was conducted between September 18 and 25, 2015 and was recorded on the sampling data sheets presented in Appendix F. The samples were deployed for one to seven days. Table 3-1 shows the sample durations and sampling equipment required to execute the multi-day sampling event.

TABLE 3-1: DETAILS OF VAPOR MONITORING POINT SAMPLING

Vapor Well	Sample Duration	Sampling Equipment
VMP-4	1-day	One 6-liter canister and one 24-hour flow controller in duplicate One WMS in duplicate
VMP-5	7-day	Three 6-liter canisters, two 72-hour and one 24-hour flow controller One WMS
VMP-6	5-day	Two 6-liter canisters, one 72-hour and one 48-hour flow controller One WMS
VMP-7	3-day	One 6-liter canister, one 72-hour flow controller One WMS
VMP-8	1-day	One 6-liter canister, one 24-hour flow controller One WMS
VMP-9	5-day**	Three 6-liter canisters, one 72-hour and two 24-hour flow controllers One WMS
VMP-10	5-day	Two 6-liter canisters, one 72-hour and one 48-hour flow controller One WMS
**: VMP-9 was planned to be a 7-day sample, but the second 72-hour canister was nearly full after 24-hours. Therefore, the field team swapped out the second 72-hour canister for the final 24-hour canister and VMP-9 became a 5-day sample.		

It should be noted that soil gas sampling conditions were not ideal in the fall of 2015. Fairbanks experienced heavy precipitation in late summer and fall, resulting in higher groundwater levels than typical and overall increased moisture content in the vadose zone. August and September 2015 totaled 6.32 inches of precipitation in Fairbanks, greater than the mean sum for August and September since 1929, of 3.19 inches (Western Regional Climate Center, Fairbanks International Airport Station). This situation compromised sampling activities as standing water was measured in the VMPs bottom caps, or WMS samplers were wet upon retrieval for three of the seven samples (VMP-6, VMP-7, and VMP-8).

3.4 Waste Handling

Investigation Derived Waste (IDW) from drilling operations consisted of soil from cores, soil core sleeves, and disposable nitrile gloves. Vadose zone contamination is not known to exist in the mid-gradient plume area where the vapor monitoring wells were installed. Therefore, IDW was not considered an F-listed hazardous waste. Soil from cores was spread near each VMP or spread near the remediation unit, whichever was more suitable based on the VMP location. Core sleeves and disposable nitrile gloves were disposed in the Fairbanks North Star Borough Landfill.

A small amount of F-listed IDW was generated during this reporting period, consisting of a few pairs of nitrile gloves and approximately a half gallon of water from cleaning rotameters. These were placed in the Satellite Ammunition Area (SAA) for storage until a larger quantity of waste is ready for disposal, up to 55 gallons. No F-listed IDW was disposed during this reporting period.

3.5 Work Plan Deviations

The following deviations occurred from work elements contained in *Gaffney Road West, Work Plan Addendum* (Ahtna, 2015):

- The screens for VMP-7 and VMP-8 were submerged with water during sampling in September 2015. The field team was unable to conduct a proper leak test because the water resulted in high vacuum and probable short-circuiting through the well cap for both monitoring points. The field team decided to continue with sampling, although the representativeness of the analytical results was unknown.
- A 7-day sample was planned to be collected for VMP-9, but the second 72-hour stainless steel canister filled in approximately 24-hours; therefore, a 5-day sample was collected (one 72-hour and two 24-hour canisters).
- The duplicate sample for VMP-4 was collected, but was not analyzed because of an error in programming of the laboratory's autosampler. The canister was released to service before the error was identified and re-analysis could occur.

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4.0 FINDINGS AND RESULTS OF FIELD ACTIVITIES

This section presents the findings and results from vapor monitoring and operation of the SSD/SVE system.

4.1 SSD/SVE Operations

This sub-section presents the mechanical and performance metrics of system operation since July 2014. Operation and maintenance data sheets are included in Appendix G.

4.1.1 Mechanical Targets

Mechanical targets for the SSD/SVE blowers are based on manufacturer's recommendations and were established in the Remedial System Installation (RSI) report (OASIS, 2010).

Mechanical targets and actual conditions include:

- SSD blower vacuum less than 45 inches of water column (inWC)
- SSD exhaust temperature less than 215 °F.
- SSD manifold/blower vacuum differential across air filter less than 5 inWC
- SVE blower vacuum less than 82 inWC
- SVE exhaust temperature less than 275 °F
- SVE manifold/blower vacuum differential across air filter less than 5 inWC

Mechanical targets have generally been met since system startup. Neither the SSD nor the SVE blower vacuum target was exceeded during the current reporting period of July 2014 to January 2016. Exhaust temperatures from both blowers have been below the maximum targets for the entirety of their operation. The differential vacuum target across the air filters has not always been met; however, the filters have been maintained in a clean condition.

4.1.2 Performance Targets

Performance targets for the SSD/SVE system were also established in the RSI report to meet the Remedial Action Objectives (RAOs) of mitigating VI in GNBBS and reducing COC concentrations in the vadose zone to meet ADEC soil cleanup levels in 18 AAC 75.341, Table B1.

The performance targets necessary to achieve the RAOs include:

- SSD system flow rate greater than 40 cubic feet per minute (cfm)
- SSD individual well flow of 10 cfm
- Average sub-slab negative pressure greater than 1 pascal or 0.004 inWC inside GNBBS building.
- SVE system flow rate greater than 80 cfm
- SVE individual well flow between 5 and 10 cfm

The target SSD and SVE system flow rates, measured by differential vacuum across a cross-section of blower exhaust piping, have generally been achieved since the system began operation. However, during 2015, individual SSD wells and SVE wells have met their target flow rate 83% and 40% of the time, respectively. The SSD system wells DW-1 and DW-3 have been experiencing higher vacuums over time. SVE wells have gradually become plugged with particle fines and periodically uptake moisture from saturated soil reducing their capability to achieve target flow rates. The target negative pressure beneath GNBBS has been met since the SSD system began operation.

4.1.3 Exhaust Stack Sampling

The concentration of PCE in the exhaust stack sample collected on October 29, 2015 was 1,700 µg/m^3. Based on the system flow rate, this concentration equates to a mass removal rate of 0.02 pounds per day of PCE, based on 24-hour day. Mass removal continues from the vadose zone at concentrations and rates that are similar to previous years.

4.2 Vapor Monitoring

The seven VMPs were installed to investigate the potential for VI at buildings above the groundwater contaminant plume where no previous VI assessments have been performed or no shallow groundwater monitoring wells exist. Concurrent active (TO-15) and passive soil samples (SE WMS) were collected from the VMPs for durations varying from 24 hours to seven days. For locations with more than one stainless steel canister (i.e., 5- or 7-day samples), the individual results for the stainless steel canisters were combined into a time-weighted average concentration for direct comparison to the continuous passive soil gas result.

Two results for TCE, the TO-15 result for VMP-6 and the SE WMS result for VMP-8, were greater than the residential shallow soil gas target of 21 µg/m^3. Even though the vapor monitoring wells are screened at depths below 5 ft bgs, the data could represent shallow soil gas in cases where a building has a basement; therefore, the results have been compared to both deep and shallow ADEC soil gas targets. Table 4-1 shows the sample results. Laboratory reports are included as Appendix H to this report.

TABLE 4-1: SEPTEMBER 2015 VAPOR MONITORING SAMPLE RESULTS

		PCE (µg/m³)		TCE (µg/m³)	
Location ID	**Sample Information**	**Active (TO-15)**	**Passive SE WMS**	**Active (TO-15)**	**Passive SE WMS**
Trip Blank	NA	NA	ND (3.8)	NA	ND (5.6)
VMP-4	24-hour TWA	7.8	17 J	1.1 J	ND (39)
VMP-5	72-hour	2.9 J	--	5.9 J	--
	72-hour	4.3 J	--	9.2	--
	24-hour	12	--	10	--
	7-day TWA	4.8 J	21	7.9 J	13
VMP-6	72-hour	7.8	--	**20**	--
	48-hour	11 J	--	**36**	--
	5-day TWA	9.1 J	1.2 J	**26**	ND (7.9)
VMP-7	3-day TWA	ND (5.8)	ND (8.9)	ND (4.6)	ND (13)
VMP-8	24-hour TWA	7.0	61	9.6	**85**
VMP-9	72-hour	2.1 J	--	ND (4.1)	--
	24-hour	ND (5.9)	--	ND (4.6)	--
	24-hour	5.1 J	--	ND (5.8)	--
	5-day TWA	2.9 J	15	< 5.8	ND (7.9)
VMP-10	72-hour	ND (5.9)	--	2.5 J	--
	48-hour	ND (5.8)	--	ND (4.6)	--
	5-day TWA	< 5.9	2.7 J	2.5 J	ND (7.9)
ADEC Shallow Soil Gas Targets	*Commercial*	*1,800*		*84*[1]	
	Residential	*420*		*20*[1]	
ADEC Deep Soil Gas Targets	*Commercial*	*18,000*		*840*[1]	
	Residential	*4,200*		*200*[1]	

µg/m³ = micrograms per cubic meter
ND = not detected
TWA = time-weighted average
J = concentration is an estimated value.
Bold result indicates exceedance of a residential soil gas target.
Result with "<" indicates average of non-detect results
[1] Extrapolated from USEPA TCE method and 2014 ADEC Fact Sheet on TCE

The seven paired active and passive sample results are rather limited for a quantitative analysis of comparability. However, some observations include:

- Seven out of the 14 paired results (seven samples with both PCE and TCE reported) had PCE and TCE detected in both the active (TO-15) and passive (SE WMS) samples. For six of the seven, the reported concentration in the passive sample was greater than the reported concentration in the active sample.
- Six of the 14 paired results had PCE and TCE either not detected in both the active and passive samples, or one of the samples was reported below the laboratory reporting limit while the other was not detected.
- The remaining paired result had a TCE concentration of 26 µg/m³ in the active sample and a non-detect in the passive sample.

Overall, these results indicate that reported concentrations of the passive samples usually were equivalent or higher than the paired active samples.

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5.0 QUALITY ASSURANCE REVIEW

This section summarizes the results of a data review using ADEC's *Environmental Laboratory Data and Quality Assurance Requirements, March 2009*, to determine data quality and to evaluate potential impact on the usability of the data. The review was performed using EPA Level II laboratory data reports provided by Eurofins Air Toxics for soil gas analytical data. Laboratory analytical reports are provided in Appendix H. ADEC data review checklists are included in Appendix I.

The following list provides a review of how data compared to data quality indicators (more details are presented in Appendix I).

- All work was performed by qualified environmental professionals per 18 AAC 75.333.
- Completeness – Twenty-four (24) of the 25 soil gas samples (96%) collected were analyzed and reported. This meets ADEC default requirements of 85%. The one sample not reported occurred because of a laboratory error involving the programming of the auto-sampler. The sample canister was released to service before the error was identified; therefore, the sample could not be re-run.
- Accuracy – All surrogate recoveries in project, method blank, matrix spike, and laboratory control samples met method control limits. All percent recoveries in continuing calibration samples also met method control limits. No data qualification is necessary for accuracy.
- Precision – One duplicate sample for active (TO-15) and passive SE WMS soil gas samples were collected during the project. The duplicate sample (15-GRW-019-SG) for the active samples was the sample that was not analyzed because of a laboratory error involving the programming of the auto-sampler. The duplicate pair for the passive samplers (15-GRW-001-SG and 15-GRW-003-SG) was within the required 25% relative percent difference for air samples for the reported compounds. The frequency of field duplicate collection met the 10% requirement. No data qualification is necessary for precision.
- Comparability – Samples were collected and analyzed in a manner that allowed analytical results to be compared to each other. Dilution was required on samples 15-GRW-006-SG, 15-GRW-007-SG, 15-GRW-008-SG, 15-GRW-011-SG and 15-GRW-019-SG due to the presence of high level non-target species, mainly Freon compounds, which possibly limited the ability to see low levels of COCs, but reporting limits were above soil gas target levels.
- Representativeness – Leak detection was used to confirm that the vapor monitoring wells did not leak atmospheric air during sampling. Two wells (VMP-7 and VMP-8) could not meet the 10% maximum leak requirement because of the presence of water in the vapor wells during sampling. As discussed in Section 3.5, sampling still commenced. There is possible low bias for samples 15-GRW-012-SG and 15-GRW-013-SG (VMP-7), and 15-GRW-014-SG and 15-GRW-015-SG (VMP-8) from the observed leakage; however, no qualification of data has occurred. Active sample 15-GRW-19-SG (14% of the analytical result for VMP-9) was at ambient pressure at the time of sample retrieval; therefore, possible low bias may exist in the analytical result from atmospheric influence. However, given that the reported concentration is the highest reported result for the three canisters

collected at VMP-9, no qualification of the data has occurred. Finally, a passive sample trip blank accompanied the field samples to ensure that sample handling and transport did not potentially cross-contaminate samples. No compounds were detected above laboratory reporting limits in the trip blank samples. A trip blank is not necessary for the canisters as canister certification, initial canister vacuums, and final canister vacuums when received at the laboratory provide the same data evaluation as a trip blank.

6.0 REMEDIATION SYSTEM EVALUATION AND STRATEGY

The SSD/SVE system has been operating for over six years. As detailed in Section 4.2, mechanical targets are generally met. Attainment of performance targets often is problematic for individual SVE wells because particle fines and moisture become entrained in the wells; however, overall system flow and protection against VI in the GNBBS building through continuous sub-slab depressurization have been reliable. Mass removal of PCE continues to occur, although removal rates have been asymptotic for approximately five years. This report provides an opportunity to review system objectives, system operations and costs, and consider additional optimization and future strategy.

6.1 Remedial Action Objectives

The RAOs for the SSD/SVE system were developed to protect human health and the environment and to comply with relevant state and federal regulations. The RAOs were initially provided in the RSI report (OASIS, 2010) and are as follows:

- Mitigate VI in GNBBS.
- Reduce concentrations of COCs to meet the ADEC Table B1 cleanup levels.

Indoor air concentrations have not exceeded current ADEC target levels since system startup and secondary metrics (e.g., system flow and vacuum measurements) also have been met, indicating the first RAO has been consistently met. The second RAO has not been directly evaluated as no soil sampling has been conducted since system startup; however, soil gas samples from vapor monitoring points within the radius of influence have been collected to provide a surrogate estimation of progress toward Table B1 soil cleanup levels (see Section 6.4).

6.2 SSD and SVE System Timeline

Table 6-1 outlines SSD/SVE system operations since the system start in January 2010.

TABLE 6-1: SSD/SVE SYSTEM OPERATION TIMELINE

Date	Actions
January 12, 2010	The system was started and run continuously. OM&M data collected in first month indicate that both systems were effective (SSD for protecting against VI and SVE in mass removal).
August 29 - October 5, 2012	SVE turned off on August 29, and exterior soil gas VMP sampling on October 5 when SVE restarted.
March 1-29, 2013	SVE turned off on March 1, and exterior soil gas WMP sampling on March 29 when SVE restarted.
June 28, 2013	SSD/SVE systems shutdown due to end of operation contract.
September 23, 2013	Separate SSD and SVE sampling ports installed. Rebound sampling for the SSD and SVE systems were performed in association with the system re-start SSD began running continuously. SVE system began operating on a 12-hour (hr) pulse schedule (12 hours on and 12 hours off).
February 28 – April 17, 2014	The SVE system was shut down on February 28. When restarted on April 17, a rebound test was performed and system set to run on a 12-hr pulse cycle.
April 29, 2014	The SVE system was turned off due to high vacuum caused by saturated soils during

Date	Actions
	spring breakup.
May 26, 2014	The SVE system was restarted on the 12-hr pulse cycle.
January 30, 2015	The SVE system was turned off for cost savings.
February 20-26, 2015	The SVE system was run for a week on the 12-hr pulse cycle.
February 27, 2015	The SVE system was turned off for cost savings.
March 24 – April 2, 2015	The SVE system was run for ten days on the 12-hr pulse cycle.
April 3, 2015	The SVE system was turned off for cost savings.
April 22, 2015	The SVE system was restarted on the 12-hr pulse cycle.
October 30, 2015	The SVE system was turned off for the winter months.
April 22, 2016	The SVE system was restarted on the 12-hr pulse cycle.

6.3 Steady State Exhaust Stack Emissions Data

The concentration of PCE in the exhaust stack sample collected on October 29, 2015 (1,700 µg/m^3) was the highest result for a non-rebound test since September 2010, nine months after system start-up. However, the stack concentrations of PCE from the eight non-rebound test samples since September 2010 have only ranged between 900 and 1,700 µg/m^3, and it is important to note that this recent result was the first sample collected during the 12-hrs on/12-hrs off pulse cycle.

Graph 1 (appended) shows steady state exhaust stack concentrations since operation began through SVE shutdown in October 2015. Rebound concentrations are not shown. Based on system flow rates, the PCE emission rate has remained steady between 0.01-0.03 pounds per day for the past five years. Appendix J shows PCE removal calculations.

6.4 Rebound Tests

Five rebound tests of the SVE system and one rebound test of the SSD system have been performed during system operation. Previous reports document the results of these tests (OASIS, 2013; ERM, 2013; and Ahtna, 2014a) and summaries are provided below. Cumulative rebound test results are shown in Appendix A.

- In October 2012, two exterior VMPs within the SVE treatment area were sampled following a month of SVE shutdown. PCE exceeded the exceeded a shallow soil gas target and cDCE exceeded a deep soil gas target.
- In March 2013, two exterior VMPs within the SVE treatment area were sampled following a month of SVE shutdown. There were no target exceedances.
- In September 2013, five exterior VMP's were sampled following nearly three months of SSD/SVE shutdown. One shallow VMP exceeded the shallow soil gas target for PCE, and one deep VMP exceeded the deep soil gas target for PCE. Two other deep VMPs exceeded the deep soil gas target for cDCE. A sample of the SVE exhaust immediately following SVE system re-start had a PCE concentration of 4,700 µg/m^3, which is approximately a factor of four greater than the long-term average concentration for continuous SSD/SVE operations. Four sub-slab VMPs, two indoor air locations, and one outdoor ambient air location were also sampled. One sub-slab VMP in the GNBBS

building exceeded target levels for PCE and TCE, but no indoor air concentrations exceeded indoor air target levels. Indoor air samples were taken for 24-hr durations.

- In April 2014, three exterior VMPs were sampled following a nearly two month SVE shutdown and none had an exceedance of soil gas targets. A sample of the SVE exhaust following SVE system re-start had a PCE concentration of 3,600 µg/m^3, which is approximately 3 times greater than the long-term average concentration for continuous SVE operations.
- The PCE concentration in the exhaust stack sample after rebound on April 22, 2016 (2,700 µg/m^3) was the lowest of three SVE rebound concentrations obtained during operation. In September 2013, the SVE rebound concentration for PCE was 4,700 µg/m^3, and in April 2014, the SVE rebound concentration for PCE was 3,600 µg/m^3.

6.5 Operations & Maintenance Costs

System operation costs are dependent on time of year and which system components are running. The heat trace component of the SVE system is only needed from October to April, and increases the monthly electricity costs by approximately $800. Table 6-2 summarizes the monthly operation costs of the remediation system as related to each system component.

TABLE 6-2: ESTIMATED OPERATING COSTS

System Component	Monthly Operating Costs	Annual Operating Costs
Heat Trace (7 months)	$790	$5,530
SSD Operation	$160	$1,920
SVE operation (12-hr pulse)	$515	$6,180
Heating and other electrical demand	$320	$3,840
Phone Autodialer	$50	$600
Totals	**$1,835**	**$18,070**

When both SVE and SSD systems are operating, these costs equate to approximately $2,900 per pound of PCE removed in the winter (October-April) and $1,300 per pound of PCE removed in the summer (May-September).

6.6 Updated Conceptual Site Model for SSD/SVE Operations

An understanding of how current remediation and mitigation processes have changed the CSM for SSD/SVE operations is key to optimizing alternatives and operation strategies.

Source

- *Pre-System*: Source concentrations of PCE in the vadose zone were greater than 1 milligram per kilogram (mg/kg), easily exceeding the migration to groundwater cleanup level of 0.024 mg/kg and presenting a substantial risk to groundwater. However, no soil boring samples contained PCE concentrations in the vadose zone greater than the direct contact and outdoor inhalation soil cleanup levels of 15 and 10 mg/kg, respectively.
- *Current*: Soil samples in the treatment area of the SVE system have not been collected since SVE operations commenced. The only available data for comparison are soil gas data from the original SVE pilot test in 2008 and soil gas results from rebound tests and

exhaust stack samples. A soil gas sample of exhaust during the SVE pilot test was collected at the beginning and end (24 hours later) of the test. PCE concentrations were 40,000 µg/m^3 and 16,000 µg/m^3, respectively. The initial exhaust samples collected during SSD/SVE startup in January 2010 were comparable at 19,000 µg/m^3 and 23,000 µg/m^3. Long-term average PCE concentrations from stack samples have been above 1,000 µg/m^3. PCE concentrations detected in vapor monitoring points during the three rebound tests have varied widely between 100 µg/m^3 and 19,000 µg/m^3. While it is not possible to draw definite conclusions from these varied results collected at various locations, PCE concentrations in soil gas have trended downward, and based on system operations and stack sample results, between 50 and 66 pounds of PCE have been removed from the vadose zone during SVE operations. Although qualitative, the concentrations of PCE in soil have decreased throughout the area of treatment.

Migration Pathways

- *Pre-System*: The risk to groundwater from vadose zone contamination was realized with the documented presence of a one-half mile long plume of PCE and its degradation compounds. The VI pathway was potentially complete at numerous buildings based on groundwater target levels (e.g., GNBBS, 1301 Turner Street, Meyeres Real Estate, Wells Fargo, Yukon Title, Northern Lights Church of Christ).
- *Current*: Groundwater remains contaminated above ADEC cleanup levels. The areal extent of the plume has not significantly changed since SVE system operations began; however, the concentrations have significantly decreased based on the historical groundwater concentration data from 1999 through 2013. Source area wells generally have experienced an order of magnitude decrease in PCE concentrations, and the mid-plume to downgradient plumes have experienced decreases in PCE concentrations on the order of two to five factors. In addition, Mann-Kendall trend analysis shows that nearly all wells have a significant decreasing trend, and the source area wells are decreasing with moderate variability (i.e., the decreases in concentration are occurring at an appreciable rate). These findings suggest that the SVE system has diminished the replenishment of chlorinated ethenes to groundwater; the source area is experiencing rapid reduction in groundwater concentrations as a result; and the downgradient portions are experiencing a gradual decline in groundwater concentrations from dispersion and lack of replenishment from the source. Based on these results, the plume size should begin to shrink. No active treatment of groundwater has occurred or is planned. The effect of decreasing groundwater concentrations for the VI pathway is more complicated because of toxicological revisions to PCE and TCE since the installation of the SVE system. A reduction in the toxicity of PCE, coupled with decreasing groundwater concentrations, has appreciably shrunk the areal extent of the plume above groundwater target levels for PCE. However, an increase in the toxicity of TCE, coupled with addition of a short-term health effect, has increased the areal extent of the plume above groundwater target levels for TCE.

Exposure Pathways and Receptors

- *Pre-System*: Human exposure through direct contact or inhalation of outdoor air from soil contamination likely did not present unacceptable risk because soil concentrations were not found that exceeded 15 or 10 mg/kg, respectively, during initial characterization activities. Human exposure through contact or ingestion of groundwater was a significant concern. A well search performed in 1999 documented a few wells in the area, although none were used for drinking water. Human exposure via the VI pathway was a significant concern. The GNBBS building had a complete pathway with unacceptable risk, and hence the SSD system was installed in the building. Numerous other buildings (e.g., 1301 Turner Street, Meyeres Real Estate, Wells Fargo, Yukon Title, and Northern Lights Church of Christ) had complete pathways, but risks were considered acceptable based on VI assessments performed at individual buildings.
- *Current*: Human exposure through direct contact or inhalation of outdoor air from soil contamination is assumed to have no unacceptable risk based on pre-installation characterization and more than six years of SVE operations, although there are no current soil data to confirm this assertion. Human exposure through contact or ingestion of groundwater was further evaluated in 2011 when another well survey was performed, and no additional wells were identified. At this point, it is assumed that the groundwater exposure pathway is controlled, although a final door-to-door survey, which has not been performed, is recommended to validate this assertion. Human exposure via the VI pathway remains a concern. Changes in the toxicity for TCE have increased uncertainty regarding the protection of human health, and analytical results from the recent soil gas sampling suggest that the pathway could be complete for previously unassessed areas of the plume.

6.7 Optimization

Two changes in operating conditions have already significantly optimized SVE operations. The first occurred in April 2014, when the SVE system began pulsed 12-hour operating cycles. The second occurred in October 2015, when it was decided to forego winter SVE operations given the dramatic cost increase and resulting reduced cost-efficiency of PCE mass removal during the winter.

At this point, there are limited optimization alternatives given the current configuration of the SVE system. One possibility is to alternate, or pulse, the operating extraction wells. However, this change would require regular labor commitment because the system is not designed and constructed to mechanize this alternative. Additionally, this alternative would likely result in minimal operational gains because of increased labor costs and nominal increases in the mass removal rate of PCE.

Any significant optimization of the SVE system at this point likely would require installation of new extraction wells to target areas along the perimeters of the current radius of influences for the existing extraction well network. However, this alternative requires significant capital investment.

The SSD system has had no optimization during its operational lifecycle, other than replacing the SSD wells DW-2 and DW-4 in 2012. Extraction lines for DW-1 and DW-3 have had increasing vacuum measurements, which suggest that these depressurization wells likely need to be replaced for efficiency. The only operational change that likely could provide significant cost savings would be to convert from a separately-housed blower system to inline fans within the GNBBS building. This change would require capital expense for parts, materials, and labor for retro-fitting the system. Estimated electrical costs for an inline fan conversion are less than $100 per month.

6.8 Proposed Operating Strategy

The subsections above have described the objectives, operating conditions and costs, updated CSM, and optimization alternatives options for continual SSD/SVE system operation. Any recommended strategy moving forward should be arrived at through a framework based on an updated CSM specific to SSD/SVE operations and RAOs.

The first RAO (mitigate VI in GNBBS) has been met and will continue to be met provided the SSD continues to operate in an effective manner. The second RAO (reduce concentrations of COCs to meet the ADEC Table B1 cleanup levels) almost certainly has not been met for the most stringent migration to groundwater cleanup levels, but even more importantly, almost certainly cannot be met by current SVE operations without significant optimization (possibly rounds of optimization) and many years of continued operation. However, the updated CSM discussed in Section 6.6 provides an opportunity for a larger scale, or programmatic, optimization as opposed to the operational optimization alternatives discussed in Section 6.7.

The updated CSM shows, with a few assumptions, that SSD/SVE operations to date have controlled or are providing control of risk to human health to the extent practicable, and as noted above regarding the most stringent soil cleanup levels, the cost benefit of continual SVE operations is likely minimal toward reaching the second RAO without significant capital investment and many years of operation.

Therefore, another optimization strategy to consider is ceasing SVE operations altogether, thereby eliminating annual operating costs, which is 75% or more of the $18,000 annual system cost. Additionally, with SVE operations ceased, the remediation shed is only being used to house the SSD blower and exhaust. As discussed in Section 6.7, the SSD infrastructure inside GNBBS could be modified to contain inline fans in the GNBBS building, thereby allowing the remediation shed to be completely mothballed or decommissioned.

Based on this framework, the following strategy is recommended for the SSD/SVE system:

- Collect subsurface soil samples from the area of influence of the SVE system to document that human health criteria are indeed met and also to document remedial progress from SVE operations;
- Collect soil gas samples from existing exterior vapor monitoring points as a baseline for final SVE operations;
- Discontinue operations of the SVE system;

- Replace extraction points DW-1 and DW-3 for the SSD system to improve efficiency, and add another depressurization well in the Allstate Insurance office where sub-slab contaminant concentrations are known to exceed ADEC targets.
- Convert the SSD infrastructure to contain inline fans within the GNBBS building;
- Mothball (i.e., leave in place) the SVE system;
- Perform quarterly sampling of sub-slab soil gas and indoor air in the GNBBS building to confirm the optimized SSD system remains protective of the VI pathway;
- Perform quarterly sampling of exterior vapor monitoring points to document rebound following SVE system shutdown;
- If the quarterly sampling of soil gas and indoor air suggest the optimization has not remained protective of human health, then the SVE system may be re-started; and
- If the quarterly sampling of soil gas and indoor air indicate the optimization is protective of human health, then the SVE system could be decommissioned and the remediation shed removed.

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7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

Regular field activities from July 2014 to January 2016 included operations and maintenance of the SSD/SVE system, installation and sampling of VMPs in the mid- and down-gradient portions of the plume for long-term monitoring of the VI pathway, and maintenance/repair of the monitoring well network at the site.

7.1.1 SSD/SVE System

The following mechanical targets of the SSD/SVE system were met during the reporting period: SSD and SVE blower vacuum levels and SSD and SVE exhaust temperatures. The differential vacuum target across the air filters for the two blowers was not always met, but the filters were maintained in a clean condition to minimize exceedances.

For performance targets of the SSD/SVE system, individual SSD wells and SVE wells met their target flow rate 83% and 40% of the time, respectively. The SSD system wells DW-1 and DW-3 have been experiencing higher vacuums over time, and the SVE wells have gradually become plugged with particle fines and periodically uptake water from saturated soil, which reduces their capability to achieve target flow rates. The target negative pressure beneath GNBBS was met during the reporting period.

The emission concentration of PCE for the one steady state sample collected during the reporting period was 1,700 µg/m^3, which is consistent with long-term averages and equates to a mass removal rate of 0.02 pounds per day of PCE based on operation 24 hours per day.

The SVE system has met the first of the two RAOs, but the second (meeting ADEC Table B1 cleanup levels) is likely unattainable without significant capital investment for one or more optimization efforts spanning many years to meet the migration to groundwater cleanup levels.

7.1.2 Vapor Monitoring

Seven VMPs were installed in the mid to down-gradient locations of the groundwater plume in July 2015. The well screens were installed to be approximately 2 feet above typical groundwater levels.

The VMPs were sampled in September 2015. Concurrent active (TO-15) and passive (SE WMS) soil gas samples were collected over periods of one to seven days. High groundwater conditions complicated sampling as water was present in three of the VMP's and the vadose zone in general had elevated moisture content.

No reported PCE concentrations for either the active or passive samples exceeded shallow or deep soil gas targets. Two of the seven results for TCE, however, exceeded the residential deep soil gas target. This is significant because the two locations (VMP-6 and VMP-8) are in residential areas and if nearby buildings have basements, then these samples from 10 ft bgs represent shallow soil gas and a potentially complete pathway.

Lastly, soil gas results indicate that reported contaminant concentrations from the passive samples were equivalent or higher than to the paired active samples for more than 90 percent of the reported results (13 out of 14). This outcome suggests that the passive samplers and analysis are a valid, conservative technology for evaluating risk for the VI pathway.

7.2 Recommendations

The following recommendations for the Gaffney West site are listed in order of higher to lower priority:

- ***Continue VI monitoring at downgradient locations and at the 1301 Turner Street residence.*** Confirm the soil gas results for long-term monitoring of VI risk, including the exceedance of the TCE soil gas targets in VMP-6 and VMP-8, with another round of sampling. If the results are repeated for VMP-6 and VMP-8, then VI assessments of nearby buildings are needed to evaluate potential risk to human health. The assessments should begin by identifying and targeting residential buildings with basements, which would likely have higher potential for a complete VI pathway. Additional monitoring needs to be performed at 1301 Turner Street, where sub-slab soil gas concentrations exceeded ADEC targets (Ahtna, 2014a).
- ***Install a fence between the SSD/SVE building and the GNBBS building.*** This is needed to keep vagrants from loitering between the two buildings.
- ***Mitigate VI risk in the GNBBS building using more efficient inline fans.*** Discontinue operation of the SVE system. Add one additional extraction well in the Allstate Insurance office, disconnect the existing SSD blower, and convert the entire SSD system infrastructure to contain inline fans. Depressurize the GNBBS building slab using inline fans and monitor differential pressure using existing sub-slab monitoring points. Perform one year of continuous indoor air sampling in GNBBS and Allstate Insurance to confirm the updated SSD system remains protective of the VI pathway. Obtain quarterly SSD exhaust samples. If indoor air sampling suggests the optimization has not remained protective of human health, then the SVE system may be re-started. If indoor air sampling indicates the optimization is protective of human health, then the SVE system could be decommissioned and the remediation building removed or mothballed pending available funds.
- ***Sample groundwater monitoring wells.*** Continue implementation of *Recommendations for Long-Term Management of the Gaffney Road East and West Chlorinated Ethene Contaminated Sites* (Ahtna, 2014b), which recommended groundwater monitoring for 2015 but was not performed. The last complete groundwater sampling event at Gaffney West monitoring wells was in 2013.
- ***Conduct a door-to-door well survey*** as described in *Recommendations for Long-Term Management of the Gaffney Road East and West Chlorinated Ethene Contaminated Sites* (Ahtna, 2014b) to rule out potential human exposure to contaminated groundwater.
- ***Perform an evaluation of the PCE source area treatment progress.*** Collect subsurface soil samples in the SVE treatment area to confirm that contaminant concentrations do not exceed human health cleanup levels for direct contact and inhalation of outdoor air. In addition, the analysis will provide quantified data for determining progress toward meeting the migration to groundwater soil cleanup level. Collect soil gas samples from

existing exterior vapor monitoring points as a baseline when discontinuing SVE operation. Perform quarterly sampling of exterior vapor monitoring points to document rebound following system shutdown.

- ***Decommission and replace MW-29S*** in the source area, because the casing collapsed and filled with gravel. MW-29S has provided valuable data since 2007 and is needed to continue documenting decreasing groundwater contaminant concentrations in the source area.

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FIGURES

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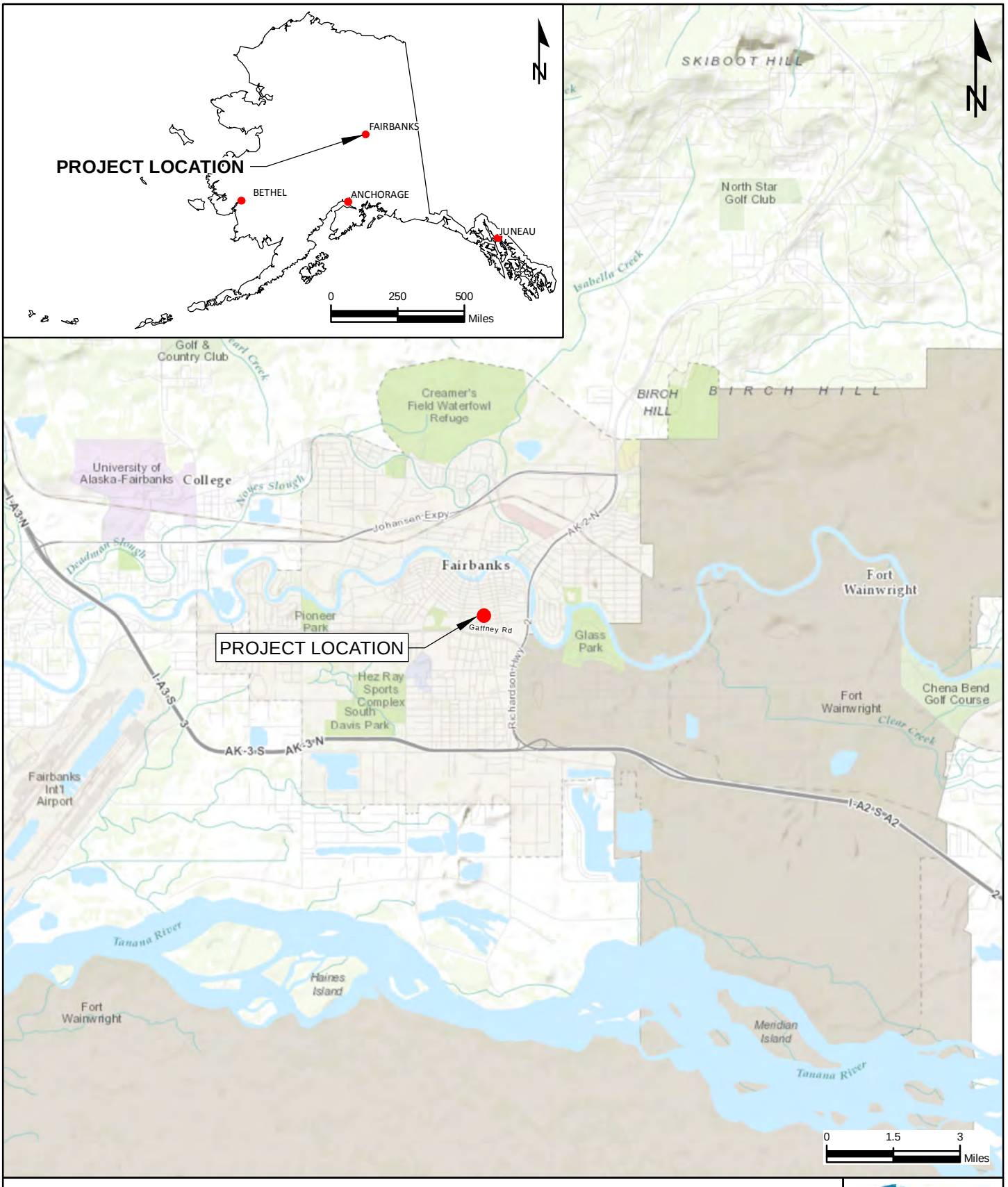

SFY2016 Gaffney West Soil Gas Monitoring and Operations, Maintenance, and Evaluation of Remediation System Report

Ahtna Engineering

State and Site Vicinity Maps

Project Number: 20266.004	Figure Number: 1
Date: 3/8/2016	
Drafted By: R.F.	

Prepared by rfrye, 3/8/2016; L:\Fairbanks\20266.004_Gaffney_WG\SMXD\RemediationReport\F1SFY2016Report.mxd

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SFY2016 Gaffney West Soil Gas Monitoring and Operations, Maintenance, and Evaluation of Remediation System Report

Vapor Monitoring Point Locations Installed July 2015

Ahtna Engineering

Project Number:	Figure Number:
20266.004	2
Date: 3/7/2016	
Drafted By: R.F.	

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GRAPH

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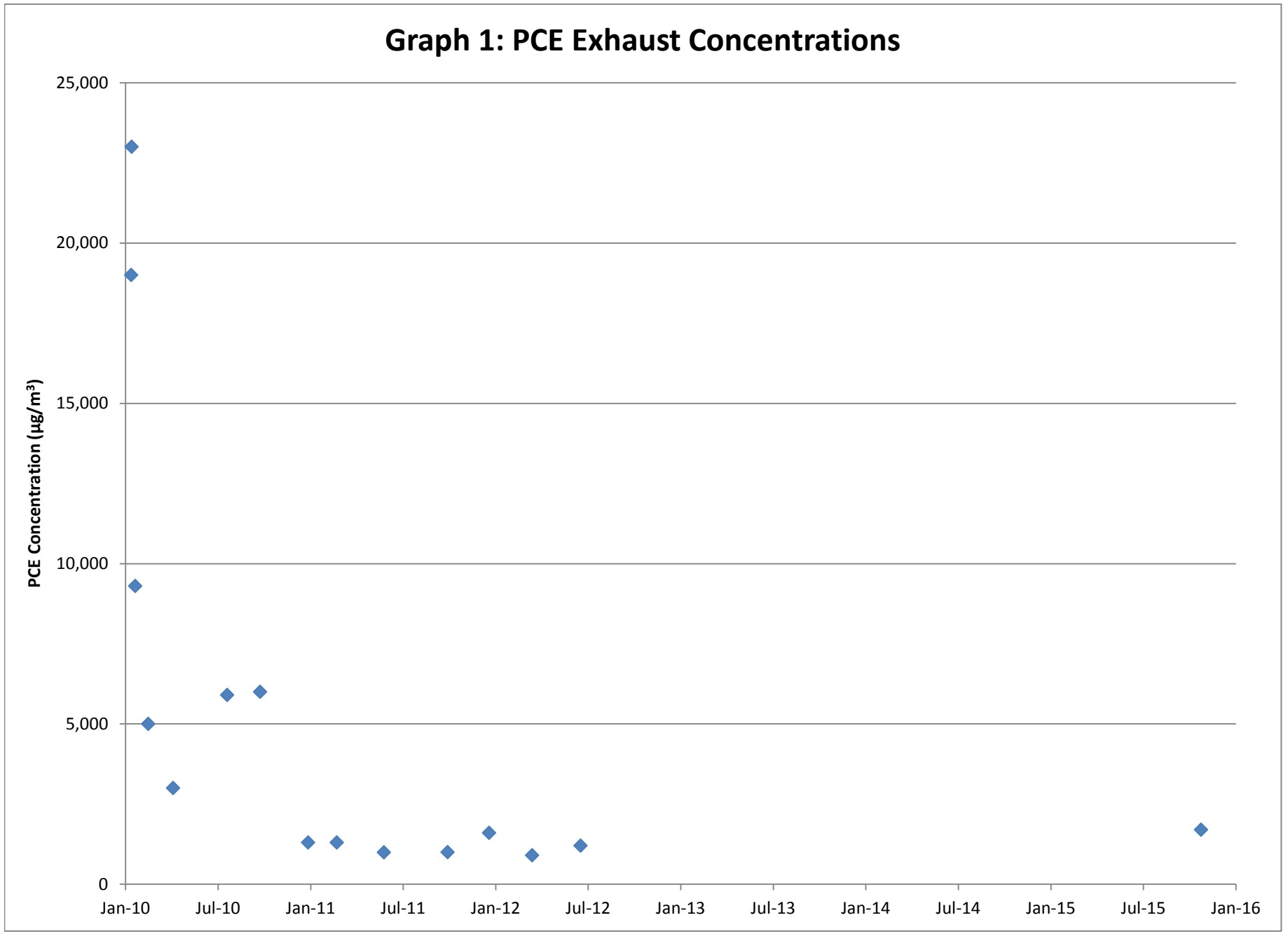
Graph 1: PCE Exhaust Concentrations
PCE Concentration (µg/m³)
25,000
20,000
15,000
10,000
5,000
0
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16

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APPENDIX A

SELECTED RESULTS AND FIGURES FROM PREVIOUS INVESTIGATIONS

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Gaffney West Remediation System Rebound Test Summary

Location ID	Building	SSD/SVE	Sample Date	Depth	Analyte	PCE	TCE	cDCE	tDCE	VC
					Unit	µg/m3	µg/m3	µg/m3	µg/m3	µg/m3
					Matrix					
SG-14	Park-n-Sell Lot	SVE	10/5/2012	6 feet	Deep Soil Gas	110	140	**3700**	270	< 9.7
SG-5	Park-n-Sell Lot	SVE	10/5/2012	5 feet	Shallow Soil Gas	**2500**	22	< 5.5	< 5.5	< 3.6
Exterior soil gas samples in Oct. 2012 taken following one-month rebound period of no SVE (SSD running)										
SG-14	Park-n-Sell Lot	SVE	3/29/2013	6 feet	Deep Soil Gas	40	32	550	32	< 2.8
SG-5	Park-n-Sell Lot	SVE	3/29/2013	9 feet	Deep Soil Gas	980	9	<4.9	<4.9	< 3.2
Exterior soil gas samples in March 2013 taken following one-month rebound period of no SVE (SSD running)										
SS-1	Good News	SSD	9/19/2013	--	Sub-Slab Soil Gas	790	5.8	< 0.84	< 0.84	< 0.84
SS-2	Good News	SSD	9/19/2013	--	Sub-Slab Soil Gas	180	1.7	1.6	0.45	< 0.38
SS-3	Good News	SSD	9/19/2013	--	Sub-Slab Soil Gas	14	< 0.41	< 0.41	< 0.41	< 0.41
SS-38	All State	SSD	9/19/2013	--	Sub-Slab Soil Gas	**31000**	**870**	100	320	< 43
AA-1	Park-n-Sell Lot	SSD	9/19/2013	--	Outdoor Air	0.17	< 0.16	< 0.16	< 0.16	< 0.16
IA-1	Good News	SSD	9/19/2013	--	Indoor Air	5.7	0.23	< 0.15	< 0.15	< 0.15
IA-20	All State	SSD	9/19/2013	--	Indoor Air	7.8	0.24	< 0.16	< 0.16	< 0.16
Sub-slab, Indoor Air, Outdoor Air samples in Sept. 2013 taken following three-month rebound period of no SSD or SVE										
Exhaust Stack	Park-n-Sell Lot	SSD	9/23/2013	--	Exhaust Stack	570	12	< 5.0	< 5.0	< 5.0
Exhaust Stack sample on 9/23/13 (row above) taken from SSD exhaust-only, taken 15 minutes after restart, following three-month rebound period of no SSD or SVE										
SG-5	Park-n-Sell Lot	SVE	9/19/2013	5 feet	Shallow Soil Gas	**9900**	49	< 9.9	< 9.9	< 9.9
SG-5	Park-n-Sell Lot	SVE	9/19/2013	9 feet	Deep Soil Gas	**19000**	160	< 23	< 23	< 23
SG-14	Park-n-Sell Lot	SVE	9/19/2013	6 feet	Deep Soil Gas	81	150	**6900**	370	20
VMP-2	Park-n-Sell Lot	SVE	9/19/2013	7 feet	Deep Soil Gas	1400	57	**3300**	300	< 2.5
VMP-3	Park-n-Sell Lot	SVE	9/19/2013	7 feet	Deep Soil Gas	220	0.71	1.7	< 0.37	< 0.37
Exterior soil gas samples in Sept. 2013 taken following three-month rebourd period of no SSD or SVE										
Exhaust Stack	Park-n-Sell Lot	SVE	9/23/2013	5 -10 feet	Exhaust Stack	4700	120	1800	160	< 0.50
Exhaust Stack sample on 9/23/13 (row above) taken from SVE exhaust-only, taken 15 minutes after restart, following three-month rebound period of no SSD or SVE										
SG-5	Park-n-Sell Lot	SVE	4/9/2014	5 feet	Shallow Soil Gas	260	2	0.78	< 0.39	< 0.39
SG-5 (Summa® canister)	Park-n-Sell Lot	SVE	4/9/2014	9 feet	Deep Soil Gas	13400	110	< 17	< 17	< 17
SG-5 (glass canister)	Park-n-Sell Lot	SVE	4/9/2014	9 feet	Deep Soil Gas	11000	80	< 13	< 13	< 13
VMP-2	Park-n-Sell Lot	SVE	4/9/2014	7 feet	Deep Soil Gas	360	22	2100	190	0.52
Exterior soil gas samples in April 2014 taken following 1.5-month rebound period of no SVE (SSD running)										
Exhaust Stack	Park-n-Sell Lot	SVE	4/17/2014	5 -10 feet	Exhaust Stack	3600	85	1200	75	< 5
Exhaust Stack sample on 4/17/14 (row above) taken from SVE exhaust-only, taken 15 minutes after restart, following 1.5-month rebound period of no SVE (SSD running)										
Exhaust Stack	Park-n-Sell Lot	SVE	10/29/2015	5 -10 feet	Exhaust Stack	1700	< 54	780	< 40	< 26
Exhaust Stack sample on 10/29/15 taken from SVE exhaust-only, taken 10 hours into 12-hr run cycle, system had been running 6 months on 12-hr on/off pulsing cycle										
ADEC Commercial Indoor Air Targets						180	8.4[1]	31	260	28
ADEC Commercial Shallow Soil Gas Targets						1800	84[1]	310	2600	280
ADEC Commercial Deep Soil Gas Targets						18000	840[1]	3100	26000	2800

SSD = Sub-Slab Depressurization

SVE = Soil Vapor Extraction

PCE = Tetrachloroethene

TCE = Trichloroethene

cDCE = cis-1,2-Dichloroethene

tDCE = trans-1,2-Dichloroethen

VC = Vinyl Chloride

µg/m3 = micrograms per cubic meter

[1] December 2012 USEPA TCE Memo and 2014 ADEC TCE Fact Sheet

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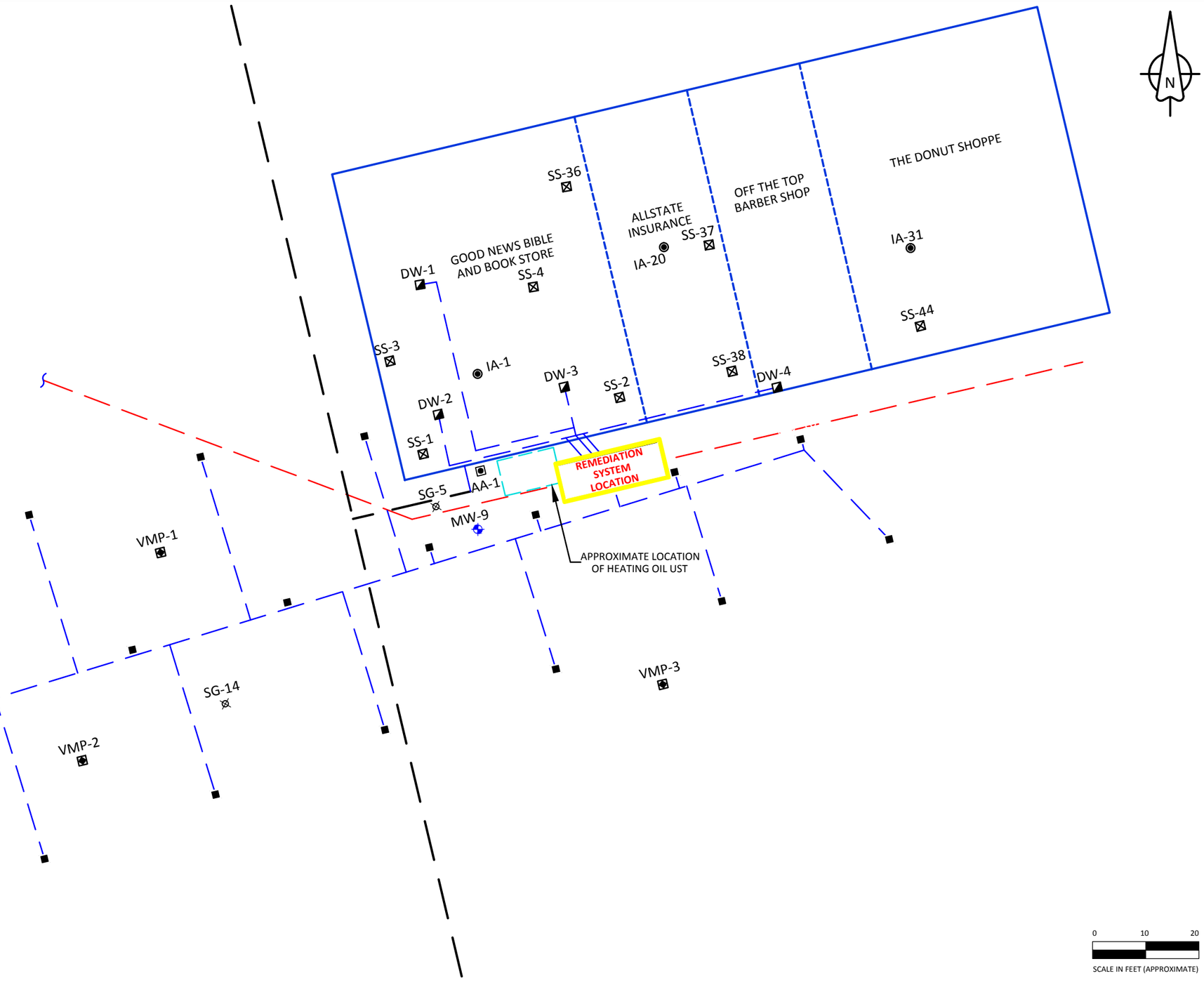

Notes:

1. All locations are approximate.
2. Image is from Google Earth : Alaska, accessed on 09.06.2013.

Groundwater Monitoring and Operations and Maintenance of Remediation System
Alaska Department of Environmental Conservation
Gaffney Road West, Fairbanks, Alaska

SSD/SVE System Components

Ahtna Engineering

Project Number:	Figure Number:
20266.004	4
Date: 12.09.2014	
Drafted By: G.R.	

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Gaffney West Cumulative Chlorinated Ethene Groundwater Results

		Contaminant	PCE	TCE	cDCE	tDCE	Vinyl chloride
		Unit	µg/L	µg/L	µg/L	µg/L	µg/L
		ADEC Groundwater Cleanup Level	5	5	70	100	2
Location	**Sample Date**	**Sample Type**					
MW-1	12-Oct-97	N	ND (0.08)	ND (0.05)	ND (0.20)	ND (0.20)	Nd (0.08)
MW-1	08-Apr-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-1	14-Apr-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-1	19-Oct-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-1	17-Oct-01	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-1	17-Oct-02	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-1	16-Oct-03	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-1	16-Nov-04	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-1	20-Oct-06	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-1	21-Oct-09	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-1	16-Mar-13	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-27	07-Oct-07	N	**300**	**7.7**	8.2	ND (2.0)	ND (2.0)
MW-27	24-Sep-08	N	**200**	5.0	3.9	ND (1.0)	ND (1.0)
MW-27	21-Oct-09	N	**210**	**8.0**	4.6	ND (2.0)	ND (2.0)
MW-27	21-Oct-09	FD	**240**	**8.3**	5.3	ND (2.0)	ND (2.0)
MW-27	08-Oct-10	N	**200**	**7.1**	3.2	ND (1.0)	ND (1.0)
MW-27	17-Mar-13	N	**150**	3.2	1.7	ND (1.0)	ND (1.0)
MW-27	17-Mar-13	FD	**150**	3.2	1.7	ND (1.0)	ND (1.0)
MW-27	29-Oct-13	N	**120**	3.6	2.0	ND (1.0)	ND (1.0)
MW-28	07-Oct-07	N	**3,800**	ND (20)	43	ND (20)	ND (20)
MW-28	24-Sep-08	N	**2,900**	ND (20)	ND (20)	ND (20)	ND (20)
MW-28	21-Oct-09	N	**2,100**	ND (20)	ND (20)	ND (20)	ND (20)
MW-28	08-Oct-10	N	**1,200**	ND (10)	ND (10)	ND (10)	ND (10)
MW-28	19-Mar-13	N	**180**	2.4	ND (1.0)	ND (1.0)	ND (1.0)
MW-28	29-Oct-13	N	**220**	**5.8**	1.4	ND (1.0)	ND (1.0)
MW-28	09-Apr-14	N	**100 JD**	3.4	ND (1.0)	ND (1.0)	ND (1.0)
MW-28	09-Apr-14	FD	**65 JD**	**3.8**	ND (0.40)	ND (0.40)	ND (0.40)
MW-29S	07-Oct-07	N	**1,200**	**14**	**90**	ND (10)	ND (10)
MW-29S	24-Sep-08	N	**1,300**	**15**	65	ND (10)	ND (10)
MW-29S	22-Oct-09	N	**1,200**	**14**	68	ND (10)	ND (10)
MW-29S	08-Oct-10	N	**1,400**	**16**	63	ND (10)	ND (10)
MW-29S	19-Mar-13	N	**390**	**5.5**	11	ND (2.0)	ND (2.0)
MW-29S	19-Mar-13	FD	**350**	**5.6**	11	ND (4.0)	ND (4.0)
MW-29S	27-Oct-13	N	**220**	3.8	6.2	ND (1.0)	ND (1.0)
MW-29S	10-Apr-14	N	**230**	4.0	9.9	ND (2.0)	ND (2.0)
MW-29M	16-Mar-13	N	0.25	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-29M	27-Oct-13	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-29D	19-Mar-13	N	1.3	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-29D	27-Oct-13	N	0.26	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-8	06-Oct-99	N	**206**	1.94	8.63		
MW-8	14-Apr-00	N	**210**	ND (5.0)	8.5	ND (5.0)	ND (10)
MW-8	19-Oct-00	N	**312**	**5.14**	8.75	ND (10)	ND (20)
MW-8	17-Oct-01	N	**321**	**5.42**	13.8	0.107	ND (1.0)
MW-8	17-Oct-02	N	**343**	**5.78**	17.6	ND (1.0)	ND (1.0)
MW-8	16-Oct-03	N	**244**	**5.15**	11.4	0.348	ND (1.0)
MW-8	16-Nov-04	N	**283**	**5.84**	15.1	0.131	ND (1.0)
MW-8	22-Oct-06	N	**378**	**6.5**	23.5	1.26	ND (1.0)
MW-8	07-Oct-07	N	**200**	4.0	9.7	ND (1.0)	ND (1.0)
MW-8	24-Sep-08	N	**210**	**5.0**	9.6	ND (1.0)	ND (1.0)
MW-8	22-Oct-09	N	**300**	**5.9**	14	ND (2.0)	ND (2.0)
MW-8	22-Oct-09	FD	**290**	**5.8**	14	ND (2.0)	ND (2.0)
MW-8	08-Oct-10	N	**350**	**5.8**	15	ND (2.0)	ND (2.0)
MW-8	29-Oct-13	N	**80**	1.9	2.3	ND (0.40)	ND (0.40)

Gaffney West Cumulative Chlorinated Ethene Groundwater Results

		Contaminant	PCE	TCE	cDCE	tDCE	Vinyl chloride
		Unit	µg/L	µg/L	µg/L	µg/L	µg/L
		ADEC Groundwater Cleanup Level	5	5	70	100	2
Location	**Sample Date**	**Sample Type**					
MW-9	06-Oct-99	N	**727**	**12.2**	14.3	ND (5.0)	
MW-9	14-Apr-00	N	**500**	ND (5.0)	ND (5.0)	ND (5.0)	ND (20)
MW-9	19-Oct-00	N	**1,200**	ND (50)	ND (50)	ND (50)	ND (100)
MW-9	17-Oct-01	N	**972**	**17.7**	19.8	0.739	ND (1.0)
MW-9	17-Oct-02	N	**1,300**	**31**	38	ND (10)	ND (10)
MW-9	16-Oct-03	N	**664**	**10.5**	11.5	0.513	ND (1.0)
MW-9	16-Nov-04	N	**1,070**	**14.8**	10.3	0.615	ND (1.0)
MW-9	25-Oct-06	N	**1,540**	**16.3**	14.4	ND (1.0)	ND (1.0)
MW-9	07-Oct-07	N	**1,300**	**13**	15	ND (10)	ND (10)
MW-9	24-Sep-08	N	**1,100**	**12**	12	ND (10)	ND (10)
MW-9	22-Oct-09	N	**1,300**	**15**	11	ND (10)	ND (10)
MW-9	08-Oct-10	N	**860**	**8.9**	8.7	ND (4.0)	ND (4.0)
MW-9	17-Mar-13	N	**210**	3.2	4.4	ND (1.0)	ND (1.0)
MW-9	17-Mar-13	FD	**190**	3.2	4.4	ND (2.0)	ND (2.0)
MW-9	29-Oct-13	N	**87**	2.5	1.0	ND (0.40)	ND (0.40)
MW-9	09-Apr-14	N	**110**	3.7	2.8	ND (1.0)	ND (1.0)
TW-46	06-Oct-99	N	**1,640**	**14.6**	**163**	3.52	
TW-46	14-Apr-00	N	**1,500**	ND (25)	**310**	ND (25)	ND (50)
TW-46	19-Oct-00	N	**1,270**	ND (50)	**329**	ND (50)	ND (100)
TW-46	17-Oct-01	N	**1,170**	**13.4**	**138**	2.98	ND (1.0)
TW-46	17-Oct-02	N	**1,640**	**32.6**	**686**	9.86	ND (10.0)
TW-46	16-Oct-03	N	**973**	**13.6**	**269**	4.72	ND (1.0)
TW-46	16-Nov-04	N	**1,130**	**14.9**	**209**	3.68	ND (1.0)
TW-46	25-Oct-06	N	**988**	**12.4**	**157**	3.0	ND (2.0)
TW-46	07-Oct-07	N	**1,100**	**11**	**150**	ND (4.0)	ND (4.0)
TW-46	24-Sep-08	N	**870**	**11**	**160**	ND (4.0)	ND (4.0)
TW-46	22-Oct-09	N	**760**	**9.9**	**130**	ND (4.0)	ND (4.0)
TW-46	08-Oct-10	N	**710**	**8**	46	ND (4.0)	ND (4.0)
TW-46	17-Mar-13	N	**370**	4.5	19	ND (2.0)	ND (2.0)
TW-46	28-Oct-13	N	**180**	3.7	56	1.1	ND (1.0)
TW-46	09-Apr-14	N	**170**	3.8	42	1.2	ND (1.0)
TW-45	06-Oct-99	N	**363**	**13.2**	41	ND (5.0)	
TW-45	14-Apr-00	N	**400**	**11**	29	ND (10)	ND (20)
TW-45	19-Oct-00	N	**448**	ND (25.0)	24.4	ND (25.0)	ND (50.0)
TW-45	17-Oct-01	N	**244**	**7.15**	26.4	0.305	ND (1.0)
TW-45	17-Oct-02	N	**350**	**7.43**	33.9	ND (1.0)	ND (1.0)
TW-45	16-Oct-03	N	**342**	**11.7**	58.9	1.63	ND (1.0)
TW-45	16-Nov-04	N	**328**	**11.7**	49.3	ND (1.0)	ND (1.0)
TW-45	24-Oct-06	N	**270**	**8.05**	61.4	ND (1.0)	ND (2.0)
TW-45	07-Oct-07	N	**300**	**10**	67	ND (2.0)	ND (2.0)
TW-45	24-Sep-08	N	**230**	**7.6**	46	ND (1.0)	ND (1.0)
TW-45	22-Oct-09	N	**180**	**6.4**	41	ND (1.0)	ND (1.0)
TW-45	08-Oct-10	N	**150**	4.5	40	ND (1.0)	ND (1.0)
TW-45	27-Oct-13	N	**39**	2.4	14	0.26	ND (0.20)
MW-26	07-Oct-07	N	**250**	4.9	6.3	ND (2.0)	ND (2.0)
MW-26	24-Sep-08	N	**260**	**6.5**	6	ND (1.0)	ND (1.0)
MW-26	26-Oct-09	N	**230**	**6.9**	5.4	ND (1.0)	ND (1.0)
MW-26	08-Oct-10	N	**220**	**6.8**	5.4	ND (2.0)	ND (2.0)
MW-26	08-Oct-10	FD	**210**	**6.8**	5.1	ND (1.0)	ND (1.0)
MW-26	27-Oct-13	N	**95**	3.8	2.3	ND (0.40)	ND (0.40)

Gaffney West Cumulative Chlorinated Ethene Groundwater Results

		Contaminant	PCE	TCE	cDCE	tDCE	Vinyl chloride
		Unit	µg/L	µg/L	µg/L	µg/L	µg/L
		ADEC Groundwater Cleanup Level	5	5	70	100	2
Location	**Sample Date**	**Sample Type**					
MW-12	06-Oct-99	N	**164**		3.44		
MW-12	14-Apr-00	N	**390**	ND (10)	ND (10)	ND (10)	ND (20)
MW-12	19-Oct-00	N	**193**	ND (12.5)	ND (12.5)	ND (12.5)	ND (25.0)
MW-12	17-Oct-01	N	**354**	4.91	9.99	ND (1.0)	ND (1.0)
MW-12	17-Oct-02	N	**252**	3.4	7.97	ND (5.0)	ND (5.0)
MW-12	16-Oct-03	N	**237**	3.21	8.04	0.172	ND (1.0)
MW-12	16-Nov-04	N	**275**	4.75	9.51	ND (1.0)	ND (1.0)
MW-12	21-Oct-06	N	**290**	**5.37**	12.8	ND (1.0)	ND (1.0)
MW-12	07-Oct-07	N	**210**	3.2	7.9	ND (1.0)	ND (1.0)
MW-12	24-Sep-08	N	**140**	2.5	4.4	ND (1.0)	ND (1.0)
MW-12	26-Oct-09	N	**200**	**6.2**	10	ND (1.0)	ND (1.0)
MW-12	07-Oct-10	N	**230**	**7.0**	11	ND (1.0)	ND (1.0)
MW-12	07-Oct-10	FD	**200**	**6.0**	9.2	ND (1.0)	ND (1.0)
MW-12	27-Oct-13	N	**92**	3.1	3.9	ND (0.40)	ND (0.40)
MW-16	16-Oct-03	N	**122**	**6.1**	3.21	0.439	ND (1.0)
MW-16	16-Nov-04	N	**77.8**	**8.55**	2.19	0.326	ND (1.0)
MW-16	20-Oct-06	N	**85.4**	**9.59**	2.27	ND (1.0)	ND (1.0)
MW-16	07-Oct-07	N	**62**	**11**	1.9	0.45	ND (0.40)
MW-16	24-Sep-08	N	**59**	**13**	2.1	0.47	ND (0.40)
MW-16	26-Oct-09	N	**48**	**11**	1.9	0.82	ND (0.40)
MW-16	07-Oct-10	N	**43**	**9.2**	1.5	0.41	ND (0.40)
MW-16	28-Oct-13	N	**33**	**7.9**	0.82	0.25	ND (0.20)
MW-3	12-Oct-97	N	**5.1**	0.9	0.5	ND (0.20)	ND (0.08)
MW-3	08-Apr-99	N	**11**	1.1	ND (1.0)	ND (1.0)	
MW-3	14-Apr-00	N	**9.8**	1.1	ND (1.0)	ND (1.0)	ND (2.0)
MW-3	19-Oct-00	N	**9.27**	0.937	0.488	ND (1.0)	ND (2.0)
MW-3	17-Oct-01	N	**8.52**	1.03	0.516	ND (1.0)	ND (1.0)
MW-3	17-Oct-02	N	**7.48**	0.942	ND (1.0)	ND (1.0)	ND (1.0)
MW-3	16-Oct-03	N	**6.02**	0.76	0.324	ND (1.0)	ND (1.0)
MW-3	16-Nov-04	N	**8.11**	1.06	0.358	ND (1.0)	ND (1.0)
MW-3	20-Oct-06	N	**9.13**	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-3	24-Sep-08	N	**8.0**	0.86	0.28	ND (0.20)	ND (0.20)
MW-3	23-Oct-09	N	**6.7**	0.77	0.21	ND (0.20)	ND (0.20)
MW-3	07-Oct-10	N	**6.5**	0.68	0.22	ND (0.20)	ND (0.20)
MW-3	07-Oct-10	FD	**6.3**	0.63	0.21	ND (0.20)	ND (0.20)
MW-3	28-Oct-13	N	4.6	0.54	ND (0.20)	ND (0.20)	ND (0.20)
MW-17S	05-Nov-98	N	**59**	**8.1**	ND (2.0)	2.1	ND (4.0)
MW-17S	08-Apr-99	N	**56**	**16**	2.2	2.5	
MW-17S	06-Oct-99	N	**78.1**	**14.3**	1.92	2.31	
MW-17S	14-Apr-00	N	**54**	**17**	2.0	2.4	ND (2.0)
MW-17S	19-Oct-00	N	**61.6**	**19.7**	ND (5.0)	2.55	ND (10.0)
MW-17S	17-Oct-01	N	**47.1**	**20.1**	2.16	3.0	ND (1.0)
MW-17S	17-Oct-02	N	**33.8**	**22.5**	2.12	2.87	ND (1.0)
MW-17S	16-Oct-03	N	**26.2**	**24.1**	2.49	3.61	ND (1.0)
MW-17S	16-Nov-04	N	**20.5**	**26.4**	2.56	5.45	ND (1.0)
MW-17S	24-Oct-06	N	ND (1.0)	**7.95**	10.1	27.3	ND (1.0)
MW-17S	07-Oct-07	N	0.48	**5.5**	8.0	24	ND (0.20)
MW-17S	24-Sep-08	N	0.61	**5.3**	6.9	23	ND (0.20)
MW-17S	27-Oct-09	N	0.42	4.2	6.8	23	ND (0.20)
MW-17S	07-Oct-10	N	0.21	2.2	6.4	24	ND (0.20)
MW-17S	16-Mar-13	N	ND (0.20)	1.3	5.1	17	ND (0.20)

Gaffney West Cumulative Chlorinated Ethene Groundwater Results

		Contaminant	PCE	TCE	cDCE	tDCE	Vinyl chloride
		Unit	µg/L	µg/L	µg/L	µg/L	µg/L
		ADEC Groundwater Cleanup Level	5	5	70	100	2
Location	**Sample Date**	**Sample Type**					
MW-17M	18-Mar-13	N	**6.9**	**5.6**	0.41	0.34	ND (0.20)
MW-17M	29-Oct-13	N	**6.5**	**7.0**	0.48	0.40	ND (0.20)
MW-17D	19-Mar-13	N	ND (0.20)	0.21	ND (0.20)	ND (0.20)	ND (0.20)
MW-21	05-Nov-98	N	**5.7**	4.2	3.3	1.0	ND (2.0)
MW-21	08-Apr-99	N	**5.5**	3.9	3.0	ND (1.0)	
MW-21	14-Apr-00	N	4.9	3.7	2.7	ND (1.0)	ND (2.0)
MW-21	19-Oct-00	N	**5.12**	4.39	2.89	1.26	ND (2.0)
MW-21	17-Oct-01	N	5.9	**5.01**	3.05	1.37	ND (1.0)
MW-21	17-Oct-02	N	4.98	4.37	3.04	1.22	ND (1.0)
MW-21	16-Oct-03	N	**6.14**	4.67	3.32	1.43	ND (1.0)
MW-21	16-Nov-04	N	**8.18**	**5.83**	3.27	1.3	ND (1.0)
MW-21	25-Oct-06	N	**6.33**	4.76	3.39	1.31	ND (1.0)
MW-21	28-Oct-09	N	**5.9**	**5.4**	3.3	1.3	ND (0.20)
MW-21	06-Oct-10	N	**7.3**	**6.2**	4.1	1.4	ND (0.20)
MW-21	18-Mar-13	N	**5.3**	**5.4**	3.0	1.2	ND (0.20)
LSMW-46	01-Jun-98	N	1	2.6	1.4	1.8	
LSMW-46	19-Oct-00	N	1.75	3.02	1.18	1.47	ND (2.0)
LSMW-46	17-Oct-01	N	2.1	4.04	2.34	2.61	ND (2.0)
LSMW-46	17-Dec-02	N	1.81	3.74	2.45	2.27	
LSMW-46	16-Oct-03	N	1.6	3.11	2.09	2.08	ND (1.0)
LSMW-46	16-Nov-04	N	1.83	4.37	3.89	3.91	ND (1.0)
LSMW-46	22-Oct-06	N	1.44	3.89	3.55	3.08	ND (1.0)
LSMW-46	28-Oct-09	N	0.71	3.0	3.1	3.4	ND (0.20)
LSMW-46	06-Oct-10	N	0.75	2.9	3.2	3.3	ND (0.20)
LSMW-38	01-Jun-98	N	2.2	2.1	1.5	ND (1.0)	
LSMW-38	19-Oct-00	N	1.05	1.4	1.11	0.48	ND (2.0)
LSMW-38	17-Oct-01	N	2.09	2.73	2.09	ND (1.0)	ND (2.0)
LSMW-38	17-Dec-02	N	ND (1.0)	1.86	1.68	ND (1.0)	
LSMW-38	16-Oct-03	N	1.96	2.54	1.48	0.872	ND (1.0)
LSMW-38	16-Nov-04	N	2.37	3.19	2.1	1.23	ND (1.0)
LSMW-38	22-Oct-06	N	2.29	3.12	2.22	1.11	ND (1.0)
LSMW-38	27-Oct-09	N	1.6	2.4	1.8	1.4	ND (0.20)
LSMW-38	07-Oct-10	N	1.8	2.6	1.8	1.4	ND (0.20)
LSMW-47	01-Jun-98	N	3.2	ND (1.0)	ND (1.0)	ND (1.0)	
LSMW-47	19-Oct-00	N	4.29	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
LSMW-47	17-Oct-01	N	3.62	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
LSMW-47	17-Dec-02	N	4.2	ND (1.0)	ND (1.0)	ND (1.0)	
LSMW-47	16-Oct-03	N	3.7	0.184	ND (1.0)	ND (1.0)	ND (1.0)
LSMW-47	16-Nov-04	N	4.58	0.31	0.14	ND (1.0)	ND (1.0)
LSMW-47	22-Oct-06	N	3.24	1.0	ND (1.0)	ND (1.0)	ND (1.0)
LSMW-47	23-Oct-09	N	2.4	0.25	ND (0.20)	ND (0.20)	ND (0.20)
LSMW-47	06-Oct-10	N	2.4	0.31	ND (0.20)	ND (0.20)	ND (0.20)
LSMW-41	01-Jun-98	N	**9.7**	1.2	ND (1.0)	ND (1.0)	
LSMW-41	19-Oct-00	N	**20.8**	3.9	3.9	0.29	ND (2.0)
LSMW-41	17-Oct-01	N	**24.7**	4.0	3.36	0.271	ND (1.0)
LSMW-41	17-Oct-02	N	**21.2**	4.22	3.16	ND (1.0)	ND (1.0)
LSMW-41	16-Oct-03	N	**21.4**	4.4	3.11	0.339	ND (1.0)
LSMW-41	16-Nov-04	N	**24.7**	**5.03**	2.28	0.292	ND (1.0)
LSMW-41	24-Oct-06	N	**18.3**	3.87	1.77	ND (1.0)	ND (1.0)
LSMW-41	23-Oct-09	N	**11**	**7.6**	1.4	0.38	ND (0.20)
LSMW-41	07-Oct-10	N	**11**	**7.8**	1.2	0.43	ND (0.20)
LSMW-41	18-Mar-13	N	**8.5**	**7.0**	1.2	0.39	ND (0.20)
LSMW-41	28-Oct-13	N	**10**	**8.3**	1.2	0.44	ND (0.20)

Gaffney West Cumulative Chlorinated Ethene Groundwater Results

		Contaminant	PCE	TCE	cDCE	tDCE	Vinyl chloride
		Unit	µg/L	µg/L	µg/L	µg/L	µg/L
		ADEC Groundwater Cleanup Level	5	5	70	100	2
Location	**Sample Date**	**Sample Type**					
MW-18S	17-Mar-13	N	**6.8**	2.2	0.69	0.45	ND (0.20)
MW-18S	28-Oct-13	N	3.4	1.5	0.57	6.6	ND (0.20)
MW-18M	05-Nov-98	N	**15**	3.1	4.7	ND (1.0)	ND (2.0)
MW-18M	08-Apr-99	N	**15**	2.8	4.0	ND (1.0)	
MW-18M	14-Apr-00	N	**14**	3.0	3.6	ND (1.0)	ND (2.0)
MW-18M	19-Oct-00	N	**15.3**	3.11	3.72	0.231	ND (2.0)
MW-18M	17-Oct-01	N	**16.9**	3.35	3.6	0.23	ND (1.0)
MW-18M	17-Oct-02	N	**14.9**	3.17	3.31	ND (1.0)	ND (1.0)
MW-18M	16-Oct-03	N	**16.6**	3.01	3.21	0.266	ND (1.0)
MW-18M	16-Nov-04	N	**20.1**	3.69	2.79	0.239	ND (1.0)
MW-18M	24-Oct-06	N	**12.5**	3.24	2.4	ND (1.0)	ND (1.0)
MW-18M	26-Oct-09	N	**12**	4.6	1.5	0.30	ND (0.20)
MW-18M	06-Oct-10	N	**13**	4.9	1.4	0.30	ND (0.20)
MW-18M	18-Mar-13	N	**8.8**	4.8	1.0	0.29	ND (0.20)
MW-18M	28-Oct-13	N	**8.3**	**5.0**	0.97	0.61	ND (0.20)
MW-18M	28-Oct-13	FD	**8.2**	4.6	0.86	0.75	ND (0.20)
MW-18D	18-Mar-13	N	**8.0**	**6.3**	1.5	0.32	ND (0.20)
MW-19	08-Oct-98	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-19	08-Apr-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-19	14-Apr-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-19	24-Oct-06	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-19	07-Oct-10	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-23	26-Oct-98	N	1.3	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-23	08-Apr-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-23	14-Apr-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-23	25-Oct-06	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-23	23-Oct-09	N	0.36	1.1	0.78	0.28	ND (0.20)
MW-23	23-Oct-09	FD	0.33	0.97	0.84	0.28	ND (0.20)
MW-23	06-Oct-10	N	0.41	0.96	0.86	0.29	ND (0.20)
MW-25S	08-Oct-98	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-25S	08-Apr-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-25S	06-Oct-99	N	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	
MW-25S	14-Apr-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-25S	19-Oct-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-25S	17-Oct-01	N	ND (1.0)	ND (1.0)	0.172	ND (1.0)	ND (1.0)
MW-25S	17-Oct-02	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-25S	16-Oct-03	N	ND (1.0)	ND (1.0)	0.224	ND (1.0)	ND (1.0)
MW-25S	16-Nov-04	N	ND (1.0)	ND (1.0)	0.177	ND (1.0)	ND (1.0)
MW-25S	26-Oct-06	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-25S	23-Oct-09	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-25S	06-Oct-10	N	ND (0.20)	ND (0.20)	0.21	ND (0.20)	ND (0.20)
MW-25M	16-Mar-13	N	ND (0.20)	1.2	0.84	ND (0.20)	ND (0.20)
MW-25D	05-Nov-98	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-25D	08-Apr-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-25D	06-Oct-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-25D	14-Apr-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-25D	19-Oct-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-25D	17-Oct-01	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-25D	17-Oct-02	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-25D	16-Oct-03	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-25D	16-Nov-04	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-25D	26-Oct-06	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-25D	23-Oct-09	N	ND (0.20)	0.26	0.25	ND (0.20)	ND (0.20)

Gaffney West Cumulative Chlorinated Ethene Groundwater Results

		Contaminant	PCE	TCE	cDCE	tDCE	Vinyl chloride
		Unit	µg/L	µg/L	µg/L	µg/L	µg/L
		ADEC Groundwater Cleanup Level	5	5	70	100	2
Location	**Sample Date**	**Sample Type**					
MW-20S	08-Apr-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-20S	14-Apr-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-20S	19-Oct-00	N	0.228	ND (1.0)	0.453		ND (2.0)
MW-20S	17-Oct-01	N	ND (1.0)	0.168	0.404	ND (1.0)	ND (1.0)
MW-20S	17-Oct-02	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-20S	16-Oct-03	N	0.143	0.172	0.546	ND (1.0)	ND (1.0)
MW-20S	16-Nov-04	N	0.153	0.264	0.77	ND (1.0)	ND (1.0)
MW-20S	27-Oct-06	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-20S	26-Oct-09	N	0.32	0.40	0.98	ND (0.20)	ND (0.20)
MW-20S	26-Oct-09	FD	0.30	0.35	1.0	ND (0.20)	ND (0.20)
MW-20S	15-Oct-10	N	ND (0.20)	ND (0.20)	0.57	ND (0.20)	ND (0.20)
MW-25D	06-Oct-10	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-20D	08-Apr-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-20D	14-Apr-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-20D	19-Oct-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-20D	17-Oct-01	N	ND (1.0)	ND (1.0)	0.139	ND (1.0)	ND (1.0)
MW-20D	17-Oct-02	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-20D	16-Oct-03	N	ND (1.0)	ND (1.0)	0.145	ND (1.0)	ND (1.0)
MW-20D	16-Nov-04	N	ND (1.0)	ND (1.0)	0.165	ND (1.0)	ND (1.0)
MW-20D	27-Oct-06	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-20D	26-Oct-09	N	ND (0.20)	0.22	0.35	ND (0.20)	ND (0.20)
MW-20D	06-Oct-10	N	ND (0.20)	0.20	0.41	ND (0.20)	ND (0.20)
MW-22S	08-Oct-98	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-22S	08-Apr-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-22S	14-Apr-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-22S	19-Oct-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-22S	17-Oct-01	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22S	17-Oct-02	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22S	16-Oct-03	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22S	16-Nov-04	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22S	26-Oct-06	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22S	23-Oct-09	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-22S	15-Oct-10	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-22D	05-Nov-98	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-22D	08-Apr-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-22D	06-Oct-99	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	
MW-22D	14-Apr-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-22D	19-Oct-00	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)
MW-22D	17-Oct-01	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22D	17-Oct-02	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22D	16-Oct-03	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22D	16-Nov-04	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22D	25-Oct-06	N	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
MW-22D	23-Oct-09	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
MW-22D	15-Oct-10	N	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)

Bold Red values exceed ADEC Groundwater Cleanup Levels

ND (0.20) = Not Detected (Method Reporting Limit)

Empty cells = Not analyzed.

N = Normal Environmental Sample

FD = Field Duplicate Sample

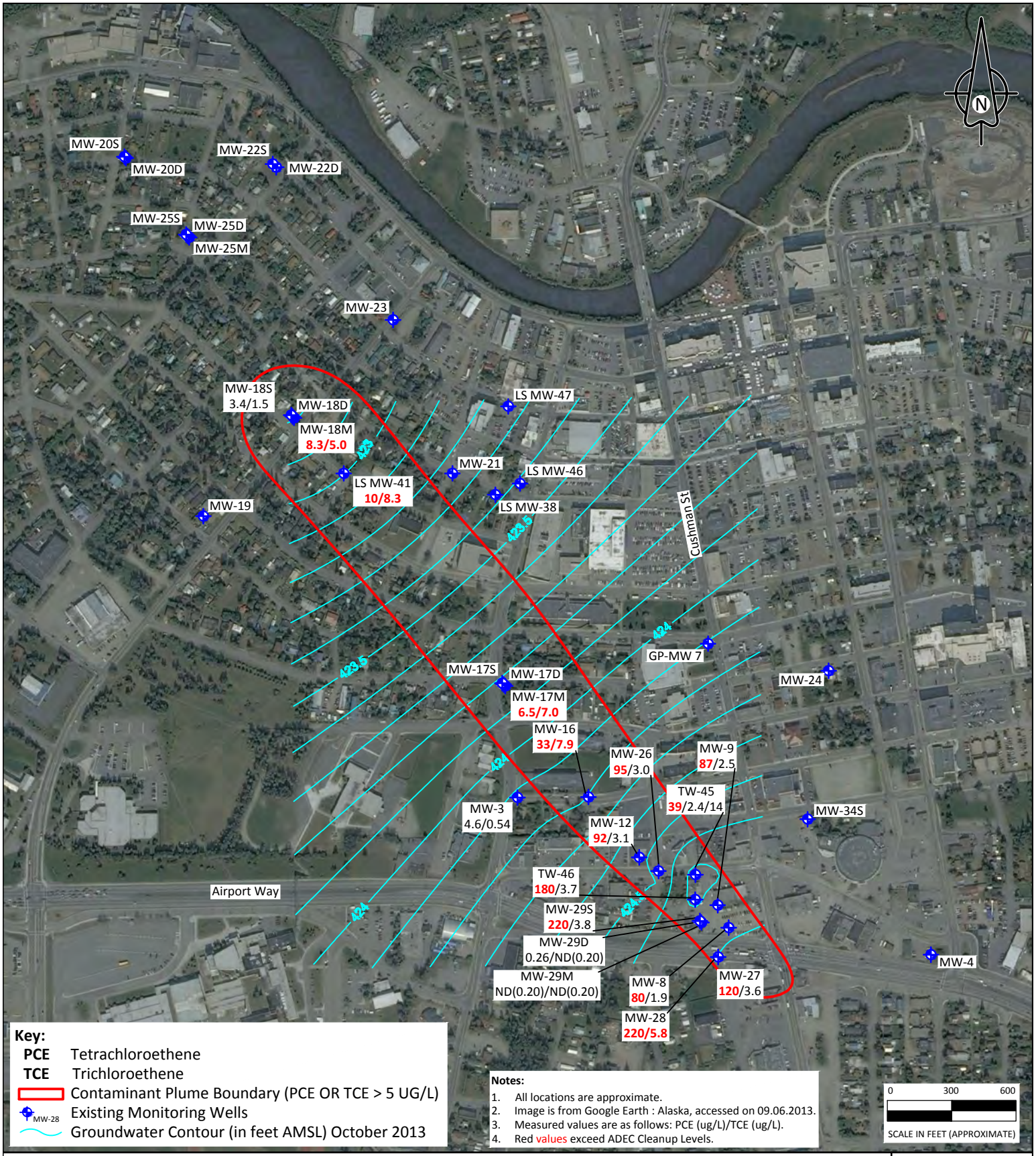
PCE = Tetrachloroethene

TCE = Trichloroethene

cDCE = cis-1,2-Dichloroethene

tDCE = trans-1,2-Dichloroethene

JD = The analyte is estimated based on relative percent difference outside of control limits for duplicate samples



Key:

PCE Tetrachloroethene

TCE Trichloroethene

Contaminant Plume Boundary (PCE OR TCE > 5 UG/L)

MW-28 Existing Monitoring Wells

Groundwater Contour (in feet AMSL) October 2013

Notes:

1. All locations are approximate.
2. Image is from Google Earth : Alaska, accessed on 09.06.2013.
3. Measured values are as follows: PCE (ug/L)/TCE (ug/L).
4. Red values exceed ADEC Cleanup Levels.

Groundwater Monitoring and Operations and Maintenance of Remediation System
Alaska Department of Environmental Conservation
Gaffney Road West, Fairbanks, Alaska

Ahtna Engineering

Groundwater Concentrations and Elevation Contours
October 2013 Results

Project Number:	Figure Number:
20266.004	2
Date: 12.09.2014	
Drafted By: G.R.	

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APPENDIX B

FIELD NOTES

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+60°F, heavy rain

7/1/14 Caffrey West SVE Weller

1700 Meet new lessee (Gene's Chrysler) at auto lot at SVE
- SVE/SSD off due to high vac.
- restart
- check collect → OK
- restart SSD continuous, SVE pulse 12 on, 12 off at 38 Hz → 76" WC blower vac
- Water in rotometers, heavy rain (wettest June on record) many SVE wells under standing water

1730 offsite

7/7/14 1100 Weller stops by - more rain SVE off cycle → sediment in rotometers means water

---

7/23/14 0745 Weller stops by - still lots of rain - SVE on the "off" cycle, will restart in 8.6 hrs - lots of silt in rotometers

---

8/5/14 1415 Weller stops by SVE/SSD, SVE Blower vac 73" WC - no water in rotometers. Lots of water in lot.

(11)

Weller Caffrey SVE 8/12/14

0715 Weller stops by SVE system, SVE blow vac 72" WC.

1200 Weller stops by SSD/SVE 9/11/14 system, SSD same as usual
SVE off - ready to come on in 3.4 hours
- reset so it starts at noon, off at midnight
- Blower Vac 82" WC after startup
- chat with Gene's Chrysler rep. They may stay here during the winter.

1500 Perman stops by SVE syst. 9/18/14
Blower vac @ 72" WC
- will return @ later date to clean rotometers

Rite in the Rain

+35°F Mostly

9/24/14 Gaffney West Weller

1230 Locate MW-18D, It is packed with gravel to 13' bgs unthread top 5' of casing. Pour bentonite grout into well hole and hydrate. backfill top 1' with native gravel

1330 Pick up utensils to replace monitoring well covers

1430 Replace MW-29S + VMP-2 covers * Tried to remove datalogger from MW-29S - it broke off - need to try to retrieve later.

1500 Trim TW-46 Top of casing * Need to be resurveyed at a later time *

1615 offsite

9/25/14

0900-1100 Replace MW-27 well cover, remove Hydrasleeve

9/26/14 1600 Inspect MW-27, MW-29S, and VMP-2 well covers' concrete curing. Remove barricades and return to Aztec Fire + Safety

(16)

+25°F clear

Weller Gaffney West 10/8/14

0815 Weller turns on heat trace SVE comes on in 31 hrs

10/13/14

0900 Heat trace circuits are all on * SVE off in 2.4 hrs.
- Water in EW-6
- Blower vac 74 "WC

10/8 1900 - Heat trace breaker 21+23 off, turned them back on.

10/15/14

1115 Weller onsite, SVE to start in 11.8 hrs
- all heat trace on
- Restart SVE, clear rotameters
- adjust control room door frame
- 4 pumps of grease in each zirk of SVE blower
- autodialer not working correctly, need to investigate

Pull data loggers

MW-24	00220162774	1500
MW-34S	00220162667	1510
Barologger	00120162755	1520
MW-35	00220162668	1520
MW-25M ~~MW-17A~~	00220163098	1540
MW-29M	00220163220	1610

Rite in the Rain

Cuffman West

10/15/14 cont'd
Place dataloggers on top shelf in SVE equipment sides
- Still need to recover datalogger in MW-29S
- MW-29 M + D had asphalt cold patch over them → difficult to remove covers
1615 offsite

10/23/14 +25°F, snow flurries
1330 - Weller onsite to try to fish out datalogger from MW-29S
- There is sand (10/20 or similar) at 11.8' BTOC
- Park-n-Sell lot is empty again (Gene's Chrysler is gone)
- get 100' extension cord from Independent Rental. Try to remove sand with Shop Vac + PVC stinger
- no go, sand too deep. MW-29S needs to be decommissioned
- clean SVE unit
1600 offsite

Cuffman West 10/31/14
0900 Wellers stops by: Heat trace on, no water in rotometers, SVE off in 3.2 hrs
SVE blower vac 77 in WC

11/4/14
1530 Weller stops by. SVE off, "SEb" flashing on t.mr. Reset timer to run 6 on-6off, ICY, Adjusted SVE Blower speed to 36 hz → Blower vac 65" WC. heat trace on.

1100 Weller stops by SVE on for 11/14/14 ~~off in 08~~ @ 0,8 hrs.
Reset so SVE runs 12 on, 12 off (on @ 1215 pm)
V 12.0 ICY+, V 12.0 ICY-
shut off power, tighten all connections in control panel, re program autodial
74" WC blower vac @ 40Hz SVE blower
1300 offsite

Rite in the Rain

+15°F, snow

11/25/14 Gaffney West Weller

17:30 Weller stops by, SVE off in 66 hrs
- no water in rotometers
- 74" WC blower vac at 41 Hz
- test call out → OK
- Restart, timer remained the same,

12/3/14 +15°F, cloudy Weller

1335 Wellers stops by
- no water in rotometers
- SVE blower vac 74" WC @ 41 Hz
- heat trace was off → turned on
- SVE off in 10.2 hrs
- LEL 20 2%
- grab Dataloggers from SVE

12/17/14 +10°F, cloudy Weller

1315 Weller stops by
- no water in rotometers
- Blower vac 72" WC @ 41 Hz
- test autodiale → OK, restart
- SVE off in 10.1 hrs
- heat trace on

-20°F, clear

Weller Gaffney West 1/6/15

1345 Weller stops by. Heat trace on. Check autodialer call out (SSD high level), OK. SVE on in 9.8 hours.

1/30/15

1100 Weller stops by for OM+M see data sheet
Turn off heat trace + SVE
Turn thermostat in equip room 60-80 (controls exhaust fan)
Turn up SSD 41HR → 50 Hz
1230 offsite

2/3/15

0940 Weller stops in, Temp in equip room OK ~80°F, SSD exhaust 104°F
Equiproom heater: Marley model # G18081B
control room %LEL - 0%

2/20/15

1120 Weller turns on heat trace
1300 Site walk with K. DeRuyter
1615 Turn on SVE (pulse 12 hr on/12 hr off) 40 Hz, 75" Hg Blower vac at startup
1620 offsite

Rite in the Rain

2/27/15 ③
1300 Perman turns off heat trace and ④SVE Blower
Before turning off:
① SVE Blower Vac: ~70 "HC
② SVE lines with moisture!

13:15 SVE unit off upon arrival. Turned off heat trace.

heat trace: Turn off three labelled breakers (bottom left side)
SVE Blower: turn knob to "off" on (10 Hp) control panel

3/23/15
1630 Weller stops by to turn on heat trace - SSD on

3/29/15
1145 Weller turns on SVE blower 30 Hz 47" HC Blower Vac, heat trace on SSD on, SVE programmed to pulse R hr on/12 hr off

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SFY 2014
Gattney West
Book 2

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JOURNAL
№ 391

4/3/15 —

INCH

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ALL-WEATHER WRITING PAPER

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Phone 374-4750 / 590-7979
awelle@ahtna.net

Project SFY 2014 Gaffney West, Book 2
AES Project # 20266.004.01

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CONTENTS

PAGE	REFERENCE	DATE

+40°E, P. Sun

4/3/15 SFY2014 Gaffney West Weller

1330 Weller stops by for abbreviated SSD/SVE check - see data sheet
- grease SVE Blower

1430 offsite after turning off heat trace and SVE Blower

4/22/15 Weller / Martin

1436 Turn on Heat trace ~~on~~ at SVE system and turn on SVE

~~$30~~ 41st Avenue - Mr Callahan's has a well rental
456 7147 Tim O'Callahan

- possible location on 11th, North side near El Dorado, along covered strip right along curb
- location on 10th, south side in planter strip
- 9th, beside MW-17 trio
- 8th, either side, stay in ROW, no curb, storm drain on N side, put on N side
- 7th ~~S side in planter strip, curb access~~ from 772 7th on corner of 6th + Perry
- 6th S side ~~at end of sidewalk~~, by same house where is MW 41 is

1/2

Martin
Weller

4/22/15

- 5th St, S side bet. ~~on~~ 931 ~~end~~ 923 5th

hi curb - in front of sidewalk, watch out for overhead lines

1615 check on SVE
Blower Vac 47 @ 31 Hz

1630 offsite

2/2

Rita in the Rain

+45°F, Sun

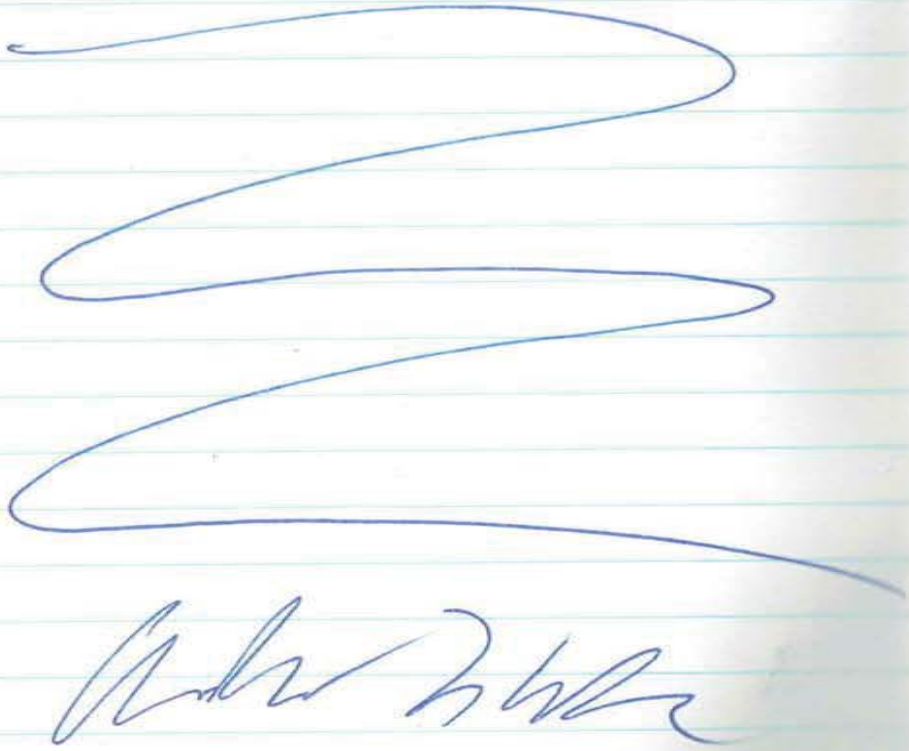
5/3/15 Gaffney West Weller

0715 Weller stops by. Turn off heat trace and equipment room heater. SSD on and good. SVE will be on in seven hours.

5/14/15

1100 Weller stops by. SSD is on. SVE set to operate in 3.1 hrs.

Chris – Grasle for electrical locates (woman)



50°F, cloudy

Weller Gaffney West 5/12/15

0900 Meet Stick to review traffic control plans for VMPs

0930 stop by SVE unit
SVE off, will start in 4.0 hrs
SSD on, good
restart SVE (12 on/12 off
- moisture in EW-5,
- total flow → 100 cfm
- Blower vac 49" WC

Utility locates 6/17/5

GVEA - 452-1151 - Nancy, sent email on 6/17 with locations
(Print out outlines of 10th + 7th)

Dighne (FNG, GCI) - done

GHU - Cindy, email 6/18, Jacinda 455-014

COI -

City of Fairbanks storm drains - message with Bob Pristas on 6/18

Aurora Energy - message with operator on 6/18
Matt Burdick 750-4988

6/17/15 Gutfrey West Weller

City of Fairbanks
Surety Bond - $5,000
Deposit - $3,000

- sent Bruce an aerial of locates

- 0800 Monday, GHU

6/22/15 Weller
0800 Meet at 11th & Turner for utility locates with GHU

8/24/15 Weller
1000 Meet GVEA for locate at 7th + 10th

6/26/15 Weller
0800 Meet GHU to confirm locates at 10th + Barnette
0815 Check on SSD/SVE → OK
SVE blower vac, 48" WC
cycle on @ 0815, cycle off @ 2015

Weller Gutfrey West 7/3/15
1300 Weller stops by remediation unit for brief check. SVE on, exhaust fan on, no water in rotometers.
SVE Blower vac: 48" WC

Weller 7/21/15
1330 Weller stops by remediation unit for brief check
- SVE off, will start in 85 hrs
- restart
- SSD good
- @ restart, Blower Vac = 49 "VC
- no moisture in rotometer

+ 70°F, Sun

7/23/15 Gulfport West Weller

0800 Weller meets GeoTek (M. McHam, O. Sutliff), tailgate safety meeting, plan job, shuffle equipment

1015 set up at VMP-7 to install VMP. see boring log

1300 finish VMP-7

1320 start VMP-9

1430 finish VMP-9, 1500 start VMP-8

~~1530~~ f@

~~1630~~ @ 1600 finish VMP-8

1630 start VMP-10

1730 finish VMP-10

1745 Weller offsite

+ 70°F, Sun

Weller Gulfport Vet 7/24/15

0730 Weller meets GeoTek (M. McHam, O. Sutliff), gear up, safety meeting

0830 set up at VMP-6

0950 finish VMP-6

1000 start on VMP-5, Tammy of Great Northwest does traffic control

1130 finish VMP-5

1145 start on VMP-4

1300 finish VMP-4

1315 Arrive at DOT

Install VMP at ~~10.0~~ @ 9.5'

sand 7.5 - 9.5'

2.25" hole

did not generate cuttings

S. Fish arrived to inspect

1515 offsite

Rain in the Rain

+75°F, sun

7/25/15 Gaffney West Weller

1300-1400 Apply asphalt cold patch to Keller st where trailer ramps cut into street. Brief SVE check, SVE manifold vac - ~~45"Hg~~ 45" WC

(1)

Andrew Zwick

+60°F, clouds

Weller Gaffney West 7/27/15

10:00 Arrive at VMP-4. Grab vapor cap to rig up tubing. Head to TTT to look at tubing options. 8 stops in Fairbanks to find couplings to attach tubing to vapor caps.

used - 1/2" -13 coupling nuts (zinc plated)
- nylon 1/4" MPT, 3/16 tubing hose barbs
- Teflon (1/4" tubing) not just ~~teflon~~-lined

14:30 back at VMP-4 - decon fittings with Alconox + DI water
- hang string for passive sampler + purge 10x total volume (casing + sand pack) 13.0 L or 216 strokes of 60 mL syringe

(all tubing ~1" of bottom)

15:10 arrive at VMP-5, hang string and tubing, purge 15.8L or 263 strokes of 60mL syringe

make swing tie

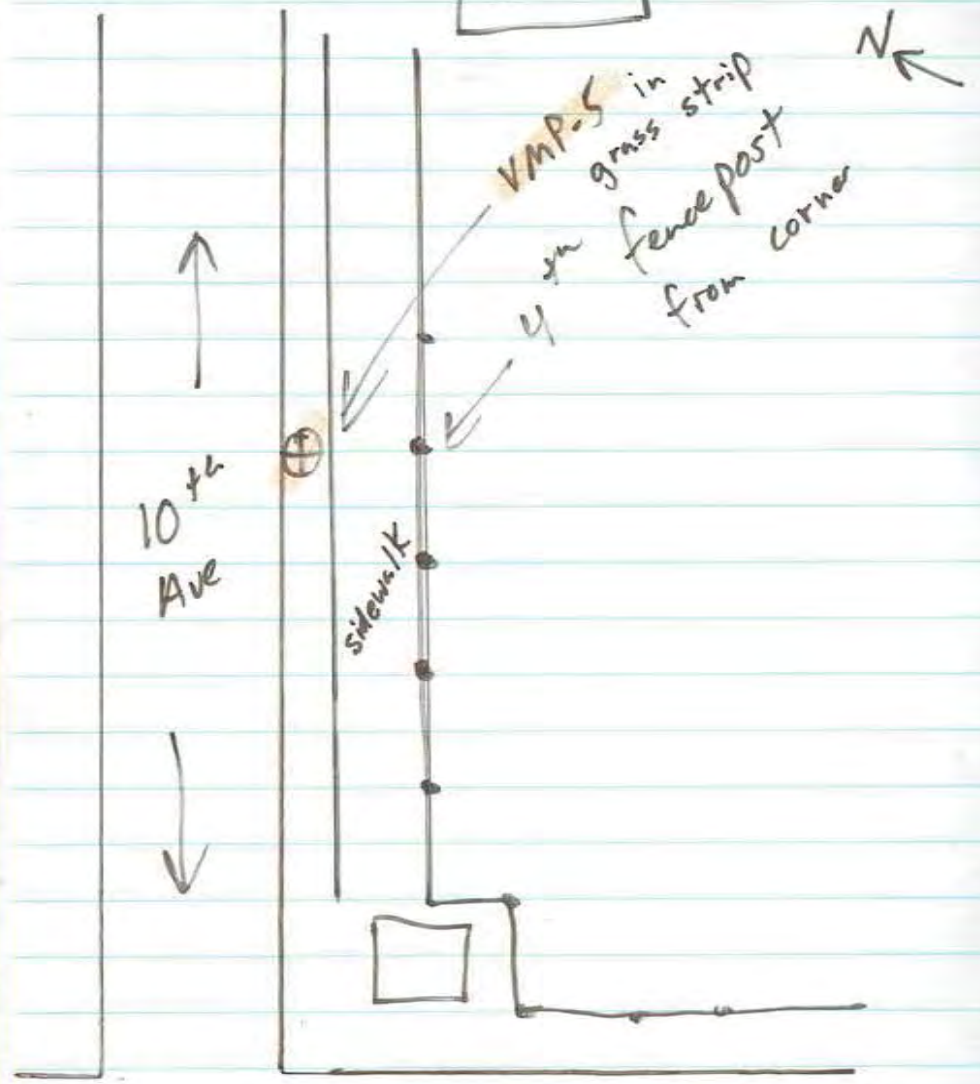
Andrew Zwick

(1/3)

Rite in the Rain

7/27/15 Gaffney West Weller

VMP-5



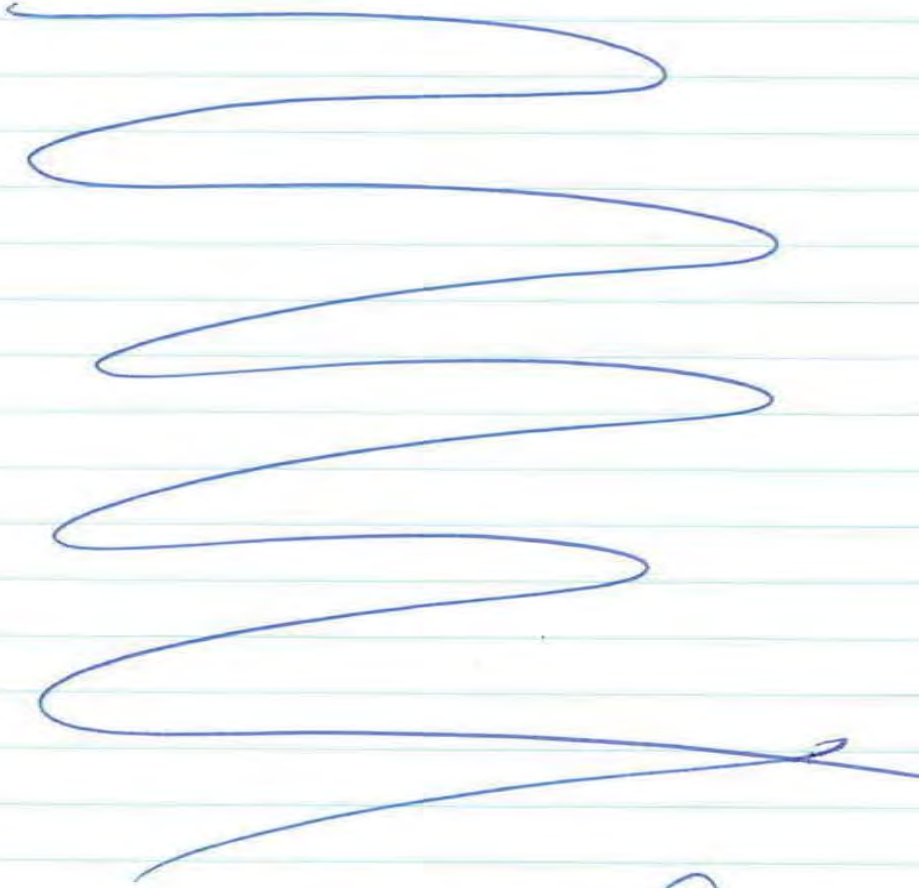
+60°F, cloudy

Weller Gaffney West 7/27/15

15:50 pickup receipt from City of Fairbanks for permit fee.

16:10 hang string and tubing at VMP-6, purge 15.8L at 263 strokes of 60mL syringe.

16:40 offsite



+ 55°F, fog

7/28/15 Gaffney West Weller

0600 Arrive at VMP-7, connect tubing and string, purge 29.9L (448 strokes of 60 mL syringe

0700 trim sono tube at VMP-6 completion

0710 Arrive at VMP-8, connect tubing and string, purge 15.8L (263 strokes on 60mL syringe)

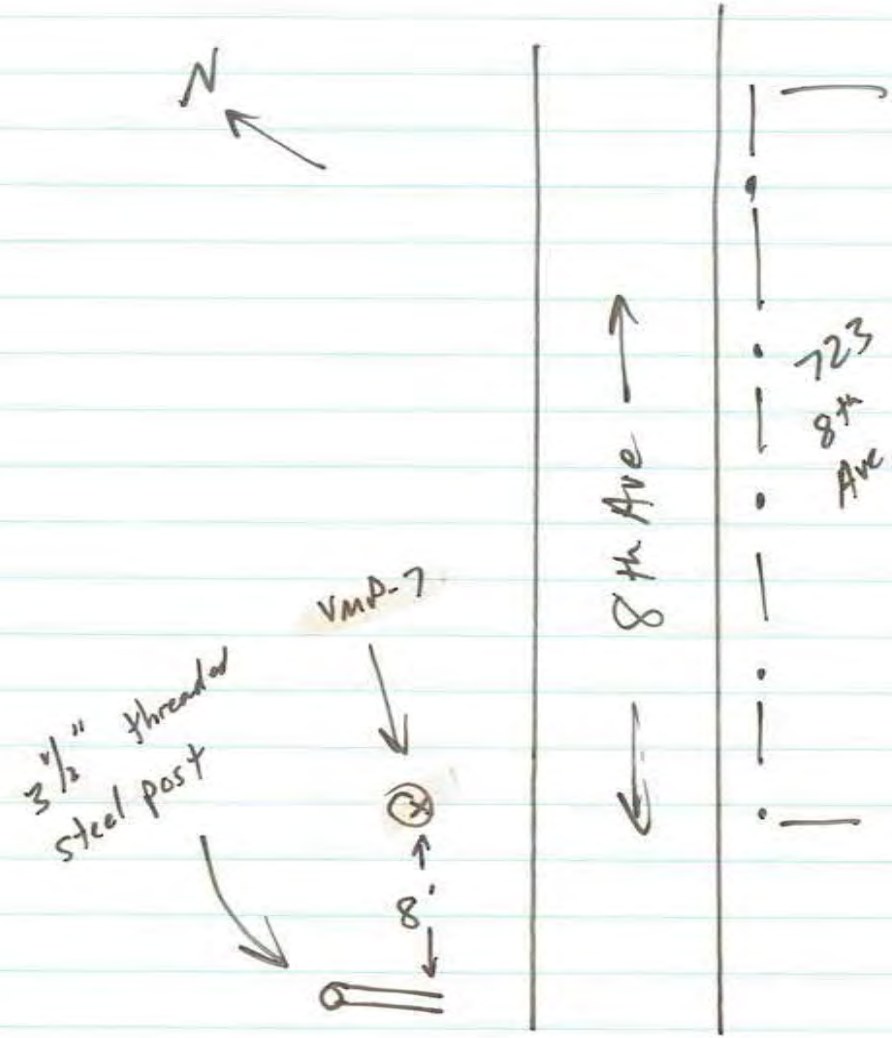
0750 offsite

1/3

Adam Zeller

Weller Gaffney West 7/28/15

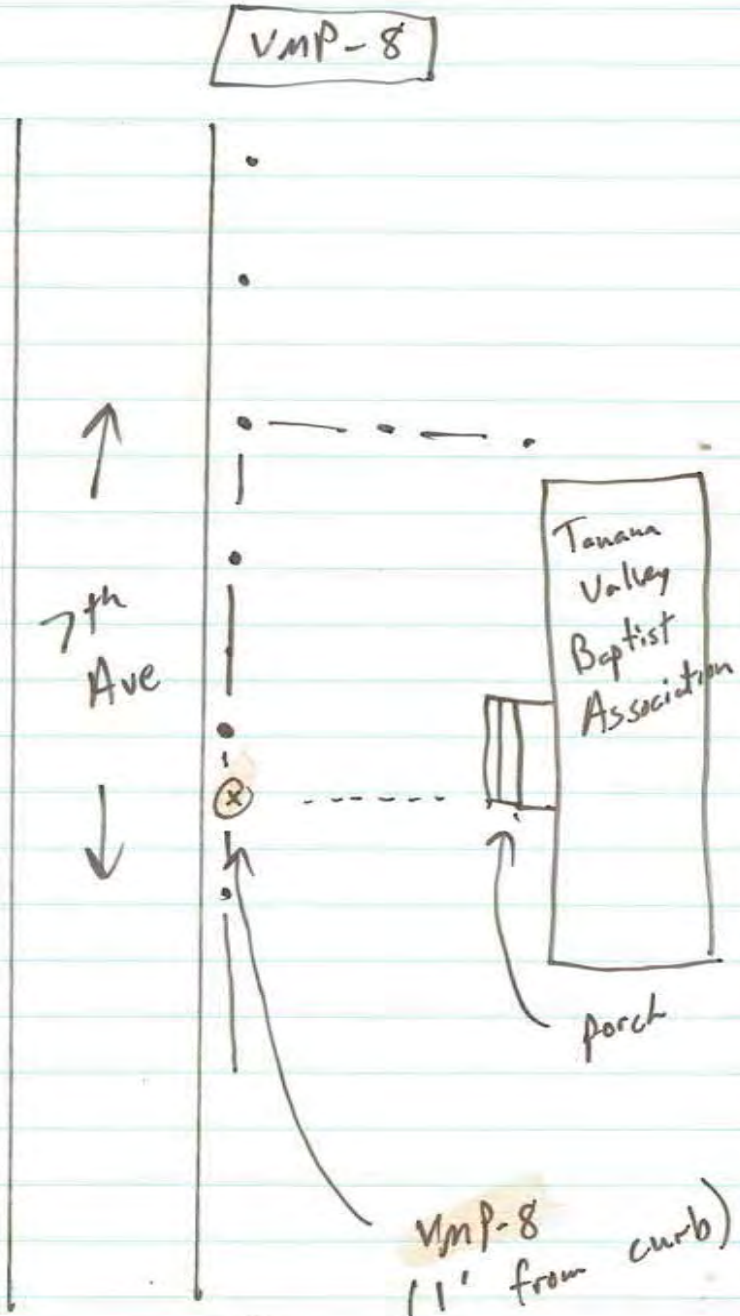
VMP-7



Adam Zeller

2/3

7/28/15 Gaffney West Weller



(3/3)

+ 60°F, cloudy

Weller Gaffney West 7/29/15

0935 Weller arrives at VMP-9 to connect tubing and purge. Purge 18.0 L (300 strokes on 60mL syringe)

1010 arrive at VMP-10 to connect tubing + purge 15.4L (257 strokes on 60 mL syringe)

1100 arrive at DOT VMP to connect tubing + purge 14.1 L (235 strokes on 60 mL syringe)

1140 offsite

(1/3)

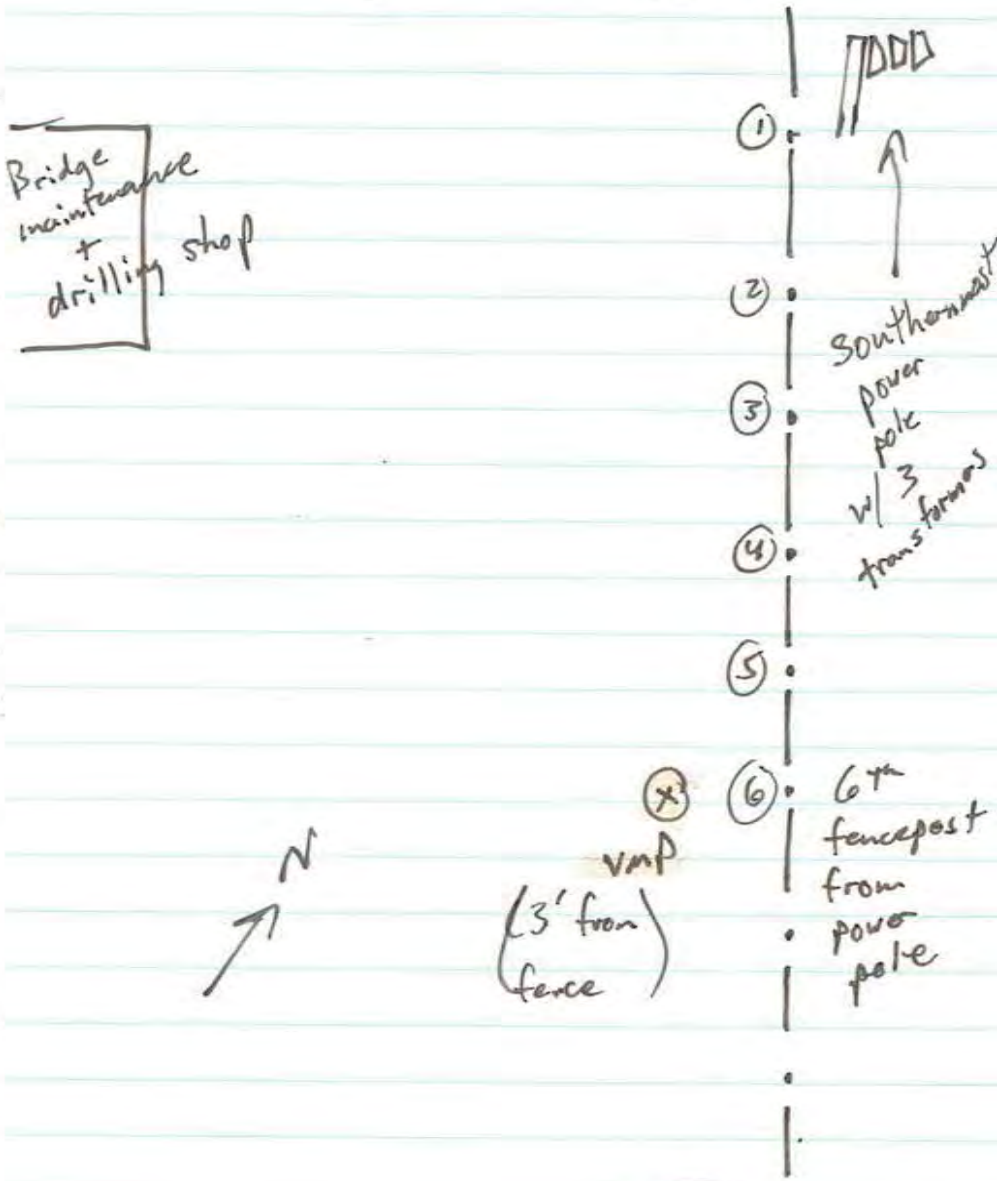
7/29/15 Gaffney West Wello

VMP-10

2/3 Anders Wells

Wello Gaffney West/Peger 7/29/15

DOT VMP

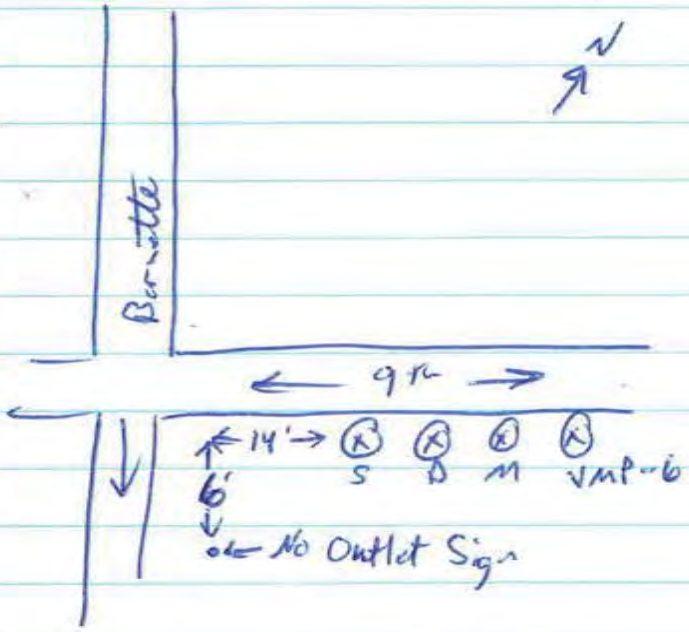


3/3 Anders Wells

8/12/15 Gaffney West Weller

1500 Wellers stops by for brief check. SVE off, set to restart in 10.0 hrs. Restart manually. Moisture in EW-6. SSD flow rates good. SVE Blower Vac 49" Hg.

9/5/15 0930 Make up dataloggers for MW-17S



Use 80# Spider Wire to hang

Barologger S/N 00 12016755

6.43' ~~9.21'~~ BTOC 39,999 readings left

will start recording at noon, every six hours

+ 90° F, Sun

Weller Gaffney West 9/5/15

Levelloggers S/N 00220162 68

20.61' BTOC 39,999 readings left

will start recording at noon, every six hours

Depth to water at MW-17S @ 10:10

9.55' BTOC

10:20 Deploy Leveloggers and Barologger in MW-17S

1025 Stop by remediation system

SVE to start up in 4.2 hrs

SSD on

restart SVE, blower vac 51" WC

- Moisture in EW-6, EW-4, EW-15

9/17/15

11:15 Gauge DTW at MW-17S 9.66' BTOC

1130 Stop by remediation system

SVE Blower vac 48" Hg

SVE Flow ~ 90 CFM @ 31 Hz

Moisture in EW-1, EW-15, EW-6

SVE to turn off in 10.7 hrs

+40°F, cloudy

9/18/15 Goffney West Weller/Martich

0730 Andrew Weller + Ben Martich set up at ~~MW-4~~ VMP 4.
Weather is 40°F, partly clear skies

0750 Complete tightness test of duplicate sample T

0754 Begin purging VMP-4. See data sheet

Sample from soil gas point outside casing of VMP-4
15-GRV-026-SG @ 0840/9/18/15
34323
initial vac 29" Hg
final vac 5.5" Hg @ 0840/9/18/15

0845 Set up at VMP-5.

0935 Finish sampling at VMP-5

0945 Set up at VMP-6

1035 Finish sampling at VMP-6

1045 Set up at VMP-7

1120 check first Tedlar Bag, 14% leak, there was also 3.5" Hg while purging, inspected tubing in well → wet, cut off 0.8ft from bottom of tubing and start purging again → still vacuum, cut 1.2 ft off (total 2' removed)

1140 begin purging again

(1/2) Andrew Zahn

+40°F, cloudy

Weller
Martich Goffney West 9/18/15

1215 Arrive at VMP-8, high helium leak + induced vacuum while purging indicated the sample tubing was submerged, trim 1-ft off bottom of tubing.

1240 Vacuum still being induced while purging. Remove Teflon tubing. Speed purge rate to 400 mL/min to see how vacuum responds. Vacuum increases → screen submerged

1400 Deploy samples at VMP-9

1500 Deploy samples at VMP-DOT

1615 Deploy samples at VMP-10

Andrew Zahn (2/2)

Rite in the Rain

+40°F, rain

9/19/15 Caffrey West Weller

0850 - 0900 Pickup canisters + WMS's from VMP-4

1200 - 1315 check vacs + pickup samples from VMP-8

1445 - 1515 ~~Pickup~~ @ Swap out canisters at VMP-DOT

Place WMS's in refrigerator at end of every day

9/20/15 +40°F, P cloudy Weller

1330 - 1430 Check on remaining vacs

9/21/15 +32°F, P cloudy Weller

0830 at Remediation to clean rotometers. Swapping out canisters + WMS's throughout the day. Cleaning rotometers in spare time.

9/22/15 Weller

1295 - 1715 check vacuums, clean rotometers

9/23/15

0920 - 1630 swaps out canisters, check vacuums, pick up WMS's, clean rotometers

+50°F, Sun

Weller G. Caffrey West 9/24/15

0745 - 0945 finish cleaning rotometers test callout → OK

step test SVE:

120 cfm @ 80 "WC vac

90 cfm @ 50 "WC vac

leave SVE @ 30 Hz ~ 50 "WC vac

- swap out canisters at VMP-5

Weller Caffrey West 9/25/15

0835 Gauge DTW at MW-17S

DTW: 9.79' BTOC

download barologger + levelogger, did not erase data + replaced in MW-17S (+/- .02')

Check Depth's of VMPs (+/- ~~0.25~~ estimated @ .5')

VMP	Time	Depth BTOC	Depth BGS	DTW BTOC
VMP-4	0945	7.20	7.88	—
VMP-5	0935	9.36	9.89	—
VMP-6	0900	9.40	10.17	+ FAC
VMP-7	0930	9.34	9.88	9.12
VMP-8	0920	9.72	10.09	9.54
VMP-9	0915	11.04	11.71	—
VMP-10	0910	8.51	8.92	—
VMP-DOT	1240	8.85	9.35	8.81

10/21/15

1500 Weller stops by. 47" WC Vac on blower, NO water in rotometer

10/29/15

Sample ID for exhaust stack will be:
15-GRW-027-ES
will pull 100mL through tube

1745: Weller onsite
Take exhaust stack sample (SVE only) after SVE Blower has been running for 10.0 hrs.
ID: 15-GRW-027-ES @ 18:10, 10/29/15
pulled 100mL through TO-17 tube @ ~ 25 mL/min
Temp is ~ 140°F, 80% RH
- Fix door due to heaving
1815 offsite

10/30/15

1645 Weller onsite, grease SVE Blower, O+M check (see data sheet)
- check ESD/callout → OK
- turn off SVE for winter @ 1315
- Need to check on heat in equipment room periodically → heat off

10/30/15

- GPS all VMP's
- Done at 1600
- File on Trimble GeoXH 2008 is Gaffney, 10/30/15, 3MB

11/2/15

0745 Wellers stops by → 10°F ambient, ~ 50°F in equipment room (only heat in equipment room is from SSD blower)

1445 Weller stops by 11/5/15
~ 30°F, SSD system running
Turn on Equipment room heater

1330 Weller stops by 11/18/15
~ -10°F ambient
SSD good
Equipment room thermostat at 70°F

1215 Weller stops by 11/24/15
~ 30°F ambient
SSD good
- moved equipment room thermostat on exhaust from 70 → 50°F

-10°F, clear

12/8/15 Gaffney West Weller

0830 QC canister shipment. Replace the ~2' long sections of ¼" Teflon tubing with new ¼" Teflon tubing. The ~2' long sections of Tygon tubing are the same as last event. (These sections are between the flow controllers and the coupling that attached to the vapor caps. Would like to consider reusing the Teflon tubing next round (label the tubing from each VMP)
Note for Flow Controllers: rates were labset lower due to cold temps
24-hr @ 3.0 mL/min
48-hr @ 1.25 mL/min
72-hr @ 1.0 mL/min

1100 P/U water level indicator, magnetic locator, helium detector from TTT

1115 Arrive VMP-10 - clear snow, inspect VMP
No water in VMP-10

1140 VMP-9 - No water

1155 VMP-8, No water

1205 VMP-7, No water

1230 VMP-6, No water
MW-17S DTW: 11.28' BTOC

(½)

-10°F, clear

Weller Gaffney West 12/8/15

1240 VMP-5, No water

1255 VMP-4, No water

1315 VMP-DOT, No water

1330 Return water level indicator and magnetic locator to TTT

(2/2)

-15°F, clear

12/9/15 Gaffney West Wellon Martich

0800 - 1830 Wellon and Martich deploy WMS' and canistors at VMP-4 through VMP-10 and at VMP-DOT. See sample data sheets. ADEC accompanies in morning.

12/10/15

1400 Wellon stops by SSD system ~75° inside, All OK

1430 - 1530 check on soil gas samples with S. Tisdell (ADEC)

Soil gas and TB samples are
15-GRW-028-SG through
15-GRW-051-SG

12/11/15

1330 - 1515 Check on soil gas samples

12/12/15

0830 - 0930 @ Check on soil gas samples

Placing WMS that have been sampled in Refrigerator

-5°F, cloudy

Wellon Gaffney West 12/13/15

0735 - 0840 Check on soil gas samples.

12/14/15

0930 - Check on soil gas samples.

1000 Stop by remediation system → SSD OK ~75°F on SVE exhaust (not running, a good approximation of interior temp) 0°F ambient, exhaust thermostat in equip. room @ 80°F. SSD exhaust @ 108°F, SSD Blower vac @ 33" Wk @ 49 Hz

Turn off: 10 Hp Motor Breakers (#3, 5, 7 + disconnect on U wall) 10 Hp control breaker (#4)

1045 P/U Water level indicator at TTT

1055 Gauge MW-175, 11.38' DTW, BTOC Download levelogger and barologger

10/15/15

0800 - 0930 check on soil gas samples
Temp is 2°C, 80% RH for VMS samples
TB VMS Temp is 20°C, 20% RH

+10°F, cloudy Weller

12/16/15 Gaffney Weller Mackey

0815 - 1000 pick up remaining soil gas samples and ship

1000 Brief check on SSD system → OK

Marley Heater is 1.8 KW

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APPENDIX C

PHOTOGRAPHIC LOG

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Photograph 1: Bottom Cap on 1-inch Sch 80 PVC VMPs

Photograph 2: 64 Perforations on Bottom Six Inches of VMP, 1/8-inch Diameter Each

Photograph 3: Vapor Extraction Plug with Attached String and Teflon Tubing

Photograph 4: Installing VMP-7 on 8th Ave. Right-of-Way

Photograph 5: Installing VMP-7 on 8th Ave. Right-of-Way

Photograph 6: Saturated Soil in VMP-8 Core

Photograph 7: Purging at VMP-4

Photograph 8: Purging at 50 ml/min at VMP-4

Photograph 9: Purging at VMP-5

Photograph 10: Low Uptake Waterloo Membrane Sampler® at VMP-5

Photograph 11: Purging at VMP-7

Photograph 12: Security Box over VMP-8

Photograph 13: Canister Boxes in Background. Waterloo Membrane Samplers® in Box in Foreground

Photograph 14: Removing Former Concrete Around MW-29S, Former Park-n-Sell Lot

Photograph 15: New Well Cover at MW-29S, Former Park-n-Sell Lot

Photograph 16: New Well Cover at VMP-2, Former Park-n-Sell Lot

Photograph 17: Location of Decommissioned MW-18D on 6th Ave Right of Way

Photograph 18: New Well Cover at MW-27, Southwest Corner of Cushman St. and Airport Way

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APPENDIX D

CITY OF FAIRBANKS PERMITS FOR VMPS

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Ahtna Engineering Services, LLC
1896 Marika Road, Suite 8
Fairbanks, AK 99709
www.ahtnaes.com

Phone: 907.374.4750

Design-Build • Construction • Environmental • Staff Augmentation

SBA Certified ANC 8(a)

June 29, 2015

Mr. Bruce Carpenter
Quality Control Officer
City of Fairbanks
800 Cushman Street
Fairbanks, AK 99701

Subject: Permit to Install Seven Vapor Monitoring Wells in City of Fairbanks Right-of-Way

Dear Mr. Carpenter:

Ahtna Engineering Services, LLC (AES) is submitting this permit application to install seven vapor monitoring wells in the City of Fairbanks rights-of-way within 11th Ave., 5th Ave., Turner St., and Kellum St. Construction details of the vapor monitoring wells are attached. No concrete or asphalt cutting will be required. This work will occur during the summer of 2015. AES will provide the City of Fairbanks with coordinates following their completion.

Thank you for your assistance in obtaining the right-of-way permit. Please contact me if you have any questions.

Sincerely,

Ahtna Engineering Services, LLC

Andrew Weller, PE
Project Engineer

Attachments:
1. Well Construction Details, Plan and Elevation Views
2. Well Locations
3. Surety Bond
4. Certificate of Insurance
5. Traffic Control Plan

Ahtna Engineering Services, LLC
110 W 38th Ave, Suite 200A
Anchorage, AK 99503
PH: 907.646.2969
FX: 907.561.5475

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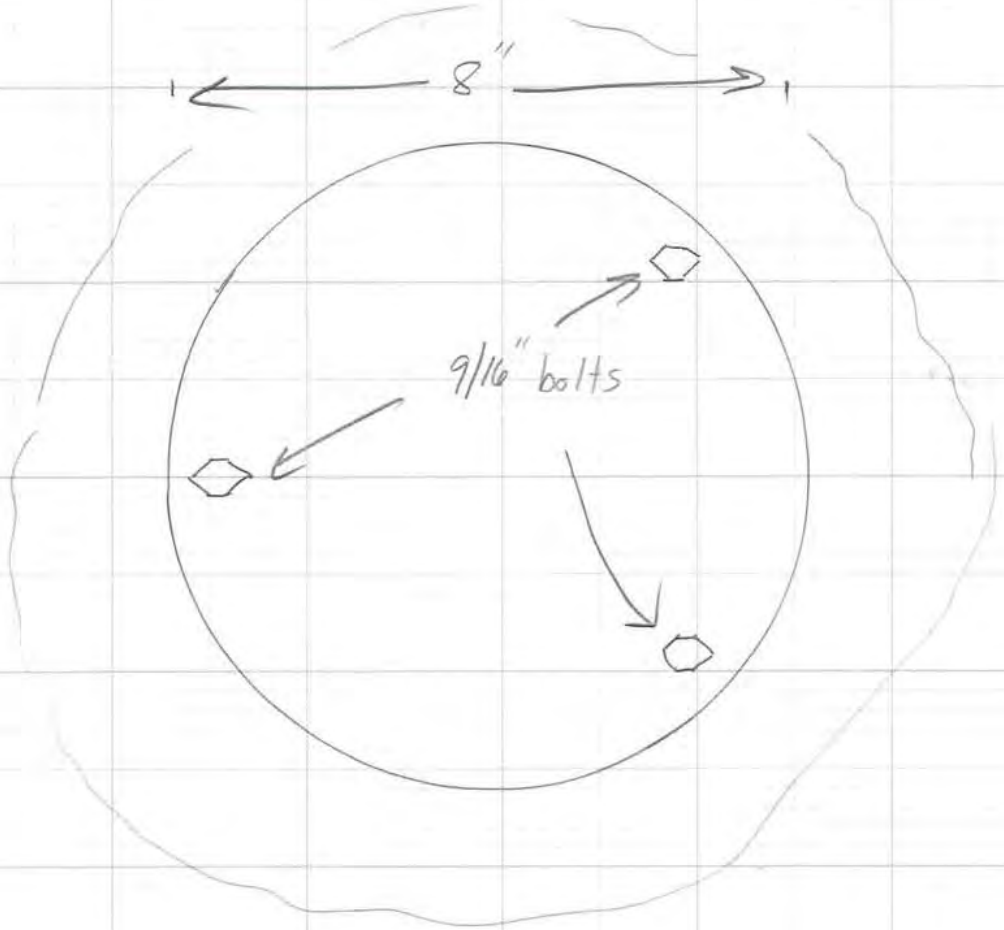
Vapor Monitoring Well Covers, Plan View



Not to scale
Andrew Z. Wilson
6/18/15

Ahtna Engineering Services, LLC
110 W 38th Ave, Suite 200A
Anchorage, Ak 99503
PH: 907.646.2969
FX: 907.561.5475

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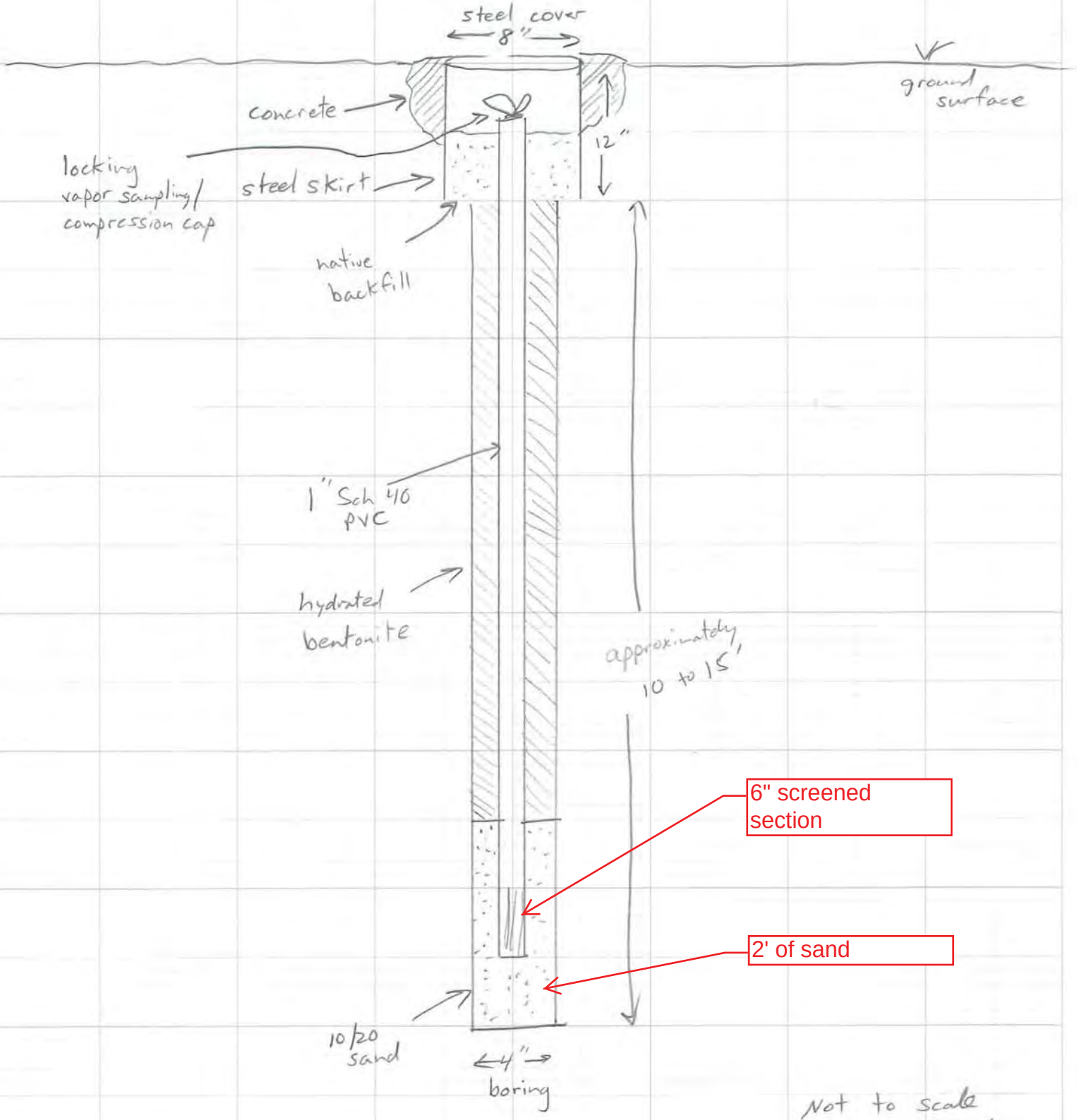
Vapor Monitoring Wells, Elevation View



Not to scale

6/18/15

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FIGURE 1

PROPOSED VAPOR MONITORING POINT LOCATIONS - JUNE 2015

SFY 2014 - GAFFNEY ROAD LONG-TERM MONITORING

GAFFNEY ROAD WEST
Fairbanks, Alaska

DATE: June 2015
CHKD: ALW
DRAWN: ALW
PROJ. No.: 20266.004

825 W. 8th Ave., Anchorage, AK 99501, (907) 258-4880

Ahtna Engineering

CHENA RIVER

MW22S
MW22D
MW20S
MW20D
MW25S
MW25D
MW25M
MW23
LS MW47
MW18S
MW18D
MW18M
LS MW46
MW21
LS MW41
LS MW38
MW19
GP MW7
MW24
MW17S
MW17D
MW17M
MW15
MW16
MW14
MW12
TW45
MW32
MW13
MW26
MW33
TW46
MW9
MW29S
MW29D
MW29M
MW8
MW7
MW31
MW4
MW6
MW27
MW28
MW30
MW1

5th Ave
6th Ave
7th Ave
8th Ave
9th Ave
10th Ave
11th Ave

Kellum St
Perry St
Cowles St
Barnette St
Cushman St

GAFFNEY ROAD AREA-WEST
GAFFNEY ROAD AREA-EAST

N

0 200 400 800 FEET

LEGEND

● NEW VAPOR MONITORING WELL LOCATION

MW23 ⊕ MONITORING WELL LOCATION (LETTER S = SHALLOW, D = DEEP, AND M = MEDIUM WELL.)

SOURCE: AERIAL PHOTO RCHRDSN_HWY7-20-06_16-3_1'PIX.JPG DATED 7/20/06 PROVIDED BY AERO-METRIC ANCHORAGE.

V:\PROJECT DRAWINGS\GAFFNEY\13 GAF\0180091_13FY_RPT-F2.dwg May 16, 2013.

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VMP-4
11th Ave
ROW in front of 649 11th
11TH AVE
BARNETTE ST
RICKERT
76-16
76-09
75-149
73-02
2B
2A
2L
2M
2O1
2O2
2Q
1B
70-4886
9A
9B
10
5A
1A
64.768

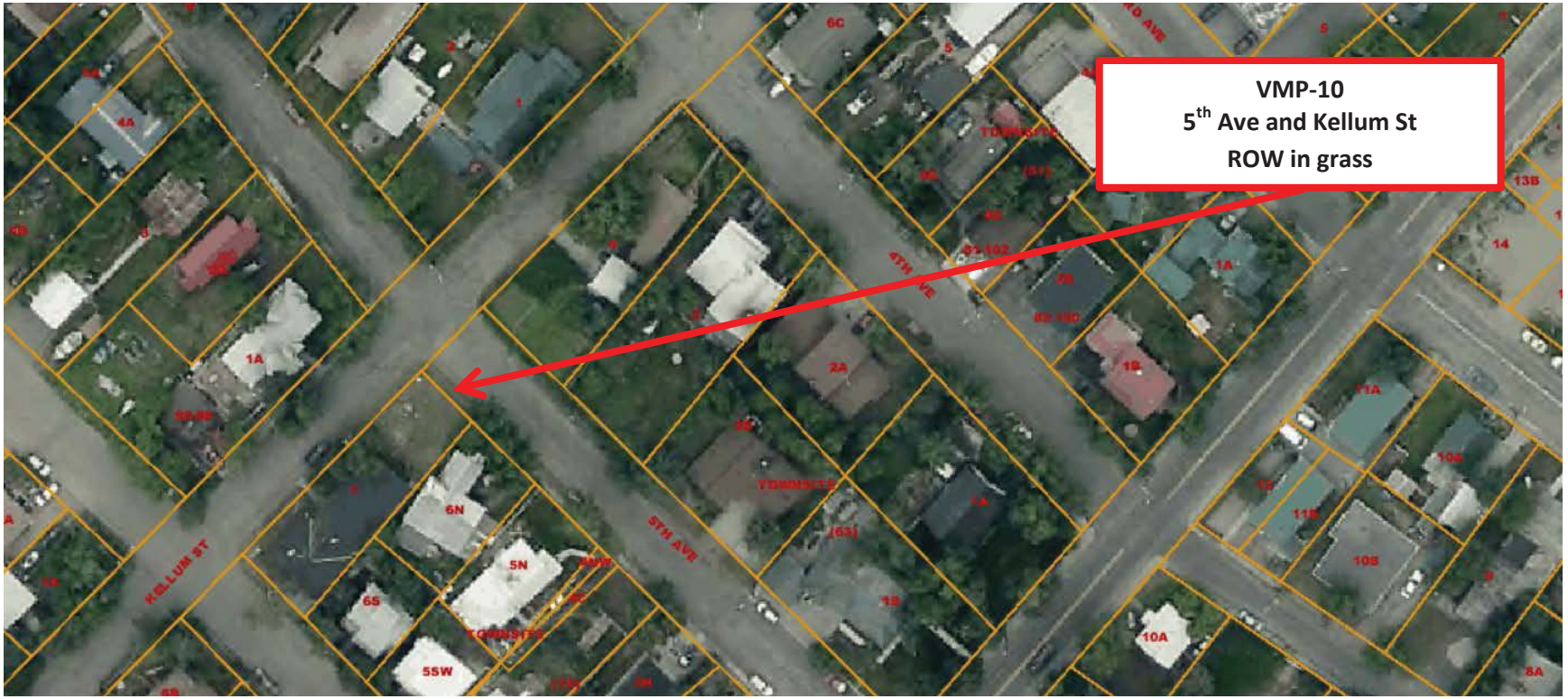

VMP-5
10th Ave
ROW in grass strip
9TH AVE
TOWNSITE
107H AVE
TOWNSITE


VMP-6
9th Ave
ROW in grass strip
9TH AVE
TOWNSITE


VMP-7
8th Ave
ROW in grass
8TH AVE
BARNETTE ST


VMP-8
7th Ave
ROW in grass
PERRY ST
7TH AVE
8TH AVE
TOWNSITE
(8S)
7A
8B
8C
7B
6
5B
17A
16B
10B
3A2
(3S)
2B


VMP-9
6th Ave and Perry St
ROW in grass
6TH AVE
7TH AVE
TOWNSITE


VMP-10
5th Ave and Kellum St
ROW in grass
KELLUM ST
5TH AVE
4TH AVE

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LICENSE OR
PERMIT BOND

Right-of-Way Bond - City of Fairbanks

Bond SAIFSU0682072

LICENSE OR PERMIT BOND

KNOW ALL BY THESE PRESENTS, That we, Ahtna Engineering Services, LLC

as Principal, and the International Fidelity Insurance Company, a New Jersey corporation, as Surety, are held and firmly bound unto City of Fairbanks, as Obligee,

in the sum of Five Thousand And No/100THS Dollars ($ $5,000.00)

for which sum, well and truly to be paid, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Signed and sealed this 25th day of June, 2015.

THE CONDITION OF THIS OBLIGATION IS SUCH, That WHEREAS, the Principal has been or is about to be granted a license or permit to do business as Right of Way (Gaffney Road West) by the Obligee.

NOW, Therefore, if the Principal well and truly comply with applicable local ordinances, and conduct business in conformity therewith, then this obligation to be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER; 1. This bond shall continue in force:

☒ Until June 30, 2016, or until the date of expiration of any Continuation Certificate executed by the Surety

OR

☐ Until canceled as herein provided.

2 This bond may be canceled by the Surety by the sending of notice in writing to the Obligee, stating when, not less than thirty days thereafter, liability hereunder shall terminate as to subsequent acts or omissions of the Principal.

Ahtna Engineering Services, LLC
Principal

By Adam G Wilson

International Fidelity Insurance Company

By Carol Lowell
Attorney-in-Fact

Carol Lowell

524-7200

POWER OF ATTORNEY

INTERNATIONAL FIDELITY INSURANCE COMPANY
ALLEGHENY CASUALTY COMPANY

ONE NEWARK CENTER, 20TH FLOOR NEWARK, NEW JERSEY 07102-5207

OW ALL MEN BY THESE PRESENTS: That **INTERNATIONAL FIDELITY INSURANCE COMPANY**, a corporation organized and existing under e laws of the State of New Jersey, and **ALLEGHENY CASUALTY COMPANY** a corporation organized and existing under the laws of the State of ennsylvania, having their principal office in the City of Newark, New Jersey, do hereby constitute and appoint

TED BARAN, JIM S. KUICH, CAROL LOWELL, MARYANNE CHANDLER, ANDY PRILL, THERESA A. LAMB, STEVE WAGNER, DALE AHRENS, MICHAEL A. MURPHY, JIM W. DOYLE, JULIE M. GLOVER, DARLENE JAKIELSKI, CHAD M. EPPLE

Bothell, WA.

their true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise, and the execution of such instrument(s) in pursuance of these presents, shall be as binding upon the said INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY, as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by their regularly elected officers at their principal offices.

This Power of Attorney is executed, and may be revoked, pursuant to and by authority of the By-Laws of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY and is granted under and by authority of the following resolution adopted by the Board of Directors of INTERNATIONAL FIDELITY INSURANCE COMPANY at a meeting duly held on the 20th day of July, 2010 and by the Board of Directors of ALLEGHENY CASUALTY COMPANY at a meeting duly held on the 15th day of August, 2000:

"RESOLVED, that (1) the President, Vice President, Chief Executive Officer or Secretary of the Corporation shall have the power to appoint, and to revoke the appointments of, Attorneys-in-Fact or agents with power and authority as defined or limited in their respective powers of attorney, and to execute on behalf of the Corporation and affix the Corporation's seal thereto, bonds, undertakings, recognizances, contracts of indemnity and other written obligations in the nature thereof or related thereto; and (2) any such Officers of the Corporation may appoint and revoke the appointments of joint-control custodians, agents for acceptance of process, and Attorneys-in-fact with authority to execute waivers and consents on behalf of the Corporation; and (3) the signature of any such Officer of the Corporation and the Corporation's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seals when so used whether heretofore or hereafter, being hereby adopted by the Corporation as the original signature of such officer and the original seal of the Corporation, to be valid and binding upon the Corporation with the same force and effect as though manually affixed."

IN WITNESS WHEREOF, INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY have each executed and attested these presents on this 22nd day of July, 2014.

INTERNATIONAL FIDELITY INSURANCE COMPANY CORPORATE SEAL 1904 NEW JERSEY

STATE OF NEW JERSEY
County of Essex

ROBERT W. MINSTER
Chief Executive Officer (International Fidelity Insurance Company) and President (Allegheny Casualty Company)

ALLEGHENY CASUALTY COMPANY 1936 PENNSYLVANIA

On this 22nd day of July 2014, before me came the individual who executed the preceding instrument, to me personally known, and, being by me duly sworn, said he is the therein described and authorized officer of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY; that the seals affixed to said instrument are the Corporate Seals of said Companies; that the said Corporate Seals and his signature were duly affixed by order of the Boards of Directors of said Companies.

IN TESTIMONY WHEREOF, I have hereunto set my hand affixed my Official Seal, at the City of Newark, New Jersey the day and year first above written.

CATHY CRUZ NOTARY PUBLIC MY COMMISSION EXPIRES 04-16-2019 STATE OF NEW JERSEY

A NOTARY PUBLIC OF NEW JERSEY
My Commission Expires April 16, 2019

CERTIFICATION

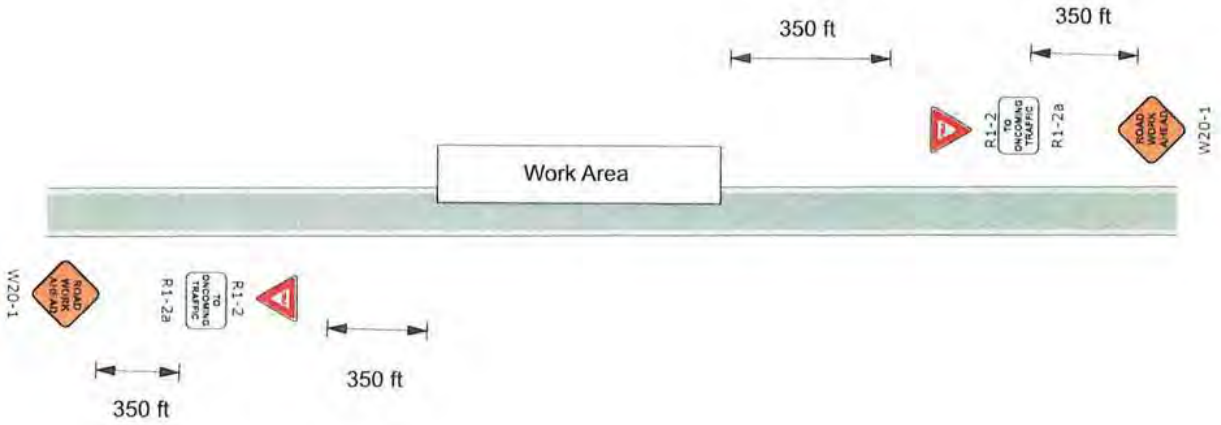
I, the undersigned officer of INTERNATIONAL FIDELITY INSURANCE COMPANY and ALLEGHENY CASUALTY COMPANY do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Sections of the By-Laws of said Companies as set forth in said Power of Attorney, with the originals on file in the home office of said companies, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

IN TESTIMONY WHEREOF, I have hereunto set my hand this 25th day of June 2015

MARIA BRANCO, Assistant Secretary

Great Northwest Inc.	**Date:** 6-18-15 **Author:** Stick Platzke **Project:** Ahtna Engineering/ test wells **Comments:** Ahtna Engineering/ Typical 1 lane 1 flagger

Notes: TCP will be in effect from June 22, 2015 till October 15, 2015
-emergency vehicles will have the right of way
- traffic will return to two way during non-work hours



ROAD WORK AHEAD 48"x48"
W20-1

36"x36"
R1-2

TO ONCOMING TRAFFIC 24"x18"
R1-2a

Candle Spacing 50'

I certify this TCP conforms to the specifications and ATM
Project Manger signature_____
Traffic control plan # 3
TCS signature_____
contact # (907) 452-5617

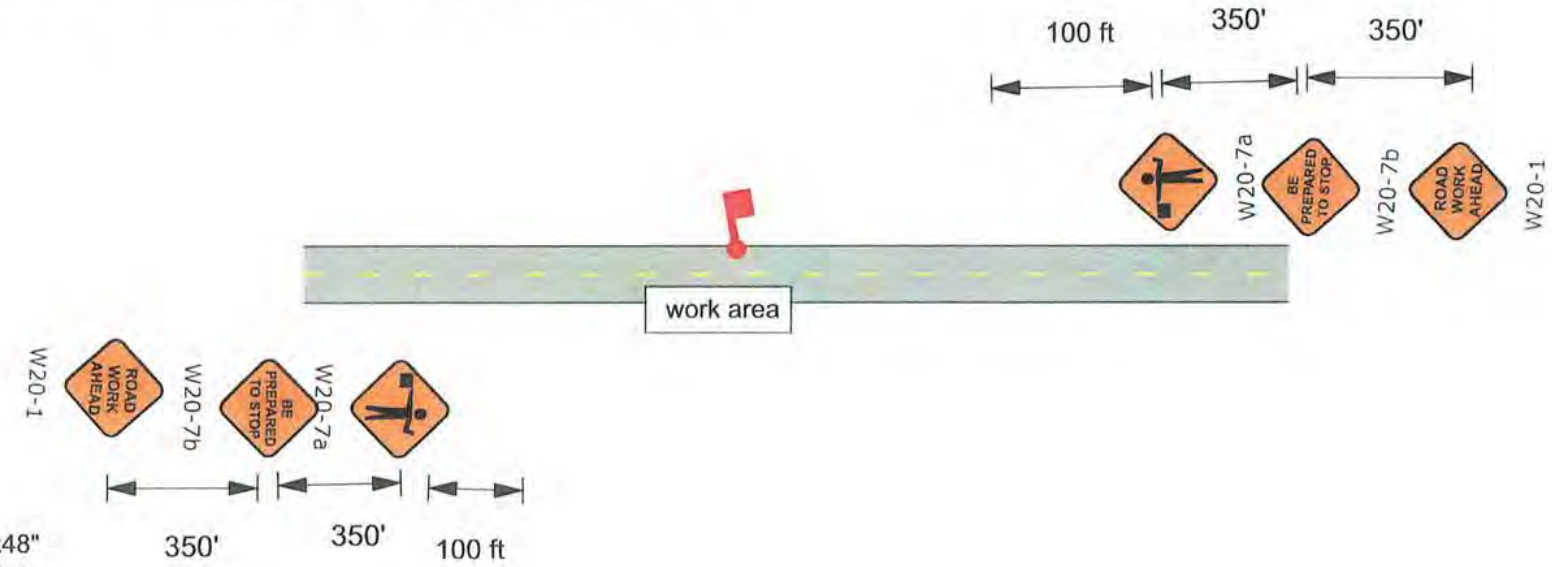
Great Northwest Inc.

Date: 6-18-15 **Author:** Stick Platzke **Project:** Ahtna Engineering/ test wells

Comments:
Ahtna Engineering/ Typical 1 lane 1 flagger

www.invarion.com

Notes: TCP will be in effect from June 22, 2015 till October 15, 2015
-emergency vehicles will have the right of way
- traffic will return to two way during non-work hours



ROAD WORK AHEAD — 48"x48" w20-1
W20-1

BE PREPARED TO STOP — 48"x48" w20-7b
W20-7b

48"x48" w20-7a
W20-7a

flagger

I certify this TCP conforms to the specifications and ATM
PM signature_____
traffic control plan # 2
TCS signature_____
contact # (907) 452-5617

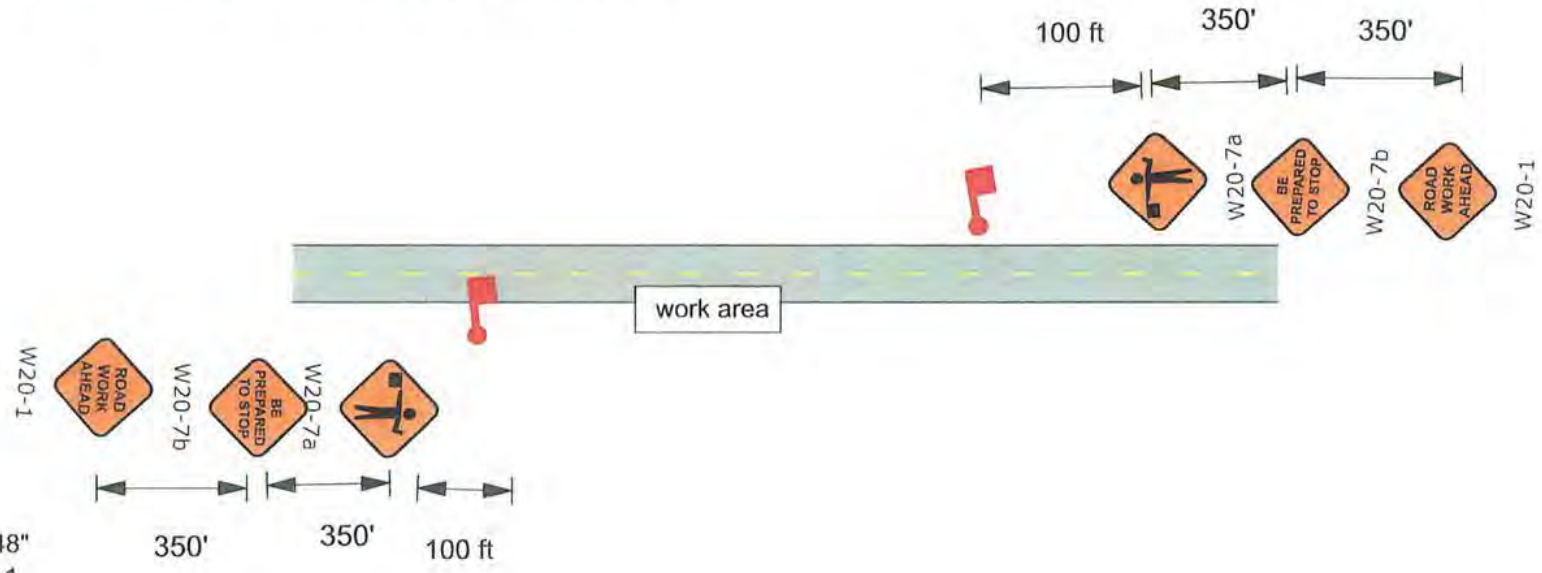
Great Northwest Inc.

Date: 6-18-15 **Author:** Stick Platzke **Project:** Ahtna Engineering/ test wells

Comments:
Ahtna Engineering/ Typical 1 lane 2 flagger

www.invarion.com

Notes: TCP will be in effect from June 22, 2015 till October 15, 2015
-emergency vehicles will have the right of way
- traffic will return to two way during non-work hours



ROAD WORK AHEAD — 48"x48" w20-1
W20-1

BE PREPARED TO STOP — 48"x48" w20-7b
W20-7b

48"x48" w20-7a
W20-7a

flagger

I certify this TCP conforms to the specifications and ATM
PM signature_____
traffic control plan # 1
TCS signature_____
contact # (907) 452-5617

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CUSTOMER COPY

City of Fairbanks
800 Cushman St.
Fairbanks, AK 99701
Tax ID# 92-6000140
(907) 459-6702

Customer Receipt No. 207833
Receipt Date 07/23/15

sent back for name

600392
AHTNA ~~CONSTRUCTION A~~ Engineering

Item No.	Description	Amount
1	ROWMJR ENG-RIGHT OF WA	$3,500.00

AMOUNT PAID: $3,500.00

Payment Type	Qnty	Ref	Amount
CHECK		CHECK	$3,500.00

Payment Type	Qnty	Ref	Amount

MEMO:

Ahtna Engineering Services, LLC
305 34th Avenue
Fairbanks, AK 99701
www.ahtnaes.com

Phone: 907.455.5953
Fax: 907.455.4903

November 23, 2015

Mr. Bruce Carpenter
Quality Control Officer
City of Fairbanks
800 Cushman Street
Fairbanks, AK 99701

Subject: Vapor Monitoring Wells Installed in City of Fairbanks Rights of Way Between 11th and 5th Avenues, Near Barnette and Kellum Streets

Dear Mr. Carpenter:

This letter describes construction details and locations of seven vapor monitoring wells that were installed in City of Fairbanks rights of way between 11th and 5th Avenues, near Barnette and Kellum Streets. Ahtna Engineering Services, LLC (Ahtna) oversaw installation of these vapor monitoring wells under the Alaska Department of Environmental Conservation (ADEC), Division of Spill Prevention and Response, Term Contract 18-8036-01, Notice-to-Proceed 18-8036-01-004E. These wells were permitted under City of Fairbanks Monitoring Well Permits 2015-01 through 2015-07, dated July 21, 2015.

The objective of installing the vapor monitoring points was to provide an infrastructure to evaluate the potential of the Gaffney Road West chlorinated ethene contaminant groundwater plume to partition into the vapor phase and collect in nearby buildings at unhealthy concentrations. This contaminant exposure route is known as vapor intrusion.

CONSTRUCTION

This section describes the construction details of the seven vapor monitoring wells. In early July 2015, the AK Digline, GVEA, GHU, and Aurora Energy identified nearby buried utilities in the vicinity of the prospective locations. The vapor monitoring wells were installed on July 23rd and 24th, 2015.

A direct-push drilling rig was used to obtain 2.25-inch diameter cores down to 15-feet below ground surface (ft bgs) at each vapor monitoring well location. The depth of groundwater was determined by core examination. Then 1-inch diameter, Schedule 80 PVC casings with threaded caps on the bottoms, and screened on the bottom 6-inches were inserted into the borings. The bottoms of the PVC casings were between 8 and 12 ft bgs, approximately two feet above the groundwater table at each location. Sand was placed in the lower annular sections so that it was one foot above the tops of the casing screens. The middle annular sections were backfilled with

bentonite crumbles and hydrated to create seals between the soil and the casings. Sand was placed in the top foot of the annular sections. Locking compression caps were placed on the tops of the casings. The tops of the casings were approximately 6-inches bgs and were protected by 8-inch diameter steel covers with 12-inch skirts. The tops of the covers were placed approximately ½-inch below grade to avoid contact with snow removal blades and were cemented into place. The attached figures show construction details.

LOCATIONS

Vapor monitoring wells were placed in the rights of way between 11th and 5th Avenues, near Barnette and Kellum Streets. All locations were in grass. The attached figure shows the locations on an aerial map. The table below shows location coordinates.

	ALASKA STATE PLANE ZONE 3, NAD83 (U.S. SURVEY FEET)	
Vapor Monitoring Well	NORTHING	EASTING
VMP-4	3964433.8	1372089.3
VMP-5	3964797.0	1371833.1
VMP-6	3964979.9	1371791.9
VMP-7	3965293.5	1371480.2
VMP-8	3965606.0	1371263.3
VMP-9	3965864.3	1371045.6
VMP-10	3966487.7	1370753.3

Thank you for your assistance in obtaining the right of way permits. Please contact me if you have any questions.

Sincerely,

Ahtna Engineering Services, LLC

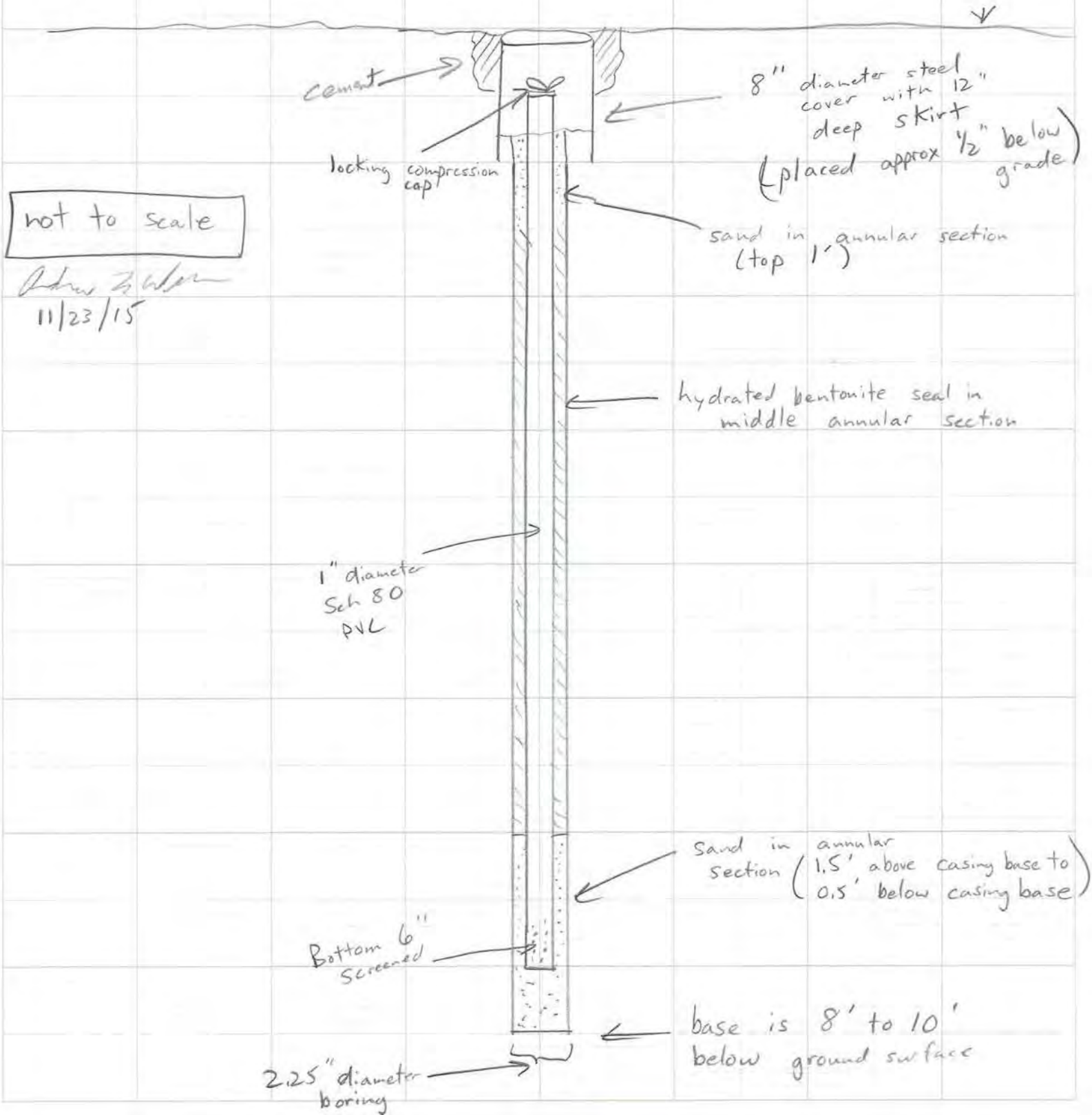
Andrew Weller, PE
Project Manager

Attachments:
1. Vapor Monitoring Wells, Elevation View
2. Vapor Monitoring Wells, Plan View
3. Vapor Monitoring Wells Locations

Ahtna Engineering Services, LLC
110 W 38th Ave, Suite 200A
Anchorage, AK 99503
PH: 907.646.2969
FX: 907.561.5475

Design-Build • Construction • Environmental • Staff Augmentation

Vapor Monitoring Wells, Elevation View



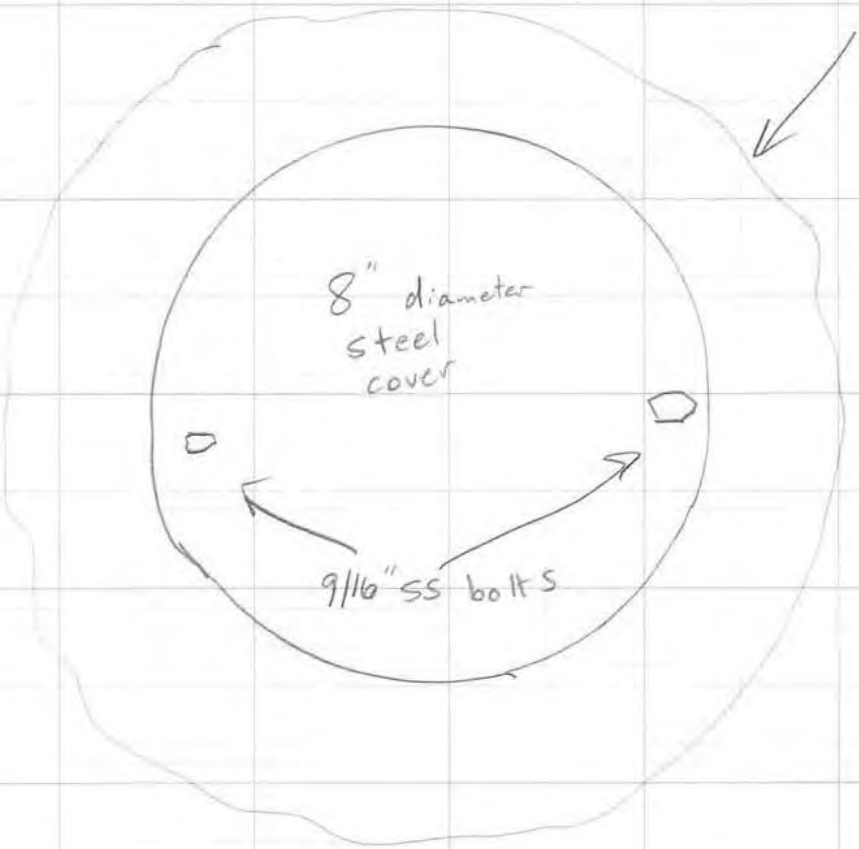
Ahtna Engineering Services, LLC
110 W 38th Ave, Suite 200A
Anchorage, AK 99503
PH: 907.646.2969
FX: 907.561.5475

Design-Build • Construction • Environmental • Staff Augmentation

Vapor Monitoring Wells, Plan View

not to scale

11/23/15



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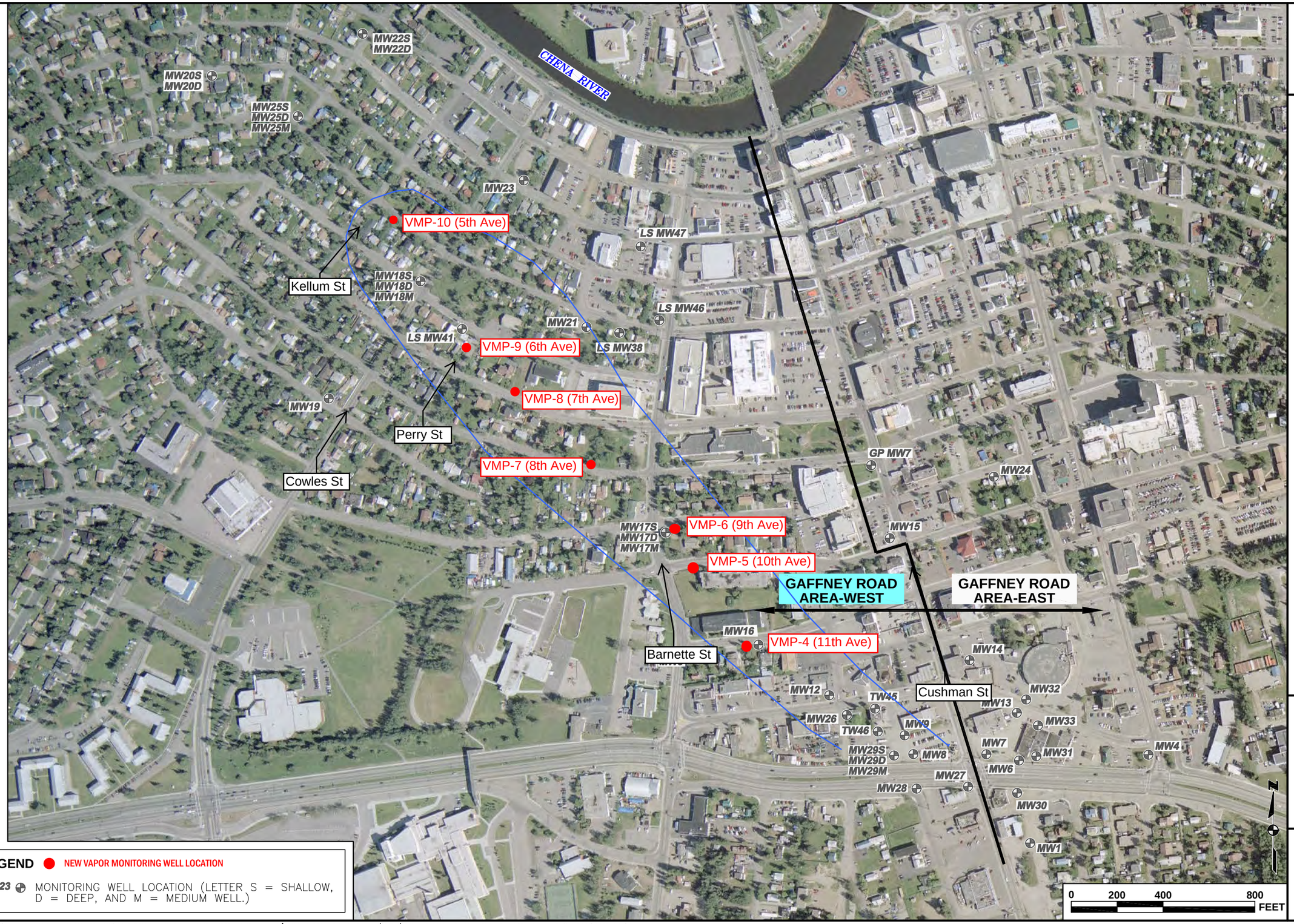

LEGEND

- NEW VAPOR MONITORING WELL LOCATION
- MW23 MONITORING WELL LOCATION (LETTER S = SHALLOW, D = DEEP, AND M = MEDIUM WELL.)

SOURCE: AERIAL PHOTO RCHRDSN_HWY7-20-06_16-3_1'PIX.JPG DATED 7/20/06 PROVIDED BY AERO-METRIC ANCHORAGE.

FIGURE 1

VAPOR MONITORING WELL LOCATIONS

GAFFNEY ROAD LONG-TERM MONITORING

GAFFNEY ROAD WEST
Fairbanks, Alaska

DATE: November 2015
CHKD: ALW
DRAWN: ALW
PROJ. No.: 20266.004

1896 Marika Road, Suite 8
Fairbanks, AK 99709

Ahtna Engineering

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APPENDIX E

BORING LOGS

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SOIL BORING AND WELL CONSTRUCTION LOG

Boring Number: VMP-4
Project Number: 20266.004.01.05

Project Name Gaffney West
Site Gaffney West
Client ADEC
Field Scientist/Engineer Andrew Weller
Date 7/24/2015
Weather 60 F, cloudy
Total Depth 15 feet bgs
Boring Size 2.25 -inch

Recovery Device Macro Core
Device Diameter N/A
Sample Method Macro Core
# of Samples 0
Drilling Company GeoTek Alaska
Rig Type Geoprobe 6610
Hammer Drop & Weight N/A
Associated Points N/A

X/Y Coordinates 1372089.3/3964433.8
X/Y Datum Alaska State Plane Zone 3
Ground Elevation 437.9822975
Elevation Datum NGVD '29
Extra Field Notes:

DEPTH (ft)	RECOVERED LENGTH (in) / DRIVEN LENGTH (in)	WELL GRAPHIC	SOIL GRAPHIC	SOIL DESCRIPTION AND NOTES
0.0				
				TOPSOIL.
				SILT.
				SILTY SAND.
2.5	48/60			FINE SAND WITH FINES.
				FINE MEDIUM SAND.
5.0				SANDY GRAVEL 60% subrounded gravel to 1/2".
7.5	18/60			
10.0				SANDY GRAVEL no fines; 60% subrounded gravel to 3/4".
				MEDIUM SAND WITH 10% FINES saturated at 12'.
12.5	30/60			
				SANDY GRAVEL no fines; 60% gravel to 1/2".
				MEDIUM SAND no fines.
15.0				

End of Boring: 15 feet bgs.

SOIL BORING AND WELL CONSTRUCTION LOG

Boring Number: VMP-5
Project Number: 20266.004.01.05

Project Name Gaffney West
Site Gaffney West
Client ADEC
Field Scientist/Engineer Andrew Weller
Date 7/24/2015
Weather 70 F, sunny
Total Depth 15 feet bgs
Boring Size 2.25 -inch

Recovery Device Macro Core
Device Diameter N/A
Sample Method Macro Core
# of Samples 0
Drilling Company GeoTek Alaska
Rig Type Geoprobe 6610
Hammer Drop & Weight N/A
Associated Points N/A

X/Y Coordinates 1371833.1/3964797
X/Y Datum Alaska State Plane Zone 3
Ground Elevation 436.906182
Elevation Datum NGVD '29
Extra Field Notes:

DEPTH (ft)	RECOVERED LENGTH (in) / DRIVEN LENGTH (in)	WELL GRAPHIC	SOIL GRAPHIC	SOIL DESCRIPTION AND NOTES
0.0				
	46/60			SILTY FINE SAND loess.
				GRAVELLY MEDIUM SAND no fines; gravel to 1.5".
2.5				FINE SAND WITH 20% FINES no plasticity.
				MEDIUM SAND no fines.
5.0				
	19/60			MEDIUM SAND WITH GRAVEL no fines; 5% gravel to 1/2".
7.5				
10.0				
	39/60			SANDY GRAVEL no fines; 60% subangular gravel; saturated at 12'.
12.5				
15.0				

End of Boring: 15 feet bgs.

SOIL BORING AND WELL CONSTRUCTION LOG

Boring Number: VMP-6
Project Number: 20266.004.01.05

Project Name Gaffney West
Site Gaffney West
Client ADEC
Field Scientist/Engineer Andrew Weller
Date 7/24/2015
Weather 70 F, sunny
Total Depth 15 feet bgs
Boring Size 2.25 -inch

Recovery Device Macro Core
Device Diameter N/A
Sample Method Macro Core
# of Samples 0
Drilling Company GeoTek Alaska
Rig Type Geoprobe 6610
Hammer Drop & Weight N/A
Associated Points N/A

X/Y Coordinates 1371791.9/3964979.9
X/Y Datum Alaska State Plane Zone 3
Ground Elevation 436.6469956
Elevation Datum NGVD '29
Extra Field Notes:

DEPTH (ft)	RECOVERED LENGTH (in) / DRIVEN LENGTH (in)	WELL GRAPHIC	SOIL GRAPHIC	SOIL DESCRIPTION AND NOTES
0.0				
	42/60			SILTY FINE SAND loess.
				FINE TO MEDIUM SAND WITH 10% FINES.
2.5				
				SILTY FINE SAND 50% fines; moderate plasticity.
5.0				
				FINE TO MEDIUM SAND no fines.
				SILT WITH LITTLE SAND moderate plasticity; frozen 8'-9'; saturated 9'-10'.
7.5	44/60			
10.0				
				MEDIUM SAND no fines; saturated at 12.5'.
12.5	42/60			
				SILT.
				MEDIUM SAND WITH GRAVEL no fines; 10% subrounded gravel to 1/2".
15.0				

End of Boring: 15 feet bgs.

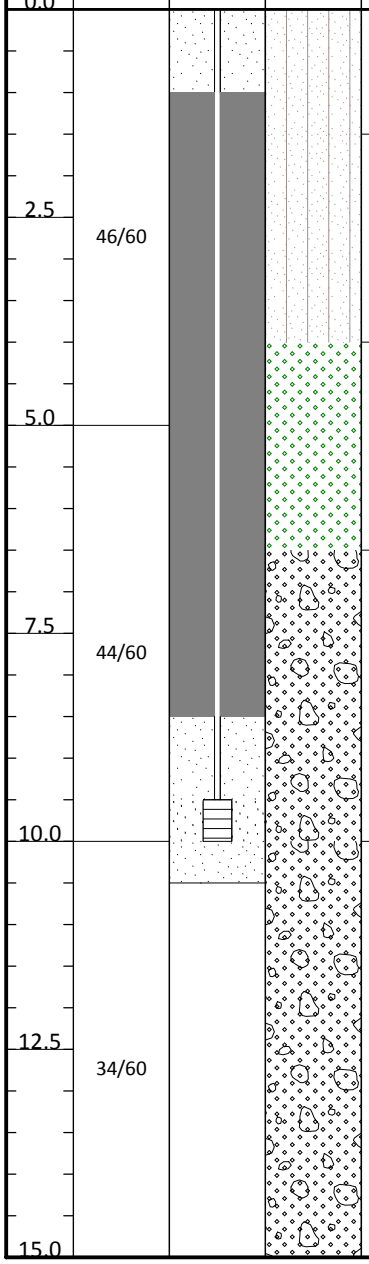
SOIL BORING AND WELL CONSTRUCTION LOG

Boring Number: VMP-7
Project Number: 20266.004.01.05

Project Name Gaffney West
Site Gaffney West
Client ADEC
Field Scientist/Engineer Andrew Weller
Date 7/24/2015
Weather 70 F, sunny
Total Depth 15 feet bgs
Boring Size 4.5 -inch

Recovery Device Macro Core
Device Diameter N/A
Sample Method Macro Core
# of Samples 0
Drilling Company GeoTek Alaska
Rig Type Geoprobe 6610
Hammer Drop & Weight N/A
Associated Points N/A

X/Y Coordinates 1371480.2/3965293.5
X/Y Datum Alaska State Plane Zone 3
Ground Elevation 435.8136622
Elevation Datum NGVD '29
Extra Field Notes:



SOIL DESCRIPTION AND NOTES

FINE SAND WITH SILT light brown; dry; 10% fines.

FINE SAND WITH SILT light brown; dry; 40% fines.

MEDIUM SAND WITH LITTLE FINES brown.

GRAVELLY MEDIUM SAND WITH LITTLE FINES gravel to 1.5".

GRAVELLY MEDIUM SAND gravel to 1.75"; no distinct redox; damp at 10.5'; saturated at 14'.

End of Boring: 15 feet bgs.

SOIL BORING AND WELL CONSTRUCTION LOG

Boring Number: VMP-8
Project Number: 20266.004.01.05

Project Name Gaffney West
Site Gaffney West
Client ADEC
Field Scientist/Engineer Andrew Weller
Date 7/24/2015
Weather 70 F, sunny
Total Depth 15 feet bgs
Boring Size 2.25 -inch

Recovery Device Macro Core
Device Diameter N/A
Sample Method Macro Core
# of Samples 0
Drilling Company GeoTek Alaska
Rig Type Geoprobe 6610
Hammer Drop & Weight N/A
Associated Points N/A

X/Y Coordinates 1371263.3/3965606
X/Y Datum Alaska State Plane Zone 3
Ground Elevation 436.0170743
Elevation Datum NGVD '29
Extra Field Notes:

DEPTH (ft)	RECOVERED LENGTH (in) / DRIVEN LENGTH (in)	WELL GRAPHIC	SOIL GRAPHIC	SOIL DESCRIPTION AND NOTES
0.0				
	32/60			SILTY FINE SAND light brown; loess.
2.5				FINE TO MEDIUM SAND WITH SILT AND GRAVEL 15% fines; 10% subrounded gravel to 3/4".
5.0				SANDY GRAVEL light brown; medium to coarse sand; angular to subrounded gravel to 1.5".
7.5	41/60			FINE SAND WITH GRAVEL 10% gravel to 1/2".
10.0				SANDY GRAVEL very loose; no fines; subrounded gravel to 3/4"; redox? at 10.5'; saturated at 12.5'.
12.5	24/60			
15.0				

End of Boring: 15 feet bgs.

SOIL BORING AND WELL CONSTRUCTION LOG

Boring Number: VMP-9
Project Number: 20266.004.01.05

Project Name Gaffney West
Site Gaffney West
Client ADEC
Field Scientist/Engineer Andrew Weller
Date 7/24/2015
Weather 70 F, sunny
Total Depth 15 feet bgs
Boring Size 2.25 -inch

Recovery Device Macro Core
Device Diameter N/A
Sample Method Macro Core
# of Samples 0
Drilling Company GeoTek Alaska
Rig Type Geoprobe 6610
Hammer Drop & Weight N/A
Associated Points N/A

X/Y Coordinates 1371045.6/3965864.3
X/Y Datum Alaska State Plane Zone 3
Ground Elevation 438.5137936
Elevation Datum NGVD '29
Extra Field Notes:

DEPTH (ft)	RECOVERED LENGTH (in) / DRIVEN LENGTH (in)	WELL GRAPHIC	SOIL GRAPHIC	SOIL DESCRIPTION AND NOTES
0.0				
	36/60			FINE TO MEDIUM SAND WITH SMALL AMOUNT OF FINES brownish gray; damp.
5.0				SANDY GRAVEL medium sand; 40% subrounded gravel to 1.5"; 15% quartz.
	31/60			
10.0				FINE TO MEDIUM SAND WITH SMALL AMOUNT OF FINES.
				GRAVELLY MEDIUM SAND no fines; 40% angular to subangular gravel to 1"; saturated at 14'.
12.5	24/60			
15.0				

End of Boring: 15 feet bgs.

SOIL BORING AND WELL CONSTRUCTION LOG

Boring Number: VMP-10
Project Number: 20266.004.01.05

Project Name Gaffney West
Site Gaffney West
Client ADEC
Field Scientist/Engineer Andrew Weller
Date 7/24/2015
Weather 70 F, sunny
Total Depth 15 feet bgs
Boring Size 2.25 -inch

Recovery Device Macro Core
Device Diameter N/A
Sample Method Macro Core
# of Samples 0
Drilling Company GeoTek Alaska
Rig Type Geoprobe 6610
Hammer Drop & Weight N/A
Associated Points N/A

X/Y Coordinates 3966487.7/1370753.3
X/Y Datum Alaska State Plane Zone 3
Ground Elevation 435.039384
Elevation Datum NGVD '29
Extra Field Notes:

DEPTH (ft)	RECOVERED LENGTH (in) / DRIVEN LENGTH (in)	WELL GRAPHIC	SOIL GRAPHIC	SOIL DESCRIPTION AND NOTES
0.0				
	46/60			SANDY SILT loess.
				ORGANICS AND SILT.
				FINE TO MEDIUM SAND WITH 10% FINES.
2.5				
5.0				FINE SAND WITH SILT.
				MEDIUM SAND.
				GRAVELLY SAND no fines; 20% gravel to 1/2".
7.5	36/60			MEDIUM SAND no fines; no gravel.
10.0				WOOD.
				SANDY GRAVEL no fines; 20% gravel to 1/2"; saturated at 11'; wood at 11.5'.
12.5	40/60			MEDIUM TO COARSE SAND WITH 10% GRAVEL no fines; 10% gravel.
				MEDIUM SAND no fines; no gravel.
15.0				

End of Boring: 15 feet bgs.

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APPENDIX F

SAMPLING DATA SHEETS

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Gaffney Active/Passive Deep Soil Gas Comparison
Q3 2015

Sample Location	VMP-4	Date	9/18/15
Weather	40°F partly cloudy		
Sampler	A. Weller, B. Martin		
Manifold Leak Test OK?	Yes, held at 14 in Hg		
Helium Percent Under Hood	50%		
Purge	1.3 L @ 50 ml/min for 26 min		
Helium Percent in Tedlar	<1%		
% Leak (% Tedlar / % Hood)	<1%		
Sample Duration	1 day		

WMS Primary Sample ID, Date, Time: 15-GRW-001-SG		9/18/15, 0830
WMS ID	~~1509-AN-LU-~~ 001	1510-AN-Lu-001
WMS Start Date / Time	9/18/15 / 0836	—
WMS Stop Date / Time	9/18/15 / 0835	—
Approx. Temperature	6°C	
Approx. Humidity	95%	

1st Canister Primary Sample ID, Date, Time: 15-GRW-002-SG		9/18/15, 0830
1st Canister ID	34734	
Flow Controller Flow Rate	3.5 ml/min (24-hr)	
Initial Vac (" Hg)	30	
Canister Start Date / Time	—	9/18/15 / 0830
Canister Stop Date / Time	—	9/19/15 / 0830
Final Vac ("Hg)	6.5	

WMS Duplicate Sample ID, Date, Time: 15-GRW-003-SG		9/18/15, 0835
WMS ID	1509-AN-LU- 092	
WMS Start Date / Time	—	9/18/15 / 0835
WMS Stop Date / Time	—	9/19/15 / 0835
Approx. Temperature	6°C	
Approx. Humidity	95%	

1st Canister Duplicate Sample ID, Date, Time: 15-GRW-004-SG		9/18/15, 0835
1st Canister ID	34746	
Flow Controller Flow Rate	3.5 ml/min (24-hr)	
Initial Vac (" Hg)	30	
Canister Start Date / Time	—	9/18/15 / 0835
Canister Stop Date / Time	—	9/19/15 / 0835
Final Vac ("Hg)	4	

WMS TRIP Blank Sample ID, Date, Time	*15-GRW-025-TB*	9/18/15 0800
WMS Trip Blank ID	1509-AN-LU- 094	
WMS Start Date / Time	9/18/15	0800
WMS Stop Date / Time	9/25/15	0800
Approx. Temperature	NA / trip Blank	
Approx. Humidity	NA / trip Blank	
DTW ('BTOC) at MW-[illegible] Time	9.66'	9/18/15 / 11:15

3100

Gaffney Active/Passive Deep Soil Gas Comparison
Q3 2015

Sample Location	VMP-5	Date	9/18/15
Weather	+40°F, cloudy		
Sampler	Weller / Martsch		
Manifold Leak Test OK?	Yes, 15 "Hg		
Helium Percent Under Hood	50 %		
Purge	1.6 L @ 50 ml/min for 32 min		
Helium Percent in Tedlar	.3 %	.25 %	
% Leak (% Tedlar / % Hood)	.6 %	.5 %	
Sample Duration	7 day		

WMS Sample ID, Date, Time: 15-GRW-005-SG	9/18/15	0935
WMS ID	1509-AN-LU-099	
WMS Start Date / Time	9/18/15	0935
WMS Stop Date / Time	9/25/15	0935
Approx. Temperature	6°C	
Approx. Humidity	95 %	

1st Canister Sample ID, Date, Time: 15-GRW-006-SG	9/18/15	0935
1st Canister ID	620046	
Flow Controller Flow Rate	1.3 ml/min (72-hr)	
Initial Vac (" Hg)	29	
Canister Start Date / Time	—	
Canister Stop Date / Time	—	
Final Vac ("Hg)	7.5	

21.5 "Hg 9/19/15 12:40
13.5 "Hg 9/20/15 14:20

2nd Canister Sample ID, Date, Time: 15-GRW-007-SG	9/21/15	0935
2nd Canister ID	31422	
Flow Controller Flow Rate	1.3 ml/min (72-hr)	
Initial Vac (" Hg)	29.5	
Canister Start Date / Time	9/21/15	0935
Canister Stop Date / Time	9/24/15	0935
Final Vac ("Hg)	6.5	

21 "Hg 9/22/15 13:10
11.5 "Hg 9/23/15 0930

3rd Canister Sample ID, Date, Time: 15-GRW-008-SG	9/24/15	0935
2nd Canister ID	34011	
Flow Controller Flow Rate	3.5 ml/min (24-hr)	
Initial Vac (" Hg)	29	
Canister Start Date / Time	9/24/15	0935
Canister Stop Date / Time	9/25/15	0935
Final Vac ("Hg)	5	

Sara

Gaffney Active/Passive Deep Soil Gas Comparison
Q3 2015

Sample Location	VMP-6 qf	Date	9/18/15
Weather	40°F, cloudy		
Sampler	Wells / Murdoch		
Manifold Leak Test OK?	Yes, 13.5" Hg		
Helium Percent Under Hood	50 %		
Purge	1.6 L @ 50 ml/min for 32 min		
Helium Percent in Tedlar	0.3% / 0.45%		
% Leak (% Tedlar / % Hood)	0.6% / 0.9%		
Sample Duration	5 day		

WMS Sample ID, Date, Time: 15-GRW-009-SG	9/18/15, 1035
WMS ID	1509-AN-LU- 097
WMS Start Date / Time	9/18/15, 1035
WMS Stop Date / Time	9/23/15, 1035
Approx. Temperature	6°C
Approx. Humidity	95%

1st Canister Sample ID, Date, Time: 15-GRW-010-SG	9/18/15, 1035			
1st Canister ID	05702			
Flow Controller Flow Rate	1.3 ml/min (72-hr)			
Initial Vac (" Hg)	28	18.5" Hg	9/19/15	12:
Canister Start Date / Time	9/18/15 1035	9" Hg	9/20/15	14:15
Canister Stop Date / Time	9/21/15, 1035			
Final Vac ("Hg)	2			

2nd Canister Sample ID, Date, Time: 15-GRW-011-SG	9/21/15, 1035			
2nd Canister ID	35550			
Flow Controller Flow Rate	1.7 ml/min (48-hr)	17.5" Hg	9/22/15	13:
Initial Vac (" Hg)	29.5			
Canister Start Date / Time	9/21/15 1035			
Canister Stop Date / Time	9/23/15, 1035			
Final Vac ("Hg)	8.5			

* Wet Waterloo when removed

Gaffney Active/Passive Deep Soil Gas Comparison
Q3 2015

8hr

Sample Location	VMP-7	Date	9/18/15
Weather	+40°F, cloudy		
Sampler	Weller, Martich		
Manifold Leak Test OK?	Yes, 16" Hg		
Helium Percent Under Hood	50%		
Purge	3.0 L @ 50 ml/min for 60 min	2.5 "Hg Vac after 10min purge, increase to 4" Hg	
Helium Percent in Tedlar	7% → see below		
% Leak (% Tedlar / % Hood)	14% → see below		
Sample Duration	3 day		

WMS Sample ID, Date, Time:	***15-GRW-012-SG 9/18/15 / 1200***
WMS ID	1509-AN-LU- 100
WMS Start Date / Time	9/18/15 / 1200
WMS Stop Date / Time	9/21/15 @ ~~9/18/15~~ / 1200
Approx. Temperature	6°C
Approx. Humidity	95%

1st Canister Sample ID, Date, Time:	***15-GRW-013-SG 9/18/15 / 1200***		
1st Canister ID	34183		
Flow Controller Flow Rate	1.3 ml/min (72-hr)		
Initial Vac (" Hg)	28.5	21.5" Hg	9/19/15 13:15
Canister Start Date / Time	9/18/15 / 1200	13.5" Hg	9/20/15 14:12
Canister Stop Date / Time	9/21/15 / 1200		
Final Vac ("Hg)	6.5		

* screen submerged

Gaffney Active/Passive Deep Soil Gas Comparison
Q3 2015

Sample Location	VMP-8 7th Date 9/18/15
Weather	+40° F, lt rain
Sampler	Weller, Mentich
Manifold Leak Test OK?	Yes 12.5"Hg
Helium Percent Under Hood	50%
Purge	1.6 L @ 50 ml/min for 32 min
Helium Percent in Tedlar	10% *
% Leak *(% Tedlar / % Hood)*	20% *
Sample Duration	*1 day*

WMS Sample ID, Date, Time:	***15-GRW-014-SG*** 9/18/15, 1300
WMS ID	1509-AN-LU-093
WMS Start Date / Time	9/18/15, 1300
WMS Stop Date / Time	9/19/15@ ~~9/18/15~~, 1300
Approx. Temperature	6 °C
Approx. Humidity	95%

1st Canister Sample ID, Date, Time:	***15-GRW-015-SG*** / 9/18/15, 1306
1st Canister ID	31150
Flow Controller Flow Rate	3.5 ml/min (24-hr)
Initial Vac (" Hg)	27
Canister Start Date / Time	9/18/15, 1300
Canister Stop Date / Time	9/19/15 1300
Final Vac ("Hg)	4.5

* tubing under water, trim 1' off bottom of tubing

* screen submerged

* tubing left out of well while sampling
* WMS was ~2' below vapor plug while sampling
* replaced tubing + string after sampling

Gaffney Active/Passive Deep Soil Gas Comparison
Q3 2015

Sample Location	VMP-9 (Perry)	Date	9/18/15
Weather	+45°		
Sampler	Weller / Mertier		
Manifold Leak Test OK?	yes, held 25" Hg		
Helium Percent Under Hood	50 %		
Purge	1.8 L @ 50 ml/min for 36 min		
Helium Percent in Tedlar	0.5 %	0.35 %	
% Leak (% Tedlar / % Hood)	1.0 %	0.70 %	
Sample Duration	~~7 day~~	5 day	

3 day Canister equilibrated in 1 day

WMS Sample ID, Date, Time: 15-GRW-016-SG		9/18/15	1400
WMS ID	1509-AN-LU- 098		
WMS Start Date / Time	9/18/15	1400	
WMS Stop Date / Time	9/23/15	1400	
Approx. Temperature	6 °C		
Approx. Humidity	95 %		

1st Canister Sample ID, Date, Time: 15-GRW-017-SG		9/18/15	1400
1st Canister ID	39311		
Flow Controller Flow Rate	1.3 ml/min (72-hr)		
Initial Vac (" Hg)	29	22 " Hg	9/17/15 / 12:15
Canister Start Date / Time	9/18/15 / 1400	13 " Hg	9/20/15 / 1410
Canister Stop Date / Time	9/21/15	1400	
Final Vac ("Hg)	5		

2nd Canister Sample ID, Date, Time: 15-GRW-018-SG		9/21/15	1400
2nd Canister ID	34273		
Flow Controller Flow Rate	1.3 ml/min (72-hr) → only ran 24 hr	8.5 " Hg	9/22/15 13:20
Initial Vac (" Hg)	28.5		
Canister Start Date / Time	9/21/15	1400	
Canister Stop Date / Time	9/22/15	1400	
Final Vac ("Hg)	8		

3rd Canister Sample ID, Date, Time: 15-GRW-019-SG		9/22/15	1400
2nd Canister ID	12047		
Flow Controller Flow Rate	3.5 ml/min (24-hr)		
Initial Vac (" Hg)	29.5		
Canister Start Date / Time	9/22/15	1400	
Canister Stop Date / Time	9/23/15	1400	
Final Vac ("Hg)	0		

Gaffney Active/Passive Deep Soil Gas Comparison
Q3 2015

Sample Location	VMP-10 5th Date 9/18/15
Weather	40° F Cloudy
Sampler	Weller, Martich
Manifold Leak Test OK?	Yes 13" Hg
Helium Percent Under Hood	50 %
Purge	1.5 L @ 50 ml/min for 30 min
Helium Percent in Tedlar	0.16 %
% Leak *(% Tedlar / % Hood)*	0.32 %
Sample Duration	*5 day*

WMS Sample ID, Date, Time: 15-GRW-020-SG	9/18/15 1615
WMS ID	1509-AN-LU- 095
WMS Start Date / Time	9/18/15 1615
WMS Stop Date / Time	9/23/15 1615
Approx. Temperature	6 °C
Approx. Humidity	95 %

1st Canister Sample ID, Date, Time: 15-GRW-021-SG	9/18/15 1615
1st Canister ID	33884
Flow Controller Flow Rate	1.3 ml/min (72-hr)
Initial Vac (" Hg)	29
Canister Start Date / Time	9/18/15 1615
Canister Stop Date / Time	9/21/15 1615
Final Vac ("Hg)	8

23.5" Hg 9/19/15 1200
18" Hg 9/20/15 1405

2nd Canister Sample ID, Date, Time: 15-GRW-022-SG	9/21/15 1615
2nd Canister ID	34352
Flow Controller Flow Rate	1.7 ml/min (48-hr)
Initial Vac (" Hg)	29.5
Canister Start Date / Time	9/4/15 1615
Canister Stop Date / Time	9/23/15 1615
Final Vac ("Hg)	7.5

20.5" Hg 9/22/15 1325

Gaffney Active/Passive Deep Soil Gas Comparison
Q3 2015

Sample Location	VMP-DOT	Date	9/18/15
Weather	+45° F, cloudy		
Sampler	Wells, Martin		
Manifold Leak Test OK?	Yes, 22" Hg		
Helium Percent Under Hood	50%		
Purge	1.4 L @ 50 ml/min for 28 min		
Helium Percent in Tedlar	0.8%	0.6%	
% Leak (% Tedlar / % Hood)	1.6%	1.2%	
Sample Duration	3 day		

WMS Sample ID, Date, Time: 15-GRW-023-SG		9/18/15	1500
WMS ID	1509-AN-LU- 096		
WMS Start Date / Time	9/18/15	1500	
WMS Stop Date / Time	9/21/15	1500	
Approx. Temperature	6 °C		
Approx. Humidity	95%		

1st Canister Sample ID, Date, Time: 15-GRW-024-SG		9/18/15	1500
1st Canister ID	35150		
Flow Controller Flow Rate	~~1.3 ml/min (72-hr)~~	3.5 ml/min	(24-hr)
Initial Vac (" Hg)	28.5		
Canister Start Date / Time	9/18/15	1500	
Canister Stop Date / Time	9/19/15	1500	
Final Vac ("Hg)	3.5		

2nd Canister ID: 15-GRW-027-SG 9/19/15 / 1500

2nd Canister ID: 33900

FC Rate: 1.7 ml/min (48-hr)

Initial Vac: 29" Hg 20" Hg 9/20/15 1355

Canister Start: 9/19/15 / 1500

Canister Stop: 9/21/15 / 1500

Final Vac: 9.5

* a lot of moisture on tubing, string, and WMS upon retrieval. Placed finger over tubing top end after removed tubing into well to see if water could

APPENDIX G

OPERATION AND MAINTENANCE DATA SHEETS

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Remediation System Abbreviated Operation, Monitoring, and Maintenance Event Data Sheet

GNBBS SVE/SSD OM&M Data Sheet

Dwyer Mark III digital manometer

Date: 1/30/15 Time: 1100 Ambient Temp.(°F): -30 °F Technician: Weller Field Instrument used/last calibrated: NR

SSD System

Line	Vacuum ("WC)	Flow (scfm)	Valve % open	Hex (ppm)	% CO_2	% O_2
DW 1	11	12	100	NR		
DW 2	4	11	60			
DW 3	11	10	100			
DW 4	4	9	70			

Dilution valve (% open)	100 % open
Knockout drum level	empty
Manifold vacuum ("WC)	36
Blower vacuum ("WC)	25
Exhaust temp (°F)	79
Exhaust flow (cfm)	67/80
Notes:	

Indoor Vapor Monitoring Points

Location	Vacuum ("WC)	Hex (ppm)	% CO_2	% O_2
SS1	0.000	NR		
SS2	0.000			
SS3	0.000			
SS4	0.017			
SS36	0.026			
SS37	0.000			
SS38	0.004			
SS44	0.003	↔ press		

SSD Control Room

Motor Speed (Hz)	43/50
Hourmeter reading/Time	39583.0 @ 1115, 1/30/15
Previous hourmeter reading/Date/Time	
Total hours since last event	
Percent Operability	

SVE System

Line	Vacuum ("WC)	Flow (scfm)	Valve % open	Hex (ppm)	% CO_2	% O_2
EW 16	760	7	100	NR		
EW 2	760	5	100	- moisture		
EW 6	760	4	100	- water in line		
EW 4	760	7	100	- moisture		
EW 1	760	5	100			
EW 13	760	0	100			
EW 7	760	4	100			
EW 5	760	3	100			
EW 10	760	8	100			
EW 3	760	5	100			
EW 12	760	5	100	- moisture		
EW 9	760	7	100			
EW 14	760	0	100			
EW 8	760	6	100			
EW 15	760	6	100			
EW 11	760	6	100			

Dilution valve (% open)	100 % open
Knockout drum level	empty
Manifold vacuum (inWC)	75
Blower vacuum (inWC)	75
Exhaust temp (°F)	165
Exhaust flow (cfm)	125
Exhaust Stack Drained?	checked
Exhaust Stack (Hex $_{(ppm)}$/%O_2/%CO_2)	NR
Exhaust Stack Colortec (ppm)	NR
Heat Trace On?	yes
Filters Checked/Cleaned?	checked (a little rust in SVE filter)
GVEA Meter Reading (kW-hr)	405883 @ 11:15 1/30/15

Outdoor Vapor Monitoring Points

Location	Vacuum ("WC)	Hex (ppm)	% CO_2	% O_2	Vac while sampling ("WC or "Hg)
VMP1 @ 7'		NR			
VMP2 @ 7'					
VMP3 @ 7'					
SG-5 @ 5'					
SG-5 @ 9'					
SG-14 @ 6'					

SVE Control Room

Motor Speed (Hz)	41
Combustible Gas Meter - % LEL	0 %
Hourmeter reading/Time	32747.3 @ 1115, 1/30/15
Previous hourmeter reading/Date/Time	
Total hours since last event	
Percent Operability	
Notes:	Shut off SVE before checking indoor VMPs Shut off heat trace turned SVE/SSD equipment room thermostat from 60° → ~~80°~~ 80°F

Laboratory Sample

Effluent Sample ID :	
Summa Canister # :	NA
Time/Date :	
Initial Vac ("Hg) :	
Final Vac ("Hg) :	

NOTES:

45 / 53 = "/" between readings indicates gauge reading "before" and "after" adjustment

NR = Not Recorded

Equipment room Heater: Marley G18081B

Turned up SSD to 50 Hz

Total Flow → 80 cfm

Callout → OK

Remediation System Abbreviated Operation, Monitoring, and Maintenance Event Data Sheet

GNBBS SVE/SSD OM&M Data Sheet

Dwyer Mark III series 475 digital manometer

Date: 4/3/15 Time: 1330 Ambient Temp.(°F): +40 °F Technician: Weller Field Instrument used/last calibrated: NR

SSD System

Line	Vacuum ("WC)	Flow (scfm)	Valve % open	Hex (ppm)	% CO_2	% O_2
DW 1	13	14	100	NR		
DW 2	8	12	100			
DW 3	13	11	100			
DW 4	5	10	60			

Dilution valve (% open)	0%, closed
Knockout drum level	empty
Manifold vacuum ("WC)	44
Blower vacuum ("WC)	31
Exhaust temp (°F)	110
Exhaust flow (cfm)	80
Notes:	

Indoor Vapor Monitoring Points

Location	Vacuum ("WC)	Hex (ppm)	% CO_2	% O_2
SS1	0.004	NR		
SS2	0.000			
SS3	0.000			
SS4	0.018			
SS36	0.080			
SS37	0.037			
SS38	0.007			
SS44	0.050			

SSD Control Room

Motor Speed (Hz)	51
Hourmeter reading/Time	39096.2 @ 1345, 4/3/15
Previous hourmeter reading/Date/Time	
Total hours since last event	
Percent Operability	

SVE System

Line	Vacuum ("WC)	Flow (scfm)	Valve % open	Hex (ppm)	% CO_2	% O_2
EW 16	45	6	100	NR		
EW 2	45	4	100	- moisture		
EW 6	46	4	100	- moisture		
EW 4	51	6	100	- moisture		
EW 1	51	0	100	- water		
EW 13	48	0	100			
EW 7	49	0	100			
EW 5	46	3	100	- moisture		
EW 10	44	5	100			
EW 3	51	0	100			
EW 12	46	5	100			
EW 9	41	4	100			
EW 14	50	0	100			
EW 8	43	4	100			
EW 15	51	5	100	- moisture		
EW 11	52	6	100			

Dilution valve (% open)	0% closed
Knockout drum level	empty
Manifold vacuum (inWC)	53
Blower vacuum (inWC)	52
Exhaust temp (°F)	146
Exhaust flow (cfm)	90
Exhaust Stack Drained?	No
Exhaust Stack (Hex (ppm)/%O_2/%CO_2)	NR
Exhaust Stack Colortec (ppm)	NR
Heat Trace On?	Yes
Filters Checked/Cleaned?	No
GVEA Meter Reading (kW-hr)	414094 @ 1345, 4/3/15

Outdoor Vapor Monitoring Points

Location	Vacuum ("WC)	Hex (ppm)	% CO_2	% O_2	Vac while sampling ("WC or "Hg)
VMP1 @ 7'		NR			
VMP2 @ 7'					
VMP3 @ 7'					
SG-5 @ 5'					
SG-5 @ 9'					
SG-14 @ 6'					

Laboratory Sample

Effluent Sample ID :	
Summa Canister # :	
Time/Date :	
Initial Vac ("Hg) :	
Final Vac ("Hg) :	

SVE Control Room

Motor Speed (Hz)	31
Combustible Gas Meter - % LEL	0%
Hourmeter reading/Time	32953.4 @ 1345, 4/3/15
Previous hourmeter reading/Date/Time	
Total hours since last event	
Percent Operability	
Notes:	

NOTES:

45 / 53 = "/" between readings indicates gauge reading "before" and "after" adjustment

NR = Not Recorded

Remediation System Abbreviated Operation, Monitoring, and Maintenance Event Data Sheet

1st Snow GNBBS SVE/SSD OM&M Data Sheet

Dwyer Mark III Series 475 Digital Manometer

Date: 10/30/15 Time: 1100 Ambient Temp.(°F): +25°F Technician: Weller Field instrument used/last calibrated: NR

SSD System

Line	Vacuum ("WC)	Flow (scfm)	Valve % open	Hex (ppm)	% CO_2	% O_2
DW 1	16	16	100	NR		
DW 2	3	10	50			
DW 3	16	12	100			
DW 4	5	9	76			

Dilution valve (% open)	0%, closed
Knockout drum level	empty
Manifold vacuum ("WC)	45
Blower vacuum ("WC)	34
Exhaust temp (°F)	114
Exhaust flow (cfm)	74
Notes:	

Indoor Vapor Monitoring Points

Location	Vacuum ("WC)	Hex (ppm)	% CO_2	% O_2
SS1	0.000	not measured		
SS2	0.000			
SS3	—			
SS4	0.018	NR		
SS36	0.051			
SS37	0.018			
SS38	0.007			
SS44	0.028			

SSD Control Room

Motor Speed (Hz)	51
Hourmeter reading/Time	42125.8 @ 12:15, 10/30
Previous hourmeter reading/Date/Time	
Total hours since last event	
Percent Operability	

SVE System

Line	Vacuum ("WC)	Flow (scfm)	Valve % open	Hex (ppm)	% CO_2	% O_2
EW 16	42	5	100	NR		
EW 2	46	4	100			
EW 6	45	0	100			
EW 4	50	5	100			
EW 1	47	2	100			
EW 13	47	0	100			
EW 7	43	2	100			
EW 5	50	0	100			
EW 10	43	5	100			
EW 3	50	0	100			
EW 12	47	0	100			
EW 9	41	4	100			
EW 14	48	3	100			
EW 8	46	4	100			
EW 15	50	4	100			
EW 11	57	4	100			

no moisture in rotometers

Dilution valve (% open)	0%, Closed
Knockout drum level	empty
Manifold vacuum (inWC)	46
Blower vacuum (inWC)	46
Exhaust temp (°F)	141
Exhaust flow (cfm)	90
Exhaust Stack Drained?	checked, empty
Exhaust Stack (Hex ppm/%O_2/%CO_2)	NR
Exhaust Stack Colortec (ppm)	NR
Heat Trace On?	No
Filters Checked/Cleaned?	Yes, some rust in SVE prefilter
GVEA Meter Reading (kW-hr)	427622

Outdoor Vapor Monitoring Points

Location	Vacuum ("WC)	Hex (ppm)	% CO_2	% O_2	Vac while sampling ("WC or "Hg)
VMP1 @ 7'	0.239	NR			
VMP2 @ 7'	0.170				
VMP3 @ 7'	plugged				
SG-5 @ 5'	0.040				
SG-5 @ 9'	0.251				
SG-14 @ 6'	71.2				

SVE Control Room

Motor Speed (Hz)	30.5
Combustible Gas Meter - % LEL	3% → has been 0-3% one last 6 months
Hourmeter reading/Time	35274.9 @ 1215, 10/30
Previous hourmeter reading/Date/Time	
Total hours since last event	
Percent Operability	
Notes:	%LEL needs to be calibrated Equipment room heater off check ESD → callout → OK

Laboratory Sample

Effluent Sample ID	15-GRW-027-ES
Summa Canister # :	T6-17, tube
Time/Date	18:10 / 10/29/15
Initial Vac ("Hg)	100 mL pulled from
Final Vac ("Hg)	SVE (only) exhaust @ 140°F 80% RH

NOTES:

45 / 53 = "/" between readings indicates gauge reading "before" and "after" adjustment

NR = Not Recorded

Remediation System Abbreviated Operation, Monitoring, and Maintenance Event Data Sheet

Dwyer Series 475 Mark III digital manometer

GNBBS SVE/SSD OM&M Data Sheet

Date: 1/21/16 **Time:** 1415 **Ambient Temp.(°F):** 0°F **Technician:** Weller / Fox **Field Instrument used/last calibrated:** NR

SSD System

Line	Vacuum ("WC)	Flow (scfm)	Valve % open	Hex (ppm)	% CO_2	% O_2
DW 1	-16	15	100	NR		
DW 2	-4	9	50			
DW 3	-16	12	100			
DW 4	-5	11	50			

Dilution valve (% open)	0
Knockout drum level	0
Manifold vacuum ("WC)	46
Blower vacuum ("WC)	34
Exhaust temp (°F)	94
Exhaust flow (cfm)	72

Indoor Vapor Monitoring Points

Location	Vacuum ("WC)	Hex (ppm)	% CO_2	% O_2
SS1	0	NR		
SS2	0			
SS3	0			
SS4	0.021			
SS36	0.024			
SS37	0			
SS38	0			
SS44	0.004			

SSD Control Room

Motor Speed (Hz)	50
Hourmeter reading/Time	44,000
Previous hourmeter reading/Date/Time	
Total hours since last event	
Percent Operability	

Notes:

SVE System

Line	Vacuum ("WC)	Flow (scfm)	Valve % open	Hex (ppm)	% CO_2	% O_2
EW 16				NR		
EW 2						
EW 6						
EW 4						
EW 1						
EW 13						
EW 7						
EW 5						
EW 10						
EW 3						
EW 12						
EW 9						
EW 14						
EW 8						
EW 15						
EW 11						

Dilution valve (% open)	
Knockout drum level	
Manifold vacuum (inWC)	
Blower vacuum (inWC)	
Exhaust temp (°F)	
Exhaust flow (cfm)	
Exhaust Stack Drained?	
Exhaust Stack (Hex $_{(ppm)}$/%O_2/%CO_2)	NR
Exhaust Stack Colortec (ppm)	NR
Heat Trace On?	
Filters Checked/Cleaned?	
GVEA Meter Reading (kW-hr)	432 491

Outdoor Vapor Monitoring Points

Location	Vacuum ("WC)	Hex (ppm)	% CO_2	% O_2	Vac while sampling ("WC or "Hg)
VMP1 @ 7'		NR			
VMP2 @ 7'					
VMP3 @ 7'					
SG-5 @ 5'					
SG-5 @ 9'					
SG-14 @ 6'					

SVE Control Room

Motor Speed (Hz)	
Combustible Gas Meter - % LEL	
Hourmeter reading/Time	
Previous hourmeter reading/Date/Time	
Total hours since last event	
Percent Operability	

Notes: SVE off

Laboratory Sample

Effluent Sample ID :	
Summa Canister # :	
Time/Date :	
Initial Vac ("Hg) :	
Final Vac ("Hg) :	

NOTES:

45 / 53 = "/" between readings indicates gauge reading "before" and "after" adjustment

NR = Not Recorded

APPENDIX H

LABORATORY REPORTS

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11/13/2015
Mr. Andrew Weller
AHTNA
1896 Marika Rd
Suite 8
Fairbanks AK 99709

Project Name: Gaffney West
Project #: 20284.004.01.03
Workorder #: 1511016

Dear Mr. Andrew Weller

The following report includes the data for the above referenced project for sample(s) received on 11/3/2015 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-17 VI are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free to 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

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WORK ORDER #: 1511016

Work Order Summary

CLIENT:	Mr. Andrew Weller AHTNA 1896 Marika Rd Suite 8 Fairbanks, AK 99709	**BILL TO:**	Accounts Payable AHTNA 110 West 38th Ave Suite 200A Anchorage, AK 99503
PHONE:	907-374-4750	**P.O. #**	20284.004.01.03
FAX:		**PROJECT #**	20284.004.01.03 Gaffney West
DATE RECEIVED:	11/03/2015	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	11/13/2015		

FRACTION #	NAME	TEST
01A	15-GRW-027-ES	Modified TO-17 VI
02A	Lab Blank	Modified TO-17 VI
03A	CCV	Modified TO-17 VI
04A	LCS	Modified TO-17 VI
04AA	LCSD	Modified TO-17 VI

CERTIFIED BY: Heidi Hayes DATE: 11/13/15

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704343-14-7, UT NELAP CA009332014-5, VA NELAP - 460197, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2014, Expiration date: 10/17/2015.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 956
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified EPA Method TO-17 (VI Tubes)
AHTNA
Workorder# 1511016

One TO-17 VI Tube sample was received on November 03, 2015. The laboratory performed the analysis via modified EPA Method TO-17 using GC/MS in the full scan mode. TO-17 'VI' sorbent tubes are thermally desorbed onto a secondary trap. The trap is thermally desorbed to elute the components into the GC/MS system for compound separation and detection.

A modification that may be applied to EPA Method TO-17 at the client's discretion is the requirement to transport sorbent tubes at 4 deg C. Laboratory studies demonstrate a high level of stability for VOCs on the TO-17 'VI' tube at room temperature for periods of up to 14 days. Tubes can be shipped to and from the field site at ambient conditions as long as the 14-day sample hold time is upheld. Trip blanks and field surrogate spikes are used as additional control measures to monitor recovery and background contribution during tube transport.

Since the TO-17 VI application significantly extends the scope of target compounds addressed in EPA Method TO-15 and TO-17, the laboratory has implemented several method modifications outlined in the table below. Specific project requirements may over-ride the laboratory modifications.

Requirement	***TO-17***	***ATL Modifications***
Initial Calibration	%RSD</=30% with 2 allowed out up to 40%	VOC list: %RSD</=30% with 2 allowed out up to 40% SVOC list: %RSD</=30% with 2 allowed out up to 40%
Daily Calibration	%D for each target compound within +/-30%.	Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene within +/-40%D
Audit Accuracy	70-130%	Second source recovery limits for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene = 60-140%.
Distributed Volume Pairs	Collection of distributed volume pairs required for monitoring ambient air to insure high quality.	If site is well-characterized or performance previously verified, single tube sampling may be appropriate. Distributed pairs may be impractical for soil gas collection due to configuration and volume constraints.
Analytical Precision	</=20% RPD	<30% RPD for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

A sampling volume of 0.10 L was used to convert ng to ug/m3 for the associated Lab Blank.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in blank (subtraction not performed).
J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
EPA METHOD TO-17

Client Sample ID: 15-GRW-027-ES

Lab ID#: 1511016-01A

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
cis-1,2-Dichloroethene	4.0	40	78	780
Tetrachloroethene	6.8	68	170	1700

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Client Sample ID: 15-GRW-027-ES

Lab ID#: 1511016-01A

EPA METHOD TO-17

File Name:	**18110417**	**Date of Extraction: NA**	**Date of Collection: 10/29/15 6:10:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 11/4/15 10:18 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
1,1-Dichloroethene	4.0	40	Not Detected	Not Detected
Vinyl Chloride	2.6	26	Not Detected	Not Detected
trans-1,2-Dichloroethene	4.0	40	Not Detected	Not Detected
cis-1,2-Dichloroethene	4.0	40	78	780
Trichloroethene	5.4	54	Not Detected	Not Detected
Tetrachloroethene	6.8	68	170	1700

Air Sample Volume(L): 0.100
Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	86	50-150
Toluene-d8	109	50-150
Naphthalene-d8	108	50-150

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Client Sample ID: Lab Blank

Lab ID#: 1511016-02A

EPA METHOD TO-17

File Name:	**18110408**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 11/4/15 03:31 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
1,1-Dichloroethene	4.0	4.0	Not Detected	Not Detected
Vinyl Chloride	2.6	2.6	Not Detected	Not Detected
trans-1,2-Dichloroethene	4.0	4.0	Not Detected	Not Detected
cis-1,2-Dichloroethene	4.0	4.0	Not Detected	Not Detected
Trichloroethene	5.4	5.4	Not Detected	Not Detected
Tetrachloroethene	6.8	6.8	Not Detected	Not Detected

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	78	50-150
Toluene-d8	93	50-150
Naphthalene-d8	96	50-150

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Client Sample ID: CCV

Lab ID#: 1511016-03A

EPA METHOD TO-17

File Name:	**18110402**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 11/4/15 11:17 AM**

Compound	%Recovery
1,1-Dichloroethene	122
Vinyl Chloride	109
trans-1,2-Dichloroethene	110
cis-1,2-Dichloroethene	114
Trichloroethene	100
Tetrachloroethene	97

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	121	50-150
Toluene-d8	105	50-150
Naphthalene-d8	109	50-150

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Client Sample ID: LCS

Lab ID#: 1511016-04A

EPA METHOD TO-17

File Name:	**18110404**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 11/4/15 12:41 PM**

Compound	%Recovery	Method Limits
1,1-Dichloroethene	110	70-130
Vinyl Chloride	116	70-130
trans-1,2-Dichloroethene	95	70-130
cis-1,2-Dichloroethene	124	70-130
Trichloroethene	103	70-130
Tetrachloroethene	103	70-130

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	112	50-150
Toluene-d8	102	50-150
Naphthalene-d8	106	50-150

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Client Sample ID: LCSD

Lab ID#: 1511016-04AA

EPA METHOD TO-17

File Name:	**18110405**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 11/4/15 01:23 PM**

Compound	%Recovery	Method Limits
1,1-Dichloroethene	111	70-130
Vinyl Chloride	120	70-130
trans-1,2-Dichloroethene	96	70-130
cis-1,2-Dichloroethene	127	70-130
Trichloroethene	104	70-130
Tetrachloroethene	104	70-130

Air Sample Volume(L): 1.00

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	112	50-150
Toluene-d8	101	50-150
Naphthalene-d8	101	50-150

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10/13/2015
Mr. Andrew Weller
AHTNA
1896 Marika Rd
Suite 8
Fairbanks AK 99709

Project Name: Gaffney
Project #:
Workorder #: 1509513

Dear Mr. Andrew Weller

The following report includes the data for the above referenced project for sample(s) received on 9/30/2015 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

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WORK ORDER #: 1509513

Work Order Summary

CLIENT:	Mr. Andrew Weller AHTNA 1896 Marika Rd Suite 8 Fairbanks, AK 99709	**BILL TO:**	Accounts Payable AHTNA 110 West 38th Ave Suite 200A Anchorage, AK 99503
PHONE:	907-374-4750	**P.O. #**	02001766
FAX:		**PROJECT #**	Gaffney
DATE RECEIVED:	09/30/2015	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	10/13/2015		

FRACTION #	NAME	TEST
01A	15-GRW-001-SG	Passive S.E. WMS
02A	15-GRW-003-SG	Passive S.E. WMS
03A	15-GRW-005-SG	Passive S.E. WMS
04A	15-GRW-009-SG	Passive S.E. WMS
05A	15-GRW-012-SG	Passive S.E. WMS
06A	15-GRW-014-SG	Passive S.E. WMS
07A	15-GRW-016-SG	Passive S.E. WMS
08A	15-GRW-020-SG	Passive S.E. WMS
09A	15-GRW-023-SG	Passive S.E. WMS
10A	15-GRW-025-TB	Passive S.E. WMS
11A	Lab Blank	Passive S.E. WMS
12A	LCS	Passive S.E. WMS
12AA	LCSD	Passive S.E. WMS

CERTIFIED BY:  DATE: 10/13/15

Technical Director

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Passive SE GC/MS
AHTNA
Workorder# 1509513

Ten WMS-PH samples were received on September 30, 2015. The laboratory extracted the charcoal sorbent bed of the passive sampler using carbon disulfide. 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.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

As per project requirements, the laboratory has reported estimated values for target compound hits that are below the Reporting Limit but greater than the Method Detection Limit.

To calculate ug/m3 concentrations in the Lab Blank, a sampling duration of 10080 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

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Summary of Detected Compounds
VOCS BY PASSIVE SAMPLER - GC/MS

Client Sample ID: 15-GRW-001-SG

Lab ID#: 1509513-01A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.050	27	0.031 J	17 J

Client Sample ID: 15-GRW-003-SG

Lab ID#: 1509513-02A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.050	27	0.030 J	16 J

Client Sample ID: 15-GRW-005-SG

Lab ID#: 1509513-03A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	5.6	0.12	13
Tetrachloroethene	0.050	3.8	0.28	21

Client Sample ID: 15-GRW-009-SG

Lab ID#: 1509513-04A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.050	5.3	0.011 J	1.2 J

Client Sample ID: 15-GRW-012-SG

Lab ID#: 1509513-05A

No Detections Were Found.

Client Sample ID: 15-GRW-014-SG

Lab ID#: 1509513-06A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	39	0.11	85
Tetrachloroethene	0.050	27	0.11	61

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Summary of Detected Compounds
VOCS BY PASSIVE SAMPLER - GC/MS

Client Sample ID: 15-GRW-016-SG

Lab ID#: 1509513-07A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.050	5.3	0.14	15

Client Sample ID: 15-GRW-020-SG

Lab ID#: 1509513-08A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Tetrachloroethene	0.050	5.3	0.025 J	2.7 J

Client Sample ID: 15-GRW-023-SG

Lab ID#: 1509513-09A

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.50	130	1100	290000
Tetrachloroethene	0.050	8.9	0.013 J	2.4 J

Client Sample ID: 15-GRW-025-TB

Lab ID#: 1509513-10A

No Detections Were Found.

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Client Sample ID: 15-GRW-001-SG

Lab ID#: 1509513-01A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100609sim**	**Date of Collection: 9/19/15 8:30:00 AM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 11:35 AM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	39	Not Detected	Not Detected
Tetrachloroethene	0.050	27	0.031 J	17 J

J = Estimated value.

Temperature = 42.8F , duration time = 1440 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130

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Client Sample ID: 15-GRW-003-SG

Lab ID#: 1509513-02A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100610sim**	**Date of Collection: 9/19/15 8:35:00 AM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 11:59 AM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	39	Not Detected	Not Detected
Tetrachloroethene	0.050	27	0.030 J	16 J

J = Estimated value.

Temperature = 42.8F , duration time = 1440 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130

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Client Sample ID: 15-GRW-005-SG

Lab ID#: 1509513-03A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100611sim**	**Date of Collection: 9/25/15 9:35:00 AM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 12:22 PM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	5.6	0.12	13
Tetrachloroethene	0.050	3.8	0.28	21

Temperature = 42.8F , duration time = 10080 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	102	70-130

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Client Sample ID: 15-GRW-009-SG

Lab ID#: 1509513-04A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100612sim**	**Date of Collection: 9/23/15 10:35:00 AM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 12:46 PM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	7.9	Not Detected	Not Detected
Tetrachloroethene	0.050	5.3	0.011 J	1.2 J

J = Estimated value.

Temperature = 42.8F , duration time = 7200 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130

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Client Sample ID: 15-GRW-012-SG

Lab ID#: 1509513-05A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100613sim**	**Date of Collection: 9/21/15 12:00:00 PM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 01:09 PM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	13	Not Detected	Not Detected
Tetrachloroethene	0.050	8.9	Not Detected	Not Detected

Temperature = 42.8F , duration time = 4320 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130

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Client Sample ID: 15-GRW-014-SG

Lab ID#: 1509513-06A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100614sim**	**Date of Collection: 9/19/15 1:00:00 PM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 01:32 PM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	39	0.11	85
Tetrachloroethene	0.050	27	0.11	61

Temperature = 42.8F , duration time = 1440 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130

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Client Sample ID: 15-GRW-016-SG

Lab ID#: 1509513-07A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100615sim**	**Date of Collection: 9/23/15 2:00:00 PM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 01:56 PM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	7.9	Not Detected	Not Detected
Tetrachloroethene	0.050	5.3	0.14	15

Temperature = 42.8F , duration time = 7200 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130

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Client Sample ID: 15-GRW-020-SG

Lab ID#: 1509513-08A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100616sim**	**Date of Collection: 9/23/15 4:15:00 PM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 02:19 PM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	7.9	Not Detected	Not Detected
Tetrachloroethene	0.050	5.3	0.025 J	2.7 J

J = Estimated value.

Temperature = 42.8F , duration time = 7200 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	103	70-130

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Client Sample ID: 15-GRW-023-SG

Lab ID#: 1509513-09A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100617sim**	**Date of Collection: 9/21/15 3:00:00 PM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 02:42 PM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.50	130	1100	290000
Tetrachloroethene	0.050	8.9	0.013 J	2.4 J

J = Estimated value.

Trichloroethene was reported from file # 10100704sim analyzed on 10/7/2015 at a dilution factor of 10.0.
Temperature = 42.8F , duration time = 4320 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	105	70-130

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Client Sample ID: 15-GRW-025-TB

Lab ID#: 1509513-10A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100607sim**	**Date of Collection: 9/25/15 8:00:00 AM**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 10:49 AM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	5.6	Not Detected	Not Detected
Tetrachloroethene	0.050	3.8	Not Detected	Not Detected

Temperature = 42.8F , duration time = 10080 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1509513-11A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100606sima**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 10:22 AM**	
		Date of Extraction: 10/6/15	

Compound	Rpt. Limit (ug)	Rpt. Limit (ug/m3)	Amount (ug)	Amount (ug/m3)
Trichloroethene	0.050	5.6	Not Detected	Not Detected
Tetrachloroethene	0.050	3.8	Not Detected	Not Detected

Temperature = 42.8F , duration time = 10080 minutes.

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	105	70-130

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Client Sample ID: LCS

Lab ID#: 1509513-12A

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100604sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 09:36 AM**	
		Date of Extraction: 10/6/15	

Compound	%Recovery	Method Limits
Trichloroethene	108	70-130
Tetrachloroethene	101	70-130

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130

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Client Sample ID: LCSD

Lab ID#: 1509513-12AA

VOCS BY PASSIVE SAMPLER - GC/MS

File Name:	**10100605sim**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/6/15 09:59 AM**	
		Date of Extraction: 10/6/15	

Compound	%Recovery	Method Limits
Trichloroethene	108	70-130
Tetrachloroethene	99	70-130

Container Type: WMS-PH

Surrogates	%Recovery	Method Limits
Toluene-d8	104	70-130

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10/13/2015
Mr. Andrew Weller
AHTNA
1896 Marika Rd
Suite 8
Fairbanks AK 99709

Project Name: Gaffney
Project #: 20266.004
Workorder #: 1509514

Dear Mr. Andrew Weller

The following report includes the data for the above referenced project for sample(s) received on 9/30/2015 at Air Toxics Ltd.

The data and associated QC analyzed by TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Eurofins Air Toxics Inc. for your air analysis needs. Eurofins Air Toxics Inc. is committed to providing accurate data of the highest quality. Please feel free 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

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WORK ORDER #: 1509514

Work Order Summary

CLIENT:	Mr. Andrew Weller AHTNA 1896 Marika Rd Suite 8 Fairbanks, AK 99709	**BILL TO:**	Accounts Payable AHTNA 110 West 38th Ave Suite 200A Anchorage, AK 99503
PHONE:	907-374-4750	**P.O. #**	02001766
FAX:		**PROJECT #**	20266.004 Gaffney
DATE RECEIVED:	09/30/2015	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	10/13/2015		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	15-GRW-002-SG	TO-15	3.9 "Hg	5.1 psi
02A(cancelled)	15-GRW-004-SG	TO-15	2 "Hg	5 psi
03A	15-GRW-006-SG	TO-15	6.3 "Hg	4.9 psi
04A	15-GRW-007-SG	TO-15	5.1 "Hg	5 psi
05A	15-GRW-008-SG	TO-15	2.8 "Hg	5.1 psi
06A	15-GRW-010-SG	TO-15	1 "Hg	4.8 psi
07A	15-GRW-011-SG	TO-15	7.1 "Hg	4.9 psi
08A	15-GRW-013-SG	TO-15	6.1 "Hg	5.2 psi
09A	15-GRW-015-SG	TO-15	0.4 "Hg	5 psi
10A	15-GRW-017-SG	TO-15	3.9 "Hg	4.9 psi
11A	15-GRW-018-SG	TO-15	7.1 "Hg	4.7 psi
12A	15-GRW-019-SG	TO-15	0.3 psi	4.9 psi
13A	15-GRW-021-SG	TO-15	7.3 "Hg	4.7 psi
14A	15-GRW-022-SG	TO-15	6.7 "Hg	4.8 psi
15A	15-GRW-024-SG	TO-15	2.6 "Hg	5.1 psi
16A	15-GRW-027-SG	TO-15	9.2 "Hg	4.8 psi
17A	15-GRW-026-SG	TO-15	3.5 "Hg	5 psi
18A	Lab Blank	TO-15	NA	NA
18B	Lab Blank	TO-15	NA	NA
19A	CCV	TO-15	NA	NA
19B	CCV	TO-15	NA	NA
20A	LCS	TO-15	NA	NA
20AA	LCSD	TO-15	NA	NA

Continued on next page

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WORK ORDER #: 1509514

Work Order Summary

CLIENT:	Mr. Andrew Weller AHTNA 1896 Marika Rd Suite 8 Fairbanks, AK 99709	**BILL TO:**	Accounts Payable AHTNA 110 West 38th Ave Suite 200A Anchorage, AK 99503
PHONE:	907-374-4750	**P.O. #**	02001766
FAX:		**PROJECT #**	20266.004 Gaffney
DATE RECEIVED:	09/30/2015	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	10/13/2015		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
20B	LCS	TO-15	NA	NA
20BB	LCSD	TO-15	NA	NA

CERTIFIED BY: Heidi Hayes DATE: 10/13/15

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704343-14-7, UT NELAP CA009332014-5, VA NELAP - 460197, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2014, Expiration date: 10/17/2015.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
EPA Method TO-15
AHTNA
Workorder# 1509514

Seventeen 6 Liter Summa Canister samples were received on September 30, 2015. The laboratory performed analysis via EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Receiving Notes

Despite the use of flow controllers for sample collection, the final canister vacuums for sample 15-GRW-019-SG was measured at ambient pressure in the field. These ambient pressure readings were confirmed by the laboratory upon sample receipt.

Analytical Notes

As per client project requirements, the laboratory has reported estimated values for target compound hits that are below the Reporting Limit but greater than the Method Detection Limit. Concentrations that are below the level at which the canister was certified (0.2 ppbv for compounds reported at 0.5 ppbv and 0.8 ppbv for compounds reported at 2.0 ppbv) may be false positives.

Dilution was performed on samples 15-GRW-006-SG, 15-GRW-007-SG, 15-GRW-008-SG, 15-GRW-011-SG and 15-GRW-019-SG due to the presence of high level non-target species.

Dilution was performed on samples 15-GRW-024-SG and 15-GRW-027-SG due to the presence of high level target species.

Due to laboratory error in configuring the autosampler sequence, sample 15-GRW-004-SG was not analyzed (CAR#FADH4A3988). The error was identified during final report review after sample had been released, and no results can be reported.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: 15-GRW-002-SG

Lab ID#: 1509514-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.78	0.21 J	4.2	1.1 J
Tetrachloroethene	0.78	1.1	5.2	7.8

Client Sample ID: 15-GRW-006-SG

Lab ID#: 1509514-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.4	1.1 J	7.6	5.9 J
Tetrachloroethene	1.4	0.42 J	9.5	2.9 J

Client Sample ID: 15-GRW-007-SG

Lab ID#: 1509514-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.3	1.7	7.2	9.2
Tetrachloroethene	1.3	0.63 J	9.1	4.3 J

Client Sample ID: 15-GRW-008-SG

Lab ID#: 1509514-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.2	1.9	6.7	10
Tetrachloroethene	1.2	1.7	8.4	12

Client Sample ID: 15-GRW-010-SG

Lab ID#: 1509514-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.68	3.6	3.7	20
Tetrachloroethene	0.68	1.2	4.6	7.8

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Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: 15-GRW-011-SG

Lab ID#: 1509514-07A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.9	6.8	10	36
Tetrachloroethene	1.9	1.7 J	13	11 J

Client Sample ID: 15-GRW-013-SG

Lab ID#: 1509514-08A

No Detections Were Found.

Client Sample ID: 15-GRW-015-SG

Lab ID#: 1509514-09A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.68	1.8	3.6	9.6
Tetrachloroethene	0.68	1.0	4.6	7.0

Client Sample ID: 15-GRW-017-SG

Lab ID#: 1509514-10A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Tetrachloroethene	0.76	0.31 J	5.2	2.1 J

Client Sample ID: 15-GRW-018-SG

Lab ID#: 1509514-11A

No Detections Were Found.

Client Sample ID: 15-GRW-019-SG

Lab ID#: 1509514-12A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Tetrachloroethene	1.1	0.76 J	7.4	5.1 J

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Summary of Detected Compounds
EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: 15-GRW-021-SG

Lab ID#: 1509514-13A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.87	0.46 J	4.7	2.5 J

Client Sample ID: 15-GRW-022-SG

Lab ID#: 1509514-14A

No Detections Were Found.

Client Sample ID: 15-GRW-024-SG

Lab ID#: 1509514-15A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	370	100000	2000	570000

Client Sample ID: 15-GRW-027-SG

Lab ID#: 1509514-16A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	160	100000	850	550000

Client Sample ID: 15-GRW-026-SG

Lab ID#: 1509514-17A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.76	0.35 J	4.1	1.9 J
Tetrachloroethene	0.76	2.2	5.2	15

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Client Sample ID: 15-GRW-002-SG

Lab ID#: 1509514-01A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100519**	**Date of Collection: 9/18/15 8:30:00 AM**	
Dil. Factor:	**1.55**	**Date of Analysis: 10/5/15 10:40 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.78	0.21 J	4.2	1.1 J
Tetrachloroethene	0.78	1.1	5.2	7.8

J = Estimated value.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	81	70-130

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Client Sample ID: 15-GRW-006-SG

Lab ID#: 1509514-03A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100516**	**Date of Collection: 9/18/15 9:35:00 AM**	
Dil. Factor:	**2.81**	**Date of Analysis: 10/5/15 06:58 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.4	1.1 J	7.6	5.9 J
Tetrachloroethene	1.4	0.42 J	9.5	2.9 J

J = Estimated value.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	103	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: 15-GRW-007-SG

Lab ID#: 1509514-04A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100517**	**Date of Collection: 9/21/15 9:35:00 AM**	
Dil. Factor:	**2.69**	**Date of Analysis: 10/5/15 07:36 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.3	1.7	7.2	9.2
Tetrachloroethene	1.3	0.63 J	9.1	4.3 J

J = Estimated value.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: 15-GRW-008-SG

Lab ID#: 1509514-05A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100518**	**Date of Collection: 9/24/15 9:35:00 AM**	
Dil. Factor:	**2.48**	**Date of Analysis: 10/5/15 08:01 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.2	1.9	6.7	10
Tetrachloroethene	1.2	1.7	8.4	12

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	104	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	121	70-130

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Client Sample ID: 15-GRW-010-SG

Lab ID#: 1509514-06A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100510**	**Date of Collection:**	**9/18/15 10:35:00 AM**
Dil. Factor:	**1.37**	**Date of Analysis:**	**10/5/15 03:39 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.68	3.6	3.7	20
Tetrachloroethene	0.68	1.2	4.6	7.8

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	95	70-130

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Client Sample ID: 15-GRW-011-SG

Lab ID#: 1509514-07A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100511**	**Date of Collection:**	**9/21/15 10:35:00 AM**
Dil. Factor:	**3.88**	**Date of Analysis:**	**10/5/15 04:03 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.9	6.8	10	36
Tetrachloroethene	1.9	1.7 J	13	11 J

J = Estimated value.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	91	70-130
4-Bromofluorobenzene	90	70-130

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Client Sample ID: 15-GRW-013-SG

Lab ID#: 1509514-08A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100512**	**Date of Collection: 9/18/15 12:00:00 PM**	
Dil. Factor:	**1.70**	**Date of Analysis: 10/5/15 04:43 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.85	Not Detected	4.6	Not Detected
Tetrachloroethene	0.85	Not Detected	5.8	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	92	70-130

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Client Sample ID: 15-GRW-015-SG

Lab ID#: 1509514-09A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100513**	**Date of Collection: 9/18/15 1:00:00 PM**	
Dil. Factor:	**1.36**	**Date of Analysis: 10/5/15 05:09 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.68	1.8	3.6	9.6
Tetrachloroethene	0.68	1.0	4.6	7.0

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	99	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	82	70-130

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Client Sample ID: 15-GRW-017-SG

Lab ID#: 1509514-10A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100514**	**Date of Collection: 9/18/15 2:00:00 PM**	
Dil. Factor:	**1.53**	**Date of Analysis: 10/5/15 05:48 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.76	Not Detected	4.1	Not Detected
Tetrachloroethene	0.76	0.31 J	5.2	2.1 J

J = Estimated value.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	84	70-130

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Client Sample ID: 15-GRW-018-SG

Lab ID#: 1509514-11A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100515**	**Date of Collection:**	**9/21/15 2:00:00 PM**
Dil. Factor:	**1.73**	**Date of Analysis:**	**10/5/15 06:14 PM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.86	Not Detected	4.6	Not Detected
Tetrachloroethene	0.86	Not Detected	5.9	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	94	70-130
4-Bromofluorobenzene	87	70-130

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Client Sample ID: 15-GRW-019-SG

Lab ID#: 1509514-12A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100520**	**Date of Collection: 9/22/15 2:00:00 PM**	
Dil. Factor:	**2.18**	**Date of Analysis: 10/5/15 11:17 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	1.1	Not Detected	5.8	Not Detected
Tetrachloroethene	1.1	0.76 J	7.4	5.1 J

J = Estimated value.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: 15-GRW-021-SG

Lab ID#: 1509514-13A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100521**	**Date of Collection: 9/18/15 4:15:00 PM**	
Dil. Factor:	**1.74**	**Date of Analysis: 10/5/15 11:58 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.87	0.46 J	4.7	2.5 J
Tetrachloroethene	0.87	Not Detected	5.9	Not Detected

J = Estimated value.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	102	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	91	70-130

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Client Sample ID: 15-GRW-022-SG

Lab ID#: 1509514-14A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100522**	**Date of Collection: 9/21/15 4:15:00 PM**	
Dil. Factor:	**1.71**	**Date of Analysis: 10/6/15 12:39 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.86	Not Detected	4.6	Not Detected
Tetrachloroethene	0.86	Not Detected	5.8	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	111	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: 15-GRW-024-SG

Lab ID#: 1509514-15A

EPA METHOD TO-15 GC/MS

File Name:	**14100816**	**Date of Collection: 9/18/15 3:00:00 PM**	
Dil. Factor:	**74.0**	**Date of Analysis: 10/8/15 03:10 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	370	100000	2000	570000
Tetrachloroethene	370	Not Detected	2500	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	90	70-130

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Client Sample ID: 15-GRW-027-SG

Lab ID#: 1509514-16A

EPA METHOD TO-15 GC/MS

File Name:	**14100817**	**Date of Collection: 9/19/15 3:00:00 PM**	
Dil. Factor:	**31.8**	**Date of Analysis: 10/8/15 03:42 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	160	100000	850	550000
Tetrachloroethene	160	Not Detected	1100	Not Detected

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	112	70-130
Toluene-d8	104	70-130
4-Bromofluorobenzene	92	70-130

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Client Sample ID: 15-GRW-026-SG

Lab ID#: 1509514-17A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100523**	**Date of Collection: 9/18/15 8:40:00 AM**	
Dil. Factor:	**1.52**	**Date of Analysis: 10/6/15 01:20 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.76	0.35 J	4.1	1.9 J
Tetrachloroethene	0.76	2.2	5.2	15

J = Estimated value.

Container Type: 6 Liter Summa Canister

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	96	70-130
4-Bromofluorobenzene	119	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1509514-18A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100505a**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/5/15 12:16 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	0.50	Not Detected	2.7	Not Detected
Tetrachloroethene	0.50	Not Detected	3.4	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	86	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1509514-18B

EPA METHOD TO-15 GC/MS

File Name:	**14100806d**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/8/15 09:36 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Trichloroethene	5.0	Not Detected	27	Not Detected
Tetrachloroethene	5.0	Not Detected	34	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	113	70-130
Toluene-d8	106	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: CCV

Lab ID#: 1509514-19A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100502**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/5/15 10:35 AM**	

Compound	%Recovery
Trichloroethene	105
Tetrachloroethene	104

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	98	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: CCV

Lab ID#: 1509514-19B

EPA METHOD TO-15 GC/MS

File Name:	**14100802**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/8/15 07:28 AM**	

Compound	%Recovery
Trichloroethene	93
Tetrachloroethene	92

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	106	70-130
4-Bromofluorobenzene	98	70-130

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Client Sample ID: LCS

Lab ID#: 1509514-20A

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100503**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/5/15 11:12 AM**	

Compound	%Recovery	Method Limits
Trichloroethene	105	70-130
Tetrachloroethene	101	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	100	70-130
Toluene-d8	94	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: LCSD

Lab ID#: 1509514-20AA

EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**a100504**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/5/15 11:37 AM**	

Compound	%Recovery	Method Limits
Trichloroethene	101	70-130
Tetrachloroethene	88	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	101	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	99	70-130

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Client Sample ID: LCS

Lab ID#: 1509514-20B

EPA METHOD TO-15 GC/MS

File Name:	**14100803**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/8/15 08:04 AM**	

Compound	%Recovery	Method Limits
Trichloroethene	97	70-130
Tetrachloroethene	90	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	108	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	94	70-130

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Client Sample ID: LCSD

Lab ID#: 1509514-20BB

EPA METHOD TO-15 GC/MS

File Name:	**14100804**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 10/8/15 08:42 AM**	

Compound	%Recovery	Method Limits
Trichloroethene	91	70-130
Tetrachloroethene	88	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	105	70-130
Toluene-d8	105	70-130
4-Bromofluorobenzene	96	70-130

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5/7/2016

Mr. Andrew Weller
AHTNA
1896 Marika Rd
Suite 8
Fairbanks AK 99709

Project Name: Gaffney West
Project #: 20266.004.01.03
Workorder #: 1604528

Dear Mr. Andrew Weller

The following report includes the data for the above referenced project for sample(s) received on 4/26/2016 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-17 VI 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

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WORK ORDER #: 1604528

Work Order Summary

CLIENT:	Mr. Andrew Weller AHTNA 1896 Marika Rd Suite 8 Fairbanks, AK 99709	**BILL TO:**	Accounts Payable AHTNA 110 West 38th Ave Suite 200A Anchorage, AK 99503
PHONE:	907-374-4750	**P.O. #**	Proj#20266.004.01.03
FAX:		**PROJECT #**	20266.004.01.03 Gaffney West
DATE RECEIVED:	04/26/2016	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/07/2016		

FRACTION #	NAME	TEST
01A	16-GRW-025-ES	Modified TO-17 VI
02A	Lab Blank	Modified TO-17 VI
03A	CCV	Modified TO-17 VI
04A	LCS	Modified TO-17 VI
04AA	LCSD	Modified TO-17 VI

CERTIFIED BY: Heidi Mayo DATE: 05/07/16

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704434-15-9, UT NELAP CA0093332015-6, VA NELAP - 8113, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2015, Expiration date: 10/17/2016.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 95630
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified EPA Method TO-17 (VI Tubes)
AHTNA
Workorder# 1604528

One TO-17 VI Tube sample was received on April 26, 2016. The laboratory performed the analysis via modified EPA Method TO-17 using GC/MS in the full scan mode. TO-17 'VI' sorbent tubes are thermally desorbed onto a secondary trap. The trap is thermally desorbed to elute the components into the GC/MS system for compound separation and detection.

A modification that may be applied to EPA Method TO-17 at the client's discretion is the requirement to transport sorbent tubes at 4 deg C. Laboratory studies demonstrate a high level of stability for VOCs on the TO-17 'VI' tube at room temperature for periods of up to 14 days. Tubes can be shipped to and from the field site at ambient conditions as long as the 14-day sample hold time is upheld. Trip blanks and field surrogate spikes are used as additional control measures to monitor recovery and background contribution during tube transport.

Since the TO-17 VI application significantly extends the scope of target compounds addressed in EPA Method TO-15 and TO-17, the laboratory has implemented several method modifications outlined in the table below. Specific project requirements may over-ride the laboratory modifications.

Requirement	***TO-17***	***ATL Modifications***
Initial Calibration	%RSD</=30% with 2 allowed out up to 40%	VOC list: %RSD</=30% with 2 allowed out up to 40% SVOC list: %RSD</=30% with 2 allowed out up to 40%
Daily Calibration	%D for each target compound within +/-30%.	Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene within +/-40%D
Audit Accuracy	70-130%	Second source recovery limits for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene = 60-140%.
Distributed Volume Pairs	Collection of distributed volume pairs required for monitoring ambient air to insure high quality.	If site is well-characterized or performance previously verified, single tube sampling may be appropriate. Distributed pairs may be impractical for soil gas collection due to configuration and volume constraints.
Analytical Precision	</=20% RPD	<30% RPD for Fluorene, Phenanthrene, Anthracene, Fluoranthene, and Pyrene.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

Sampling volume was supplied by the client. A sampling volume of 0.100 L was used to convert ng to ug/m3 for the associated Lab Blank.

Due to the Method Detection Limit study performed on the instrument, the reporting limit for Vinyl Chloride was raised from 2.6ng to 5.1ng.

All Quality Control Limit exceedances and affected sample results are noted by flags. Each flag is defined at the bottom of this Case Narrative and on each Sample Result Summary page.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in blank (subtraction not performed).
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.
UJ- Non-detected compound associated with low bias in the CCV
N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
EPA METHOD TO-17

Client Sample ID: 16-GRW-025-ES

Lab ID#: 1604528-01A

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
trans-1,2-Dichloroethene	4.0	40	7.9	79
cis-1,2-Dichloroethene	4.0	40	110	1100
Trichloroethene	5.4	54	7.7	77
Tetrachloroethene	6.8	68	270	2700

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Client Sample ID: 16-GRW-025-ES

Lab ID#: 1604528-01A

EPA METHOD TO-17

File Name:	**6042606**	**Date of Extraction: NA**	**Date of Collection: 4/22/16 1:18:00 PM**
Dil. Factor:	**1.00**		**Date of Analysis: 4/26/16 03:56 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
1,1-Dichloroethene	4.0	40	Not Detected	Not Detected
Vinyl Chloride	5.1	51	Not Detected	Not Detected
trans-1,2-Dichloroethene	4.0	40	7.9	79
cis-1,2-Dichloroethene	4.0	40	110	1100
Trichloroethene	5.4	54	7.7	77
Tetrachloroethene	6.8	68	270	2700

Air Sample Volume(L): 0.100

Container Type: TO-17 VI Tube

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	80	50-150
Toluene-d8	86	50-150
Naphthalene-d8	78	50-150

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Client Sample ID: Lab Blank

Lab ID#: 1604528-02A

EPA METHOD TO-17

File Name:	**6042605**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 4/26/16 02:39 PM**

Compound	Rpt. Limit (ng)	Rpt. Limit (ug/m3)	Amount (ng)	Amount (ug/m3)
1,1-Dichloroethene	4.0	40	Not Detected	Not Detected
Vinyl Chloride	5.1	51	Not Detected	Not Detected
trans-1,2-Dichloroethene	4.0	40	Not Detected	Not Detected
cis-1,2-Dichloroethene	4.0	40	Not Detected	Not Detected
Trichloroethene	5.4	54	Not Detected	Not Detected
Tetrachloroethene	6.8	68	Not Detected	Not Detected

Air Sample Volume(L): 0.100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	72	50-150
Toluene-d8	82	50-150
Naphthalene-d8	83	50-150

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Client Sample ID: CCV
Lab ID#: 1604528-03A
EPA METHOD TO-17

File Name:	**6042602**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 4/26/16 12:13 PM**

Compound	%Recovery
1,1-Dichloroethene	110
Vinyl Chloride	102
trans-1,2-Dichloroethene	104
cis-1,2-Dichloroethene	104
Trichloroethene	97
Tetrachloroethene	106

Air Sample Volume(L): 1.00
Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	86	50-150
Toluene-d8	94	50-150
Naphthalene-d8	84	50-150

eurofins | Air Toxics

Client Sample ID: LCS
Lab ID#: 1604528-04A
EPA METHOD TO-17

File Name:	**6042603**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 4/26/16 12:55 PM**

Compound	%Recovery	Method Limits
1,1-Dichloroethene	122	70-130
Vinyl Chloride	106	70-130
trans-1,2-Dichloroethene	90	70-130
cis-1,2-Dichloroethene	113	70-130
Trichloroethene	104	70-130
Tetrachloroethene	107	70-130

Air Sample Volume(L): 1.00
Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	86	50-150
Toluene-d8	95	50-150
Naphthalene-d8	87	50-150

eurofins | Air Toxics

Client Sample ID: LCSD

Lab ID#: 1604528-04AA

EPA METHOD TO-17

File Name:	**6042604**	**Date of Extraction: NA**	**Date of Collection: NA**
Dil. Factor:	**1.00**		**Date of Analysis: 4/26/16 01:35 PM**

Compound	%Recovery	Method Limits
1,1-Dichloroethene	133 Q	70-130
Vinyl Chloride	115	70-130
trans-1,2-Dichloroethene	95	70-130
cis-1,2-Dichloroethene	118	70-130
Trichloroethene	104	70-130
Tetrachloroethene	107	70-130

Air Sample Volume(L): 1.00

Q = Exceeds Quality Control limits.

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	83	50-150
Toluene-d8	94	50-150
Naphthalene-d8	85	50-150

APPENDIX I

DATA REVIEW CHECKLISTS

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Laboratory Data Review Checklist for Air Samples

Completed by:	B Martich		
Title:	Senior Scientist	Date:	Feb 19, 2016
CS Report Name:	Gaffney Road West March 2016	Report Date:	Oct 13, 2015
Consultant Firm:	Geosyntec Consultants		
Laboratory Name:	Eurofins	Laboratory Report Number:	1509514
ADEC File Number:	102.38.084	ADEC Haz ID:	4503

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:

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:

One canister at ambient pressure (15-GRW-019-SG)

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

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

canister represents 1/7 of analytical result and also highest reported concentration for VMP-9. No qualification made

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:

pressure for 15-GRW-019-SG, dilution required for some canisters, and error associated with sequencing the autosampler for 15-GRW-004-SG prevented sample analysis

c. Were all corrective actions documented?

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

No actions taken other than documentation

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

Comments:

Potential low bias noted for ambient pressure in 15-GRW-019-S, and elevated RLs for dilution. Data remain usable for decision-making.

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:

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: NA

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

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

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

Comments: NA

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:

Spike not performed

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

○ Yes ○ No ◉ NA (Please explain) Comments:

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

○ Yes ◉ No ○ NA (Please explain) Comments:

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

Comments:

NA

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:

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

Comments:

NA

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:

ii. Submitted blind to lab?

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

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 25 %)

$$RPD\ (\%) = \text{Absolute Value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

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

Sample not run because of error in autosampler

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

Precision for field dupes not measured. Data usability not affected.

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

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

dedicated equipment used

i. All results less than PQL?

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

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

NA

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

Comments:

NA

7. Other Data Flags/Qualifiers

a. Defined and appropriate?

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

Reset Form

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Laboratory Data Review Checklist for Air Samples

Completed by:	B Martich		
Title:	Senior Scientist	Date:	Feb 19, 2016
CS Report Name:	Gaffney Road West March 2016	Report Date:	Oct 13, 2015
Consultant Firm:	Geosyntec Consultants		
Laboratory Name:	Eurofins	Laboratory Report Number:	1509513
ADEC File Number:	102.38.084	ADEC Haz ID:	4503

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:

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 discrepancies

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

c. Were all corrective actions documented?

◉ Yes ○ No ◉ NA (Please explain) Comments:

None necessary

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

Comments:

NA

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:

Less than deep soil gas targets

d. Data quality or usability affected?

Comments:

NA

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:

NA

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

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

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

Comments:

NA

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:

Spike not performed

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

○ Yes ○ No ◉ NA (Please explain) Comments:

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

○ Yes ◉ No ○ NA (Please explain) Comments:

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

Comments:

NA

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:

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

Comments:

NA

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:

ii. Submitted blind to lab?

◉ Yes ○ No ○ NA (Please explain) Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 25 %)

$$RPD\ (\%) = \text{Absolute Value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

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

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

○ Yes ○ No ◉ NA (Please explain) Comments:

dedicated equipment used

i. All results less than PQL?

○ Yes ○ No ◉ NA (Please explain) Comments:

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

NA

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

Comments:

NA

7. Other Data Flags/Qualifiers

a. Defined and appropriate?

○ Yes ○ No ◉ NA (Please explain) Comments:

Reset Form

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APPENDIX J

PCE REMOVAL CALCULATIONS

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Estimated SSD/SVE Monthly Costs

Estimated Monthly Costs	Winter	Summer
5W ft Heat Trace at 70%	$795	-
Building Heat, Exhaust, Controls	$200	$50
100% SSD Operation	$160	$160
50% SVE operation (12-hr pulse)	$515	$515
Electricity Customer Charge	$20	$20
Phone	$50	$50
Total Estimated Monthly Cost	***$1,740***	***$795***
Avg Removal Rate (2011-present)		
lb/day	0.02	0.02
lb/month	0.6	0.6
$/lb-PCE	$2,900	$1,325

W = Watts, ft = foot, SSD = Sub-Slab Depressurization, hr = hour

SVE = Soil Vapor Extraction, lb = pound, PCE = Tetrachloroethene

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Tetrachloroethene Removal Through 10/29/15 (Numerical Estimate)

Date	Days of Operation	SSD Flow (cfm)	SVE Flow (cfm)	Combined SSD and SVE Exhaust PCE Concentration ($\mu g/m^3$)	Combined SSD and SVE PCE Emission Rate (lbs/day)	SSD Exhaust PCE Concentration ($\mu g/m^3$)	SVE Exhaust PCE Concentration ($\mu g/m^3$)	SSD Emission Rate (lbs/day)	SVE Emission Rate (lbs/day)	Total PCE Removed (lbs)
1/12/2010	1	80	310	19,000	0.67	--	--	--	--	0.7
1/13/2010	2	91	280	23,000	0.77	--	--	--	--	0.8
1/20/2010	9	61	280	9,300	0.29	--	--	--	--	2.0
2/15/2010	35	58	290	5,000	0.16	--	--	--	--	4.1
4/5/2010	84	60	120	3,000	0.05	--	--	--	--	2.4
7/21/2010	191	60	110	5,900	0.09	--	--	--	--	9.6
9/24/2010	256	60	140	6,000	0.11	--	--	--	--	7.0
12/28/2010	351	62	140	1,300	0.02	--	--	--	--	2.2
2/23/2011	408	52	170	1,300	0.03	--	--	--	--	1.5
5/27/2011	501	58	120	990	0.02	--	--	--	--	1.5
9/30/2011	627	56	110	1,000	0.01	--	--	--	--	1.9
12/21/2011	709	45	170	1,600	0.03	--	--	--	--	2.5
3/15/2012	794	42	180	900	0.02	--	--	--	--	1.5
6/19/2012	890	50	130	1,200	0.02	--	--	--	--	1.9
9/23/2013	1351	50	130	1,281	0.02	190	1,700	0.0009	0.02	9.6
10/29/2015	2117	74	90	1,019	0.007	190	1700	0.001	0.01	1.0
									Total Estimated Pounds PCE Removed	***50.1***

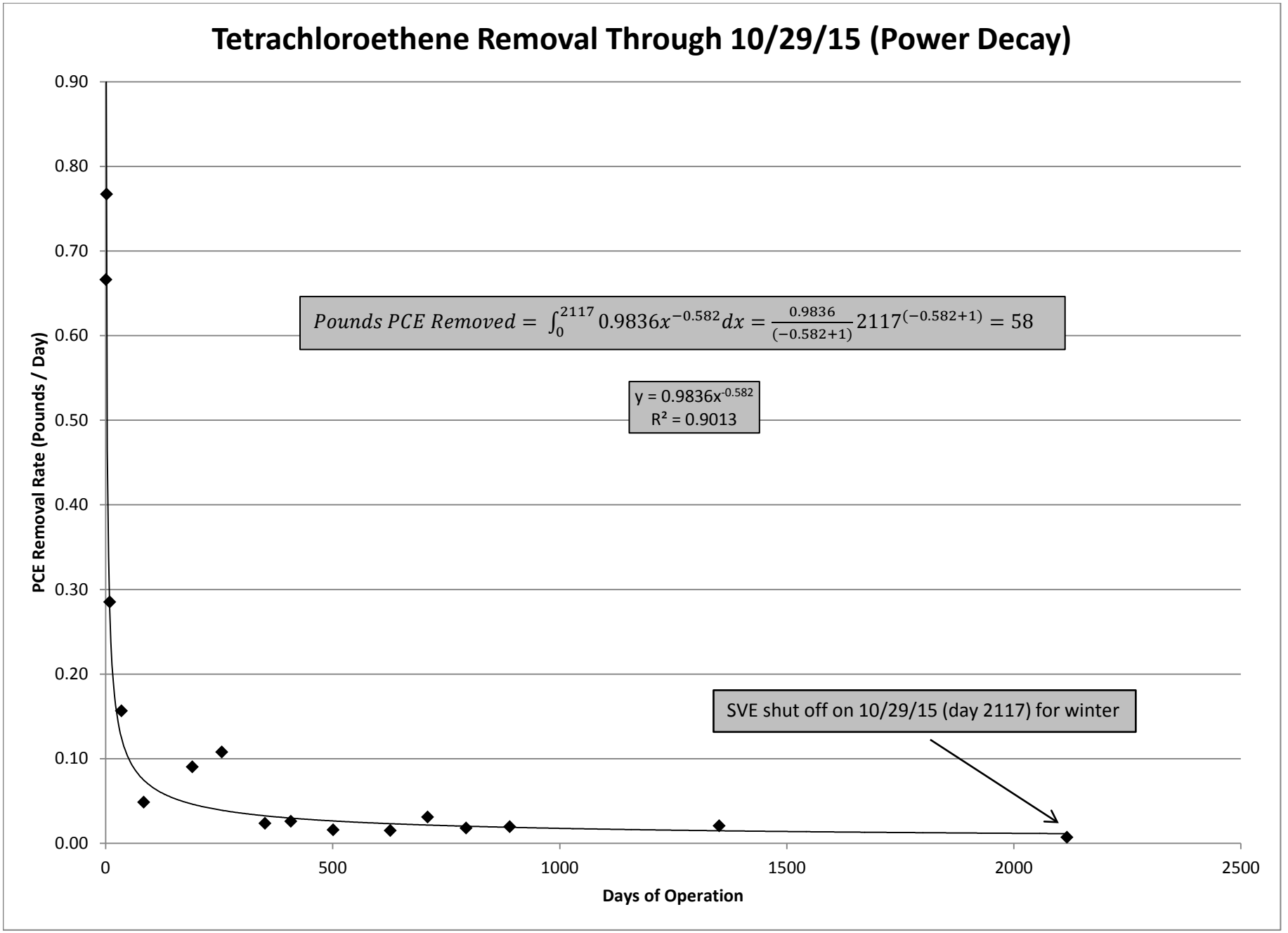
Notes: SSD = Sub-Slab Depressurization, SVE = Soil Vapor Extraction, PCE = Tetrachloroethene, cfm = cubic feet per minute, $\mu g/m^3$ = micrograms per cubic minute, lbs = pounds

Concentrations are assumed to be steady state.

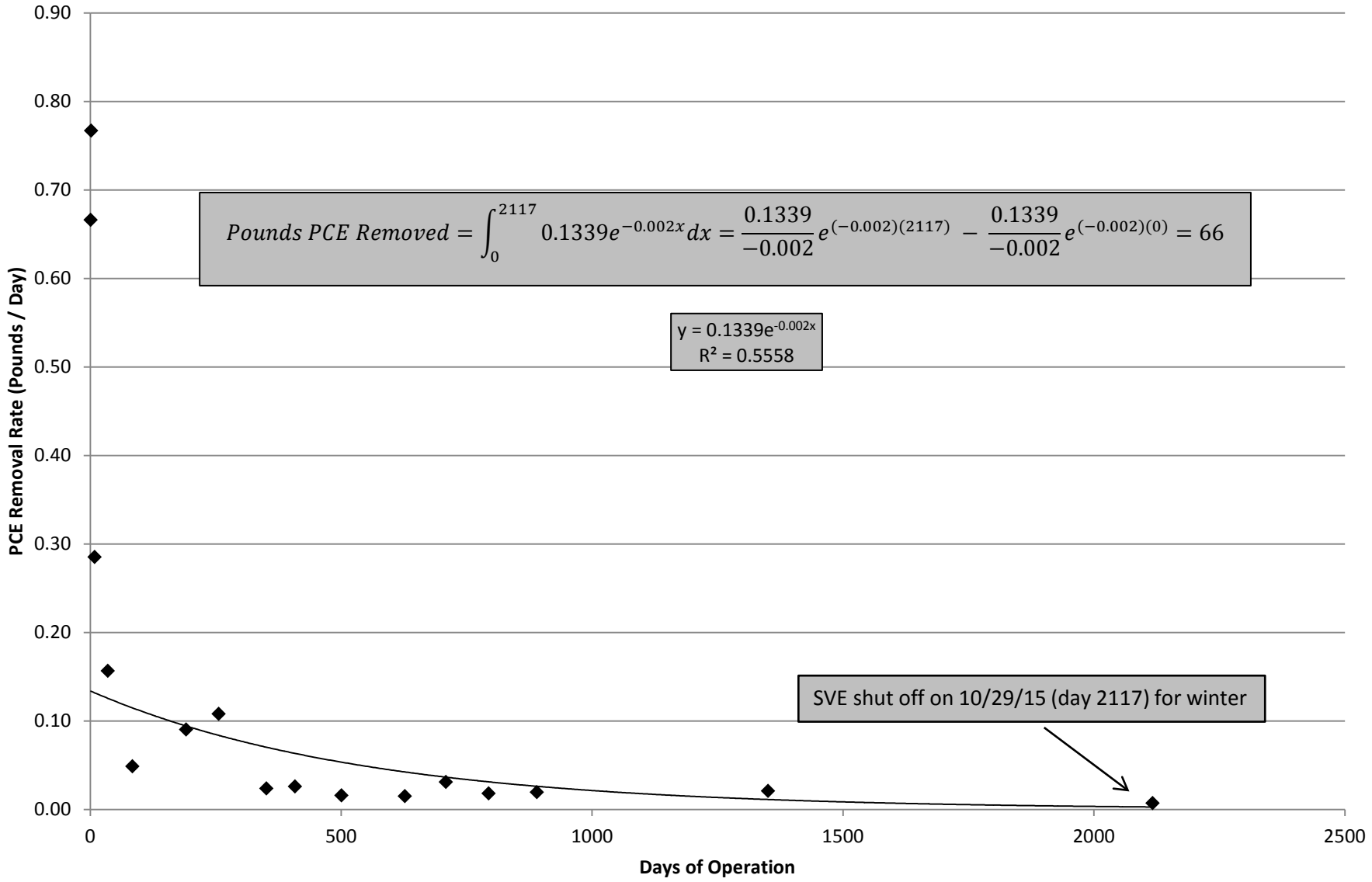
Prior to 9/23/13, calculations assume SVE blower ran continuously. After 9/23/13, the SVE hourmeter was used in calculations as pulsing and rebound testing occurred frequently.

The SSD exhaust concentrations on 9/23/13 and 10/29/15 are assumed to be 1/3 of the rebound SSD concentration on 9/23/16.

The SVE exhaust concentration on 9/23/13 is assumed to be the same as the steady state concentration measured on 10/29/15.


Tetrachloroethene Removal Through 10/29/15 (Power Decay)
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
PCE Removal Rate (Pounds / Day)
$Pounds\ PCE\ Removed = \int_0^{2117} 0.9836x^{-0.582}dx = \frac{0.9836}{(-0.582+1)}2117^{(-0.582+1)} = 58$
y = 0.9836x-0.582
R² = 0.9013
SVE shut off on 10/29/15 (day 2117) for winter
0
500
1000
1500
2000
2500
Days of Operation

Tetrachloroethene Removal Through 10/29/15 (Exponential Decay)



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APPENDIX K

GAFFNEY ROAD SITE GIS/ACCESS DATABASE SUMMARY

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Ahtna Engineering Services, LLC
110 E 38th Ave, Suite 200
Anchorage, AK 99503
www.ahtnaes.com

Phone: 907.646.2969
Fax: 907.561.5475

Design-Build • Construction • Environmental • Staff Augmentation

SBA Certified ANC 8(a)

June 22, 2016

Mr. Dennis Harwood
ADEC Division of Spill Prevention and Response
Response Fund Administration Program
Contract Management Section
555 Cordova Street
Anchorage, AK 99501

Subject: Gaffney Road Site GIS/Access Database Summary

Dear Mr. Harwood:

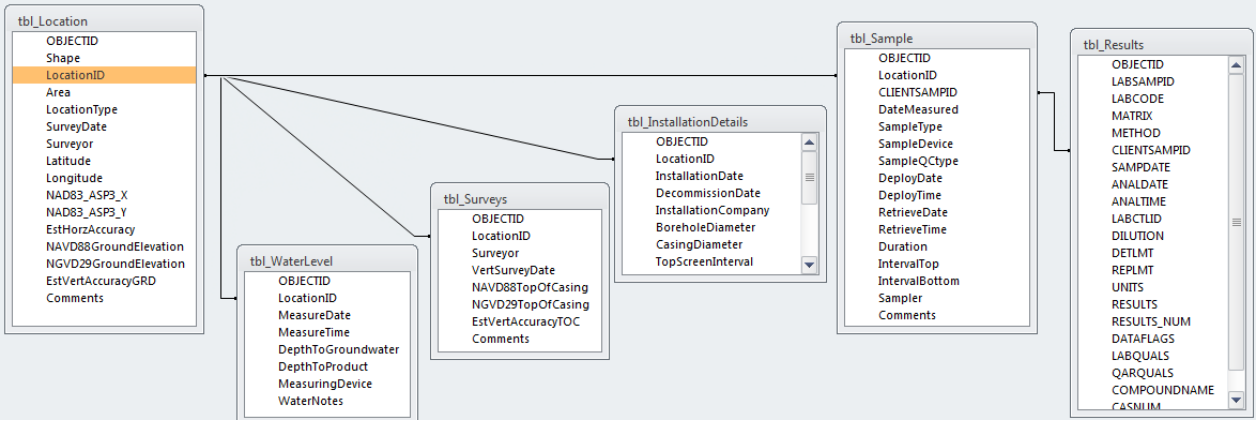
Ahtna Engineering Services (AES) is providing this GIS/Access Database to Alaska Department of Environmental Conservation (ADEC) for the above referenced project. The database contains data obtained between 1997 and 2015. This letter presents more specific information related to the database structure, valid values, metadata, and content.

Structure

The database is constructed of several tables and a series of queries designed to group and present data. The six tables that contain the data are: tbl_InstallationDetails, tbl_Location, tbl_Sample, tbl_Surveys, tbl_Results, and tbl_WaterLevel. The tbl_ValidValueList contains descriptions of the coded values used in the tables. The remaining tables (GDB tables, tbl_Location_Shape_Index, Selection, and SelectedObjects) contain spatial data that is used by the GIS software.

The location table (tbl_Location) assigns a unique identification number to each location where environmental information has been collected. The table also includes location type (e.g. monitoring well, indoor air, etc.), area (East or West), and coordinates (in Alaska State Plane Coordinate System, Zone 3, North American Datum 1983). The LocationID field is linked to four other tables (tbl_InstallationDetails, tbl_Sample, tbl_Surveys, and tbl_WaterLevel). The sample table (tbl_Sample) is then linked to tbl_Results, through the CLIENTSAMPID field. Each LocationID must be in tbl_Location once, but may be in the other tables multiple times. Each CLIENTSAMPID must be in tbl_Sample once, but may be in tbl_Results multiple times. Figure 1 displays a diagram that demonstrates the links between tables.

FIGURE 1: DATABASE RELATIONSHIP DIAGRAM



Each sample that has been collected at the site is included once in tbl_Sample. The results of these samples are in tbl_Results. As mentioned before, these tables are connected via the CLIENTSAMPID, which is a unique identification number given to each sample. Each CLIENTSAMPID will be in tbl_Sample once, but in tbl_Results many times. In addition to the parameter, unit, and result, the results table also includes any data qualifiers (LABQUALS and QARQUALS).

The relationships created in MS Access are mirrored in GIS as Geodatabase Relationship Classes, which require an ArcMap Standard or Advanced license to edit. When viewed in ArcMap, these relationships allow the user to view all information present in the database that has been linked to the specific location ID mapped.

Valid Values

The data within the tables has been standardized where possible to allow items to be grouped, filtered, and sorted by these specific fields. The list of these standardized values is available in tbl_ValidValueList. This table can be filtered and sorted to identify which values are permissible given a specific field.

Metadata

Metadata is provided for both the Access and GIS components of the database. The metadata describes the type of information contained in the various fields and include units where required. Metadata can be viewed in Access by opening a table in design view. Design view provides the data type and a description for each field in the table. GIS metadata has been included for all features, data tables, and the geodatabase itself. It contains information on data sources, development, spatial attributes, terms & conditions of use, and contact information.

Content

The Gaffney Road Site GIS/Access Database contains information collected since 1997 at the site. Data collected in SFY 2016 was added to an existing database. The following information is a description of the types of data that have been collected and compiled into the database.

When available, installation information for a permanent location, such as a monitoring well) is provided in tbl_InstallationDetails. The information present includes installation date, company, and specifics related to the installation, such as diameters, depths, and screened intervals for a monitoring well. Similarly, some permanent installations have been professionally surveyed to obtain accurate elevation data. This information is presented in tbl_Surveys.

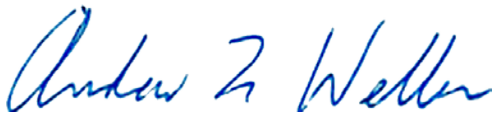
Water level data as collected in 2010 and 2012 through 2014. The data is presented is the depth to groundwater in a well at the specified date and time. The number given is the measurement from the top of the well casing to the groundwater

The samples (tbl_Samples and tbl_Results) that have been collected include groundwater, soil, and various air samples (indoor, outdoor, soil gas, etc.). Locations that are classified as "Visually Located on Orthophoto" were located using a combination of field notes and aerial imagery. These locations should be considered accurate within 2-3 meters, and not used for spatial analyses.

If you have any questions, please contact Andrew Weller (aweller@ahtna.net) or Sam Fox (sfox@geosyntec.com).

Sincerely,

Ahtna Engineering Services, LLC



Andrew Weller, PE
Ahtna Engineering Services, LLC
Project Engineer

Sam Fox
Geosyntec Consultants
Staff Engineer

Attachments:
1. Summary of Tables: Gaffney Road Site GIS/Access Database

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ATTACHMENT 1 SUMMARY OF TABLES: GAFFNEY ROAD SITE GIS/ACCESS DATABASE

Table	Field Names	Contents
tbl_InstallationDetails	Location ID (LocationID) Installation Date (InstallationDate) Decommission Date (DecommissionDate) Installation Company (InstallationCompany) Borehole Diameter (BoreholeDiameter) Casing Diameter (CasingDiameter) Top Screen Interval (TopScreenInterval) Total Depth (TotalDepth) Sump (Sump) Surface Completion Type (SurfaceCompletionType) Screen Slot Size (ScreenSlotSize) Screen Material (ScreenMaterial) Riser Material (RiserMaterial) Notes (Notes)	Installation information on locations where permanent installations were completed.
tbl_Location	Shape (Shape) – Used by GIS Location ID (LocationID) Area (Area) Location type (LocationType) Survey Date (SurveyData) Surveyor (Surveyor) Decimal degrees (Latitude and Longitude) North American Datum 1983, Alaska State Plane Coordinate System, Zone 3 in feet, easting and northing (NAD83_ASP_X and NAD83_ASP_Y) Ground surface elevation at location in relation to NAVD88 datum in feet (NAVD88GroundElevation) Ground surface elevation at location in relation to NGVD29 datum in feet (NGVD29GroundElevation) Accuracy (EstHorzAccuracy and EstVertAccuracyGRD) Comments (Comments)	Assigns a unique ID number to locations where environmental information has been obtained. The LocationID field is linked to the LocationID fields of tbl_InstallationDetails, tbl_Sample, tbl_Surveys, and tbl_WaterLevel
tbl_Results	Lab sample identification number (LABSAMPID) Lab identifier (LABCODE) Sample matrix (MATRIX) Analytical/Test Method (METHOD) Sample identification number (CLIENTSAMPID) Sample collection date (SAMPDATE) Sample analysis date (ANALDATE) Sample analysis time (ANALTIME) Laboratory control ID or batch number (LABCTLID) Sample dilution prior to analysis (DILUTION) Method detection limit (DETLMT)	Contains information about how a sample was analyzed (e.g., the analytical method used), method reporting limits and additional lab information, as well as results and data flags. This table contains results obtained in the lab and in the field.

	Method report limit or PQL (REPLMT) Units (UNITS) Results as text (RESULTS) Results as number (RESULTS_NUM) Data qualifiers – historical data (DATAFLAGS) Data qualifiers assigned by lab (LABQUALS) Data qualifiers assigned by third party (QARQUALS) Compound Name (COMPOUNDNAME) CAS Number(CASNUM) Comments (COMMENTS)	
tbl_Sample	Location ID (LocationID) Sample identification number (CLIENTSAMPID) Date sampled or measured (DateMeasured) Type of sample (SampleType) Device used to collect or test sample (SampleDevice) Type of sample for quality control (SampleQCType) Sample collection start date (DeployDate) Sample collection start time (DeployTime) Sample collection end date (RetrieveDate) Sample collection end time (RetrieveTime) Duration of sample collection (Duration) Top of sample interval (IntervalTop) Bottom of sample interval (IntervalBottom) Personnel collecting sample (Sampler) Comments (Comments)	Contains information on sampled collected from the site. Defines samples by location, date, collection method, and collecting personnel. The table also includes identification of primary or duplicate samples.
tbl_Surveys	Location ID (LocationID) Surveyor (Surveyor) Date of elevation survey (VertSurveyDate) Top of caing elevation in relation to the NAVD88 datum in feet (NAVD88TopOfCassing) Top of caing elevation in relation to the NGVD29 datum in feet (NGVD29TopOfCassing) Estimated vertical accuracy of top of cading in feet (EstVertAccuracyTOV) Comments (Comments)	Contains information on locations were professional surveys have been performed.
tbl_WaterLevel	Location ID (LocationID) Date of measurement (MeasureDate) Time of measurement (MeasureTime) Depth in feet to groundwater below top of well casing (DepthToGroundwater) Depth in feet to product below top of well casing (DepthToProduct) Deviced used to measure depth (MeasuringDevice) Notes (WaterNotes)	Contains information on the groundwater depth collected from a particular location