SFY 2016

Vapor Intrusion Assessment and SSD/SVE System OM&M Work Plan

314 Wendell Avenue

FINAL

August 2015

ERM Project # 0227323

Prepared By: ______________________

Cody Black, PE
Project Manager

Reviewed By: ______________________

Max Schwenne
Partner

ERM Alaska, Inc.
825 West 8th Avenue
Anchorage, Alaska 99501
T: (907) 258-4880
F: (907) 258-4033

- Page Intentionally Left Blank -

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

%...................... percent
µg/L................ micrograms per liter
µg/m³ .... micrograms per cubic meter
AAC................ Alaska Administrative Code
ADEC .... Alaska Department of Environmental Conservation
AOC................ Area of Accumulation
bgs................... below ground surface
CAA................ central accumulation area
cDCE.............. *cis*-1,2-dichloroethene
COPC............. contaminant of potential concern
CRMP .... Chena River Monitoring Program
CSM .... conceptual site model
DCE................ dichloroethene
ERM .... ERM Alaska, Inc.
ESL .... ES Laundromat
FNACS .... Fairbanks Native Association Community Services
GCL................ groundwater cleanup levels
HS.................... Hannah Solomon
IDW .... investigation derived waste
inWC.............. inches of water column
mL\min.......... milliliters per minute
OM&M........... operation, maintenance, and monitoring
PCE .... tetrachloroethene
PPE.................. personal protective equipment
QA/QC .... Quality Assurance/Quality Control
RAO .... remedial action objective
RCRA............. Resource Conservation and Recovery Act
SAA................ Satellite Accumulation Area
SCL.................. soil cleanup levels
SFY .... State Fiscal Year
SSD.................. sub-slab depressurization
SVE.................. soil vapor extraction
TCE .... trichloroethene
tDCE *trans*-1,2-dichloroethene
USEPA............ United States Environmental Protection Agency
VC .... vinyl chloride
VI..................... vapor intrusion
VMP............... vapor monitoring point

- Page Intentionally Left Blank -

1. INTRODUCTION

ERM Alaska, Inc. (ERM) has prepared this work plan on behalf of the Alaska Department of Environmental Conservation (ADEC) to conduct vapor intrusion (VI) assessment sampling and operation, maintenance and monitoring (OM&M) of the sub-slab depressurization (SSD) and soil vapor extraction (SVE) system at the ES Laundromat (ESL) building located at 314 Wendell Avenue, Fairbanks, Alaska. The scope of fieldwork described in this work plan is to be performed between July 2015 and June 2016. This work plan provides a description of the project objectives, project background, regulatory framework, conceptual site model (CSM), work to be performed, methodology, quality assurance (QA) and quality control (QC) plans, and a project schedule.

1.1. Project Objectives

Efforts to mitigate VI and to remediate vadose zone impacts in the chlorinated ethene source area at ESL have been performed since 2011. These efforts have resulted in mitigation of chlorinated ethene concentrations in indoor air and in soil gas beneath the building to below Alaska Department of Environmental Conservation (ADEC) target levels for commercial exposure. Findings from the initial site characterization efforts beginning in 2002 suggest that several properties near ESL along the former sewer utility line require an updated assessment to understand the current potential for VI. Therefore, the scope of activities for State Fiscal Year (SFY) 2016 includes conducting a broad soil gas sampling program, OM&M of the SSD/SVE system, and a long-term shutdown test of the SSD/SVE system.

This work plan describes the methods by which soil gas sampling is approached, SSD/SVE system OM&M will be conducted, and the long-term SSD/SVE system shutdown will be performed. The objectives of soil gas sampling, OM&M, and shutdown work scope contracted to ERM for SFY 2016 are listed below:

- assess the extent of potential vapor intrusion risk at locations along the former sewer line utility for comparison with ADEC VI target levels;
- operate, maintain, and monitor operation of the SSD/SVE system; and
- compare soil gas contaminants of potential concern (COPC) concentrations to targets after a 6-month shutdown test of the SSD/SVE system.

1.2. Project Background

1.2.1. Environmental Setting

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. The Chena Alluvium is characterized by well-stratified layers of unconsolidated coarse sand and gravel, inter-bedded 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 feet 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. Where present, permafrost ranges in depth from 2 to 40 feet 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 in localized areas from seasonal frosts. Also, where discontinuous permafrost is present, confined conditions may exist in subpermafrost 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 the stages of the Tanana and Chena rivers. The Tanana River is primarily glacial-fed and is generally at its highest during peak summer, whereas the Chena River is generally at its highest during spring snowmelt and late-summer precipitation.

1.2.2. Previous Site Work

Investigation and characterization efforts have been conducted at the Site since 2001. Soil and groundwater characterization has continued since the initial investigations in 2008 in the vicinity of 314 Wendell Avenue. The horizontal and vertical extent of groundwater contamination was generally delineated between 2008 and 2010. These investigations have identified tetrachloroethylene (PCE) and its degradation products, trichloroethylene (TCE) and *cis*-1, 2-dichloroethylene (cDCE), in groundwater at concentrations above the ADEC GCL (Table 1) (OASIS 2009). During additional characterization activities in October 2009, April 2010 and June 2010, monitoring wells were installed at several depth intervals between the Wendell Avenue Site and the Chena River to characterize the groundwater plume horizontally and vertically (OASIS 2010a). Shallow ("S") wells are screened across the water table from approximately 10 to 15 feet or 20 feet below ground surface (bgs); medium ("M") wells are screened from approximately 20 to 30 feet bgs, and deep ("D") wells are screened from 35 to 40 feet bgs. Porewater samples were collected from the Chena River bank adjacent to the Wendell Avenue Site.

A detailed summary of the October 2008 through June 2010 characterization activities is presented in the Chena River Monitoring Plan (CRMP) (OASIS 2010b). Conclusions from the CRMP are briefly summarized in this section.

The source area is located near the ESL Building (Figure 2); the highest levels of groundwater contamination have historically been detected immediately west of ESL, at a maximum PCE concentration of 13,000 micrograms per liter (µg/L) in the shallow groundwater. Deeper samples exhibited only low levels of contamination, suggesting no evidence of a deep source. Three source area medium depth wells (25 to 30 feet bgs) results indicate that groundwater COPC contamination is primarily in the smear zone in the core of the source area. The primary contaminant in is PCE, with relatively lower concentrations of TCE and DCE.

In addition to the source area, PCE and TCE were detected in a 2002 soil gas investigation along the former sewer line to the east along Wendell Avenue. Several of the 2002 soil gas results exceeded the ADEC target levels for PCE and TCE. Some of these exceedances were located east of Dunkel Street.

The groundwater plume extends from the source area to the Chena River; however, the plume expands downward as it moves towards the river. Elevated contaminant concentrations were detected in shallow, medium and deep wells nearer the river, suggesting that contamination extends from near the water table to approximately 40 feet bgs.

Overall, these results indicate that the PCE is being degraded to DCE as it migrates across the Site. As groundwater approaches the Chena River, a majority of the PCE has been degraded to DCE. TCE has occasionally been detected in porewater samples and was above the GCL on one occasion. The further degradation of DCE to vinyl chloride (VC) and ethene has not been observed near the Chena River. Trend analyses performed for wells along the plume centerline indicate that the plume is declining to stable in the source area; and is stable near the Chena River.

A SSD/SVE system was installed to mitigate VI into the ESL Building and remediate vadose zone soil in the source area around the ESL Building. The SSD/SVE system consists of six SSD wells, five SVE wells, a network of sub-slab soil gas and soil gas VMPs and an SSD/SVE system enclosure. Findings from the SFY 2012 Wendell Avenue Site project indicate that the SSD/SVE system is effectively remediating the vadose zone at the Site. Vadose zone soil gas samples collected from the treatment area have decreased during system operation. SSD/SVE system exhaust stack PCE concentrations have decreased and become asymptotic during system operation. Results of periodic shutdown tests conducted in 2012 and 2014 indicate that soil gas COPC concentrations are at least an order-of-magnitude lower than pre-remediation concentrations.

1.3. Regulatory Framework

The primary COPCs at 314 Wendell Avenue Site are PCE and its potential degradation products TCE; 1, 1-DCE; cDCE; *trans*-1,2-dichlorehylene (tDCE); and VC. A regulatory framework for this project has been developed using the following regulations and guidance documents:

- ADEC, 18 Alaska Administrative Code (AAC) 75, Oil and Other Hazardous Substances Pollution Control, Revised as of 15 June 2015 (ADEC 2015);
- Vapor Intrusion Guidance for Contaminated Sites, October 2012 (ADEC 2012a).

Table 1 presents the maximum concentrations of COPCs detected in groundwater at the Site, the source area remedial action objectives (RAO) for active remediation, and the GCLs applicable to the Wendell Avenue Site to be achieved by monitored natural attenuation following active remediation.

TABLE 1: CONTAMINANTS OF POTENTIAL CONCERN

Compound	Maximum Groundwater Detection (µg/L), Location and Date	Groundwater VI Target Levels or Groundwater RAOs (µg/L) (ADEC 2012a)	Sub-Slab/Shallow Soil Gas VI Target Levels or Vadose Zone RAOs (µg/m^3) (ADEC 2012a)	Groundwater Cleanup Levels 18 AAC 75.345, Table C (µg /L)
PCE	13,000 (MW-8S) [10/2008]	240	1,800	5
TCE*	610 (MW-8S) [10/2010]	22	88	5
1,1-DCE	1.14 (PP-1) [7/2002]	820	8800	7
cDCE	800 (MW-8S) [5/2011]	180	310	70
tDCE	82 (PP-1) [10/2008]	1,580	2600	100
VC	ND	2.5	280	2

* - The TCE ADEC VI target levels and GCLs are expected to be lowered in response to IRIS Toxicity Profile for Trichloroethylene (United States Environmental Protection Agency ([USEPA] 2011)
µg/m^3 - microgram per cubic meter
ND – not detected

1.4. Conceptual Site Model

The current human health CSM scoping and graphical forms prepared for the Wendell Avenue Site are presented in Appendix A. The CSM is based on the following discussion of exposure media and routes. In late 2012, the ESL owners closed the business. However, the closing of ESL did not result in changes to the CSM.

1.4.1. Incidental Soil Ingestion

Historical soil sampling conducted in the Wendell Avenue Site area has shown concentrations of chlorinated ethenes exceeding soil cleanup levels (SCLs) listed in 18 AAC 75.341, Table B1, under 40-inch zone for soil between 0 and 15 feet bgs. Potential receptors to contamination from the incidental soil ingestion exposure route include:

- current and future residents;
- current and future commercial or industrial workers;
- current and future Site visitors, trespassers or recreational users; and
- current and future construction workers.

1.4.2. Ingestion of Groundwater

Historical groundwater sampling conducted in the Wendell Avenue Site area has shown concentrations of chlorinated ethenes exceeding the GCLs listed in 18 AAC 75.345, Table C. Although the shallow groundwater at the Wendell Avenue Site is not used as a source of drinking water, all groundwater in Alaska is considered a potential drinking water source unless determined otherwise using the criteria presented in 18 AAC 75.350. No groundwater determination has been completed for this Site under 18 AAC 75.350. There are no institutional controls currently in place to restrict or prevent the installation of a drinking water well. In addition, the municipal wells operated by Golden Heart Utilities are located approximately 1 kilometer in a cross gradient or upgradient direction from the Wendell Avenue Site. Potential receptors to contamination from the ingestion of groundwater exposure route include:

- current and future residents;
- current and future commercial or industrial workers;
- current and future Site visitors, trespassers or recreational users; and
- current and future construction workers.

1.4.3. Inhalation of Outdoor and Indoor Air

Historical soil sampling conducted at the Wendell Avenue Site area has shown concentrations of chlorinated ethenes exceeding the SCLs for soil between 0 and 15 feet bgs. VI sampling at the ESL Building and the Fairbanks Native Association Community Services has shown concentrations of chlorinated ethenes in sub-slab soil gas samples exceeding the target levels for shallow or sub-slab soil gas. VI sampling has also shown concentrations of chlorinated ethenes in indoor air at the ESL Building, exceeding the ADEC target levels for indoor air. Operation of the SSD system has reduced sub-slab and indoor air concentrations of chlorinated ethenes in the ESL Building to below the ADEC target levels. However, continued monitoring will be needed to confirm that concentrations are consistently below target levels under differing operational scenarios. Potential receptors to contamination from the inhalation of outdoor and indoor air exposure routes include:

- current and future residents;
- current and future commercial or industrial workers;
- current and future Site visitors, trespassers or recreational users; and

- current and future construction workers.

1.4.4. *Inhalation of Volatile Compounds in Tap Water*

The presence of pumping wells in the Wendell Avenue Site area has not been determined. Therefore, it is assumed that they exist and could be used for indoor household purposes. Additionally, chlorinated ethenes for the Wendell Avenue Site are volatile. Potential receptors to contamination from the inhalation of volatile compounds in tap water exposure route include:

- current and future residents;
- current and future commercial or industrial workers;
- current and future Site visitors, trespassers or recreational users; and
- current and future construction workers.

1.4.5. *Surface Water/Sediment*

Groundwater sampling conducted at the Wendell Avenue Site and porewater sampling conducted on the south bank of the Chena River indicate that some chlorinated ethenes are present in groundwater that is hydrologically connected to the Chena River at concentrations exceeding a screening level of 1/10th the GCLs. Sediment samples collected from the Chena River bed contained concentrations of some chlorinated ethenes, exceeding screening benchmark values. Therefore, ingestion of surface water and direct contact with sediment are considered complete exposure routes. Potential receptors to contamination from the ingestion of surface water and direct contact with sediment exposure routes include:

- current and future residents;
- current and future commercial or industrial workers;
- current and future Site visitors, trespassers or recreational users; and
- current and future construction workers.

1.4.6. *Dermal Adsorption of Contaminants from Soil/Surface Water*

The COPCs at the Wendell Avenue Site have a limited potential for adsorption through the skin and are not listed in Appendix B of Policy Guidance on Developing Conceptual Site Models (ADEC 2010a). Therefore, the dermal adsorption exposure routes are not considered complete.

1.4.7. *Ingestion of Wild and Farmed Foods*

The COPCs at the Wendell Avenue Site have a limited potential to bioaccumulate and are not listed in Appendix C of Policy Guidance on Developing Conceptual Site Models (ADEC 2010a). Therefore, the ingestion of wild and farmed foods exposure route is not considered complete.

2. SCOPE OF WORK

The SFY 2016 scope of work will include the installation of vapor monitoring points (VMPs), collection of soil gas samples, performing OM&M of the SSD/SVE system, and conducting a long-term SSD/SVE system shutdown. Soil gas sampling will be conducted from VMPs installed under this project and existing sub-slab and soil gas VMPs. Soil gas sampling will be conducted to assess the extents of VI risk in the vicinity of ESL, to assess mitigation and remediation performance, and to determine the steady-state COPC concentrations in soil gas without active mitigation/remediation.

2.1. Installation of VMPs

Soil gas VMPs will be installed at five locations in the vicinity of ESL. Soil gas VMPs will be installed at the following locations:

- SG-20 - 136 Dunkel Street
- SG-21 -141 Dunkel Street
- SG-22 - near the Fairbanks Native Association (FNA) Hannah Solomon (HS) Building at 317 Wendell Avenue.
- SG-23 - 302 Wendell Avenue
- SG-24 - 312 Wendell Avenue

Proposed VMPs are shown in Figure 2. Final VMP locations will be dependent on underground utility locations and property access agreements.

The soil gas VMPs will be installed in borings advanced to a depth of 8 bgs using a vacuum truck and air knife to avoid utility strikes. Groundwater is not expected at that depth. A 6-inch diameter boring will be advanced to 8 feet bgs. A 3/8-inch diameter, 6-inch long, stainless-steel soil gas screen connected to ¼-inch nylon tubing will extend to the ground surface. The screen will be bedded in silica sand between 8.0 and 7.0 feet bgs. A minimum 1-foot thick bentonite seal will be placed in the boring above the sand pack. The bentonite seal will consist of an initial layer of bentonite chips covered by a thicker layer of bentonite slurry. The soil gas VMP will be completed in an 8-inch diameter steel monument. The monument will be finished with either soil, asphalt, or cement to match the surrounding surface material. It is expected that the boring will remain open during VMP installation, however, appropriate measures will be taken if the boring begins to close in.

Following placement of the sand pack and bentonite seal, the remainder of the boring will be backfilled with material removed. All excess material from the boring will be placed into a 55-gallon steel drum for proper disposal as described in Section 3.5.

2.1.1. *Property Access Agreements, Utility Locates and Permits*

Property access agreements, completion of a thorough utility locate process, and all City of Fairbanks permits will be in place prior to installation of VMPs. ADEC will assist with property access agreements. If an access agreement is not reached, the VMP may be relocated following discussion with ADEC project manager.

Underground utility locates will be performed using any available information, the Alaska Digline, as well as a third party utility locate contractor. If any final VMP is located in the roadway, a traffic control plan will be prepared and City of Fairbanks permits obtained.

2.2. Soil Gas Sampling

Soil gas sampling will be conducted at selected locations associated with the ESL building and surrounding area. Soil gas samples will be collected at three times during this project as outlined in the SFY 2016 Sample Summary presented as Table 2. Soil gas samples will be collected from VMPs using 30-minute flow controllers, a leak detection hood, and Summa® canisters. The laboratory analysis of soil gas samples is discussed in Section 3.6. Samples will be collected from soil gas and sub-slab VMPs as described in the following sections.

TABLE 2: SAMPLE SUMMARY

Anticipated Sampling Event Date and Objective	Building or Address	SSD/SVE System Operational Status	Sample Locations	Sample Type(s)	Purpose
September 2015 OM&M Sampling	ESL	SSD/SVE System on	RS-1	Exhaust Stack	Sample during SSD/SVE system operation from exhaust stack to monitor trend in contaminant removal. Sample will be collected just prior to shutdown.
October 2015 Investigation Sampling - Soil Gas Plume Extents	136 Dunkel	SSD/SVE System Shutdown	SG-20* and duplicate	Deep Soil Gas	Sampling will follow SSD/SVE system shutdown in September 2015 and one month of equilibration of newly installed VMPs. Soil gas results from these locations will determine limits of vapor intrusion risk associated with impacts resulting from potential discharges to the subsurface from the sewer line. Subsurface work conducted in fall with thawed soil conditions to reduce cost of utility avoidance and boring advancement.
	414 Dunkel		SG-21*	Deep Soil Gas	
	302 Wendell		SG-23*	Deep Soil Gas	
March 2016 OM&M and VI Assessment Sampling	ESL	SSD/SVE System Shutdown	SS-4 and duplicate & SG-3 @ 8 ft. bgs.	Sub-Slab Soil Gas and Deep Soil Gas	Sample soil gas within potential influence of the SSD/SVE system after a 6-month shutdown test to assess steady-state extent and magnitude of PCE and TCE soil gas plume. Results will determine limits of VI risk at building located within and adjacent to the source area when active treatment is not being performed.
	330 Wendell		SG-2 @ 8 ft. bgs.	Deep Soil Gas	
	312 Wendell		SG-24*	Deep Soil Gas	
	HS		SG-22*	Deep Soil Gas	
	FNACS		SS-1 & SS-2	Sub-Slab Soil Gas	
June 2016 VI Assessment Sampling	ESL	SSD/SVE System on	SS-4 and duplicate	Sub-Slab Soil Gas	Sample soil gas beneath ESL and in the exhaust stack to assess effectiveness of mitigation/remediation in source area and for comparison with previous active treatment samples to evaluate trends in contaminant reduction at the site.
	ESL		RS-1	Exhaust Stack	

*denotes proposed VMP installed in 2015

- Page Intentionally Left Blank -

2.2.1. *Soil Gas Sampling Procedure*

All sampling materials received from the lab will be inspected upon arrival to determine if the appropriate equipment has been provided and that all Summa® canisters have a minimum vacuum of 25 inches of mercury (inHg). Initial vacuum will be measured before sample collection using a high-quality gauge and will be recorded in the log book, on the tag accompanying the each canister, and on chain-of-custody (COC).

In the field, the initial step at each VMP is to check the differential pressure between the surface and sub-surface by connecting a digital manometer accurate to 0.001 inches water column (inWC) to the sub-slab monitoring point and recording the pressure/vacuum difference.

The next step involves leak detection for the sub-slab monitoring point. This process involves testing both the sample manifold and the sub-slab monitoring point for integrity. Figure 4 shows a schematic of a sub-slab sampling train. The following procedure will be used for conducting the manifold leak check:

- Check the initial vacuum in the Summa® canister that will be used for the sample. Ensure the Summa® canister valve remains closed unless sampling.
- Connect the sub-slab probe to the fitting under the leak detection hood using Teflon® tubing and Swagelok® compression-style fittings.
- Close the monitoring point valve under the hood.
- Remove the Summa® canister brass cap and attach the certified flow controller.
- Attach the manifold with vacuum gauge to the flow controller.
- Connect the leak detection hood to the manifold port without the pump valve using Teflon® tubing and Swagelok® compression-style fittings.
- Connect the pump valve side of the manifold to a peristaltic pump using polyethylene tubing.
- Use the peristaltic pump to pull a vacuum of approximately 15 inHg on the vacuum gauge. Vacuum will also be displayed on the flow controller.
- Close the pump valve and disconnect the tubing from the peristaltic pump.
- Verify the manifold maintains a steady vacuum. If the vacuum in the manifold does not decrease after one minute, then the manifold is considered leak-free. However, if the vacuum is decreasing in the manifold, check each connection and perform the manifold leak check again.

At this point, it is ensured that leaks do not exist between the Summa® canister valve and the monitoring point valve. A helium leak check will now be performed to ensure the integrity of the sub-slab probe seal and fittings between the probe and the monitoring point valve. The following process will be used for the helium leak check:

- Release the vacuum by opening the pump valve.
- Reconnect the tubing to the peristaltic pump.
- Connect the peristaltic pump to the rotameter using polyethylene tubing.
- Open the monitoring pump valve under the leak detection hood.
- Turn on the helium detector, let it complete the startup process, and connect it to one of the leak detection hood ports using polyethylene tubing.
- Connect the helium source to the other leak detection hood port using polyethylene tubing.
- Apply helium gas to the leak detection hood until 75 percent (%) helium concentration is displayed on the helium detector.
- Turn on the peristaltic pump. Verify that the flow rate is 200 milliliters per minute (mL/min) using the rotameter. Let it purge for 1 minute.
- After 1 minute, connect a Tedlar® bag to the rotameter outlet. Collect a sample in the Tedlar® bag for 10 minutes at 200 mL/min.
- Maintain a constant helium concentration of 75% in the hood during the 10-minute purge. Make a note in the field logbook if any vacuum is displayed while purging.
- At the completion of the purge, analyze the helium concentration of the air in the Tedlar® bag. A reading of less than 10% of the helium concentration measured in the leak detection hood is considered a successful leak check. A reading of more than 10% requires a re-test. Check the tightness of the under hood fittings. Hydrated bentonite may be applied around the sub-slab probe to provide an additional seal.
- Lastly, measure oxygen, carbon dioxide and total volatile hydrocarbons concentration in the Tedlar® bag using a multi-gas meter.

At this point, the sub-slab air sample may be collected. The following process will occur:

- Close the pump valve on the manifold and turn off the peristaltic pump.
- Open the valve on the Summa® canister and allow the canister to fill. Record the deployment date and time in the field book. Monitor the manifold vacuum gauge until the canister vacuum is reduced to 5 inHg or until 30 minutes have passed.
- Close the valve on the Summa® canister, disconnect the flow controller from the Summa® canister and replace the brass cap on the canister to reduce potential loss of vacuum. Record the final vacuum and retrieval date and time in the field book.

Prior to shipment of Summa® canisters to the laboratory, measure the final vacuum of each canister with a high quality gage to ensure a minimum 5 inHg remain. Record the final vacuum on the tag accompanying each canister and on the COC form. Complete the COC with all required information using the sample retrieval date and time.

2.3. SSD/SVE System OM&M

ERM will perform quarterly SSD/SVE system OM&M inspections at ESL. OM&M inspections will be performed to verify operational status in accordance with established operational goals. A complete description of the SSD/SVE system and the operational goals is presented in the Remediation System Installation Report (OASIS 2011).

The OM&M inspections begin with the completion of OM&M data sheets. The OM&M data sheets are completed by reading the system meters and gauges and using a micromanometer. At a minimum, the following parameters will be recorded:

- SSD and SVE blower hour meter readings;
- System alarm status;
- Flow rate and vacuum from each DW and SVE well;
- Total flow from the SSD system effluent;
- Manifold vacuum level;
- Blower exhaust temperature;
- Moisture separator fluid level; and
- Vacuum readings from selected VMPs (Figure 3).

Filling out the OM&M data sheets will prompt the operator to perform maintenance tasks and identify where performance targets are not being achieved. The system will be balanced during OM&M visits to maximize contaminant removal by adjusting individual well flow rates to operational goals. After any system adjustments are performed, the final system conditions will be documented on the OM&M data sheets. An OM&M data sheet template is included in Appendix B.

Two OM&M events will also include the collection of an air sample from the SSD/SVE system exhaust stack to measure concentrations of chlorinated ethenes in the SSD/SVE system effluent. Exhaust stack samples will be collected from the SSD/SVE system exhaust stack in September 2015 and June 2016. The exhaust stack samples will be collected to verify that emissions remain below regulatory thresholds triggering air quality concerns. The data from these samples will also verify that emissions continue to decline or remain at asymptotic levels. This data will be valuable for comparison with future results from rebound or shutdown testing of the SSD system.

2.4. SSD/SVE System Shutdown Test

A 6-month system shutdown test will be performed in SFY 2016 to assess the impacts of mitigation and remediation efforts since 2011. The shutdown test will be coordinated with soil gas efforts described in Section 2.2 to determine the degree to which system operation has decreased COPC concentrations below targets at steady-state soil gas conditions. The shutdown test will also provide information on whether system operation continues to mitigate VI at ESL and nearby properties.

The shutdown test will be accomplished by shutting down the SSD/SVE system in September 2015 and restarting the SVE portion of the system in March 2016. The SSD/SVE system blowers, control panel, and main service breaker will be shut down in September. In March 2016, the SVE portion of the system will be restarted. The March startup will begin with turning on the main service breaker and energizing the heat trace on the SVE lines. The SVE system will be restarted and balanced at least 24 hours after the heat trace lines have been energized. The SSD system will be restarted in late spring 2016 once seasonal freezing temperatures have passed.

2.5. Reporting

A data summary report from the SFY2016 activities will be prepared to include OM&M data sheets, field notes, laboratory analytical results, and a quality assurance review and completed ADEC data review checklists. The data summary report will be prepared following the final sample collection effort in June 2016.

3. QUALITY ASSURANCE AND QUALITY CONTROL

The VI assessment and SSD/SVE OM&M project will be performed in accordance with the QA/QC procedures presented in this section. ERM professional staff will manage and execute the elements of this work plan. Cody Black will be the project manager. Field efforts will be performed by several ERM engineers and scientists, each meeting the definition of "qualified person" as per 18 AAC 75.990(100).

3.1. Project Quality Assurance

Field personnel will collect samples in a manner that preserves the integrity of the sample matrix. Samplers will use certified sample media to prevent cross-contamination between samples. Sampling equipment will be dedicated to each sample location to the extent practical. Sample matrices will have minimal disturbance before collection. Sample containers will be sealed, labeled and preserved in accordance with the analytical method. All equipment will be calibrated, maintained and operated according to manufacturer recommendations.

3.2. Field Documentation

Field documentation will consist of the use of field logs, sample identification labels and photographs. A field logbook will be maintained by the ERM field team leader to record a description of field activities and samples collected. Corrections will be struck, initialed and dated. Information and observations relevant to monitoring activities will be recorded in the comments section of the appropriate forms and/or in the field logbook.

3.3. Sample Identification

Samples collected for laboratory analysis will be identified with a standard sample identification number format. Sample numbers will use the following format: 15-WAS-101-IA.

Where "15" represents the year; "WAS" represents "Wendell Avenue Site;" "101" is a sequential sample number; and "IA" is the designator for sample type. Possible sample types for this project are listed below.

- IA - indoor air
- SS - sub-slab air
- AA - ambient air
- SG - soil gas
- ES - exhaust stack air

3.4. Sample Handling

Samples will be tracked by the use of COC laboratory forms. Each sample will be individually identified on a COC form. These forms will include the sample identification number, sample retrieval date, sample retrieval time, initial vacuum, final vacuum, requested analysis, type and number of sample containers, QC information, and requested analytical turnaround time. Each form will be signed and dated on relinquishment to another party, be it the shipper, courier or laboratory to maintain the custody the samples.

3.5. Investigation-Derived Waste

PCE-contaminated soil at 314 Wendell Avenue is classified as Resource Conservation and Recovery Act (RCRA) F-listed hazardous waste. The site is considered a small quantity generator with identification number AKR000203042. IDW expected to be generated during OM&M of the SSD/SVE system includes personal protective equipment (PPE) and soil. Solid and liquid waste will be segregated. IDW generated at the site will be stored in sealed buckets in the Satellite Accumulation Area (SAA) in the equipment room of the SSD/SVE system enclosure or in 55-gallon steel drums in the Central Accumulation Area (CAA). Emerald Alaska will be contacted for manifesting and transporting the waste to an approved treatment, storage, and disposal (TSD) facility. Wastes should be removed from the CAA within 270 days from initial placement in the CAA. IDW drums in the CAA will be inspected weekly and inspections will be documented in the field log book.

PPE includes items such as nitrile gloves, sample materials such as tubing and colorimetric tubes, condensate, rotameter wash water, spent filter cartridges and filter cake. IDW in the SAA will be transferred to the CAA before 55 gallons are accumulated.

IDW will also include soil generated during installation of new VMPs. VMPs will be installed using a vacuum equipment and air knife techniques to avoid encounters with the multiple utilities in the area. Soil removed to install each VMP will be placed back into the boring, to the extent practicable, consistent with the Area of Contamination (AOC) policy of the USEPA. Remaining soil will be placed in a 55-gallon steel drum and stored in the Central Accumulation Area (CAA) until transport to the appropriate disposal facility.

3.6. Analytical Procedures

Soil gas samples will be analyzed using the EPA Methods TO-15 low-level. SSD exhaust stack samples will be analyzed using the EPA Method TO-15. Table 3 presents the analytical program for each sample type.

Table 4 presents the estimated reporting limits for each COPC. Sample analysis of soil gas and sub-slab soil gas samples will be performed by Eurofins/Air Toxics of Folsom, California.

TABLE 3: LABORATORY ANALYTICAL PROGRAM

Matrix	Analytical Method	Sample Container/Hold Time	Number of Primary Samples
Soil Gas	EPA TO-15 low-level	6-liter Summa® canisters/30 days	11
SSD Exhaust Stack[1]	EPA TO-15	1-liter Summa® canisters/30 days	2

1 = Exhaust stack samples will only be collected during two of the OM&M events.

TABLE 4: ESTIMATED LABORATORY REPORTING LIMITS

Analyte	Estimated Reporting Limits – EPA TO-15 low-level (µg/m^3)	Estimated Reporting Limits EPA TO-15 (µg/m^3)
PCE	0.68	3.4
TCE	0.54	2.7
1,1-DCE	0.41	2.0
cis-1,2 DCE	0.40	2.0
trans-1,2 DCE	0.40	2.0
VC	0.26	1.3

3.7. Quality Control Samples

QC procedures are used to ensure that data are useable for their intended purpose. Specific objectives of QC program are listed below:

- Samples collected at the site are consistent with project objectives;
- Samples are identified, preserved, and transported in a manner such that the data are representative of the actual site conditions;
- Information is not lost in sample transport; and
- The data are legally defensible.

Sampling will be performed in accordance with the methods described in Section 2.

QC samples will be collected and prepared to assess potential errors introduced during sample collection, handling and analyses. As part of the QA/QC program, field duplicate (QC) samples will be collected and analyzed.

Field duplicate samples will be collected to verify the reproducibility of data within the project laboratory. One soil gas field duplicate will be collected during each VI assessment sampling event, resulting in a QC frequency greater than 10%. Duplicate samples will not be collected for SSD/SVE system effluent samples. This equates to one field duplicate per VI assessment sampling event.

The duplicate samples will be handled, labeled, and documented in the same manner as regular field samples to prevent potential bias in the laboratory results. Field duplicates will not be identified but labeled in the same manner as other field samples on the chain-of-custody forms.

3.8. Data Quality Objectives

Analytical data quality objectives (DQO) have been established for this project to ensure that the monitoring data is of sufficient quantity and quality to accomplish the objectives listed below. The reporting limits for the individual samples may be affected by sample dilution caused by elevated target analyte concentrations. This effect shall be minimized to the extent practical by the laboratory during sample analysis. The contract laboratory will provide summaries of the air sample analyses and the associated QC samples for review and validation.

- Monitor PCE; TCE; 1,1-DCE; cis-1,2 DCE; trans-1,2 DCE; and VC for comparison with ADEC Vapor Intrusion Guidelines (ADEC 2012a);
- Evaluate the results of the site mitigation activities; and
- Ensure the integrity of the results is legally defensible.

The laboratory analytical DQOs accuracy, precision, completeness and reporting limits for the planned air sampling activities are as follows:

- Accuracy (Percent Recovery) – 70 to 130;
- Precision (Relative percent differences [RPD]) - < 30;
- Completeness (Percent) – 95; and
- Reporting Limit – below the Residential Sub-Slab Soil Gas Target Levels.

3.9. Data Reduction, Validation and Reporting

Verification of all analytical data will be performed by a qualified professional experienced in data verification/validation procedures. All data will be verified in accordance with the EPA procedural guidance documents and the ADEC regulatory guidance documents as appropriate. The reference documents include the EPA Environmental Data Verification and Validation EPA QA/G-8, November 2002; the EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA-540-R-08-01), June 2008; and the EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA-540-R-10-011), January 2010.

Additionally, the data verification will conform to the ADEC Environmental Laboratory Data and Quality Assurance Requirements, Technical Memo-06-2002, dated March 2009 (ADEC 2009). Laboratory performance and analytical results will be checked through a QA review, which will include the ADEC Laboratory Data Review Checklist for Air Samples (ADEC 2012b). The review will assess analytical quality through five data quality indicators: completeness, accuracy, precision, comparability and representativeness. The impact of any discrepancies will be discussed with respect to the quality and usability of the data.

The following are DQOs for each indicator:

- Completeness – 95% of all samples collected should be analyzed.
- Accuracy – Percent recoveries of laboratory control samples, laboratory blank samples and surrogate recoveries in primary samples will be compared against laboratory control limits.
- Precision – Field and laboratory precision of samples will be measured through the collection and analysis of replicate samples. A replicate sample involves filling two canisters from the same air mass over the same period of time and is a measure of field precision. RPD for replicate samples should be less than 30%.
- Comparability – To compare data, samples will be analyzed for the same parameters using the same sampling and analytical methods. Reporting limits for samples should be less than the ADEC target levels presented in Table 1.
- Representativeness – Leak tests will be performed for samples to ensure that surface infiltration is not occurring. Air samples will be collected with Summa® canisters to capture air samples over the intended timeframe.

- Page Intentionally Left Blank -

4. SCHEDULE

Table 5 presents the estimated schedule for the project.

TABLE 5: PROJECT SCHEDULE

Activity	Estimated Date
Installation of new VMPs	August/September 2015
SSD/SVE OM&M	Mid-September 2015
SSD/SVE Shutdown	Mid-September 2015
Soil Gas Plume Extents Investigation Sampling	October 2015
VI Assessment Sampling	Early March 2016
SVE Startup & OM&M	Mid-March 2016
SSD Startup and SSD/SVE OM&M	May 2016
VI Assessment Sampling	Early June 2016
SSD/SVE OM&M	Mid-June 2016

- Page Intentionally Left Blank -

5. REFERENCES

Alaska Department of Environmental Conservation (ADEC) 2009. ADEC Environmental Laboratory Data and Quality Assurance Requirements, Technical Memo-06-2002, dated March 2009.

ADEC 2010a. Policy Guidance on Developing Conceptual Site Models. October.

ADEC 2010b. ADEC's Laboratory Data Review Checklist.

OASIS 2011. Remediation System Installation Report, 314 Wendell Avenue Site, Fairbanks, Alaska. November.

ADEC 2012a. Vapor Intrusion Guidance for Contaminated Sites. October.

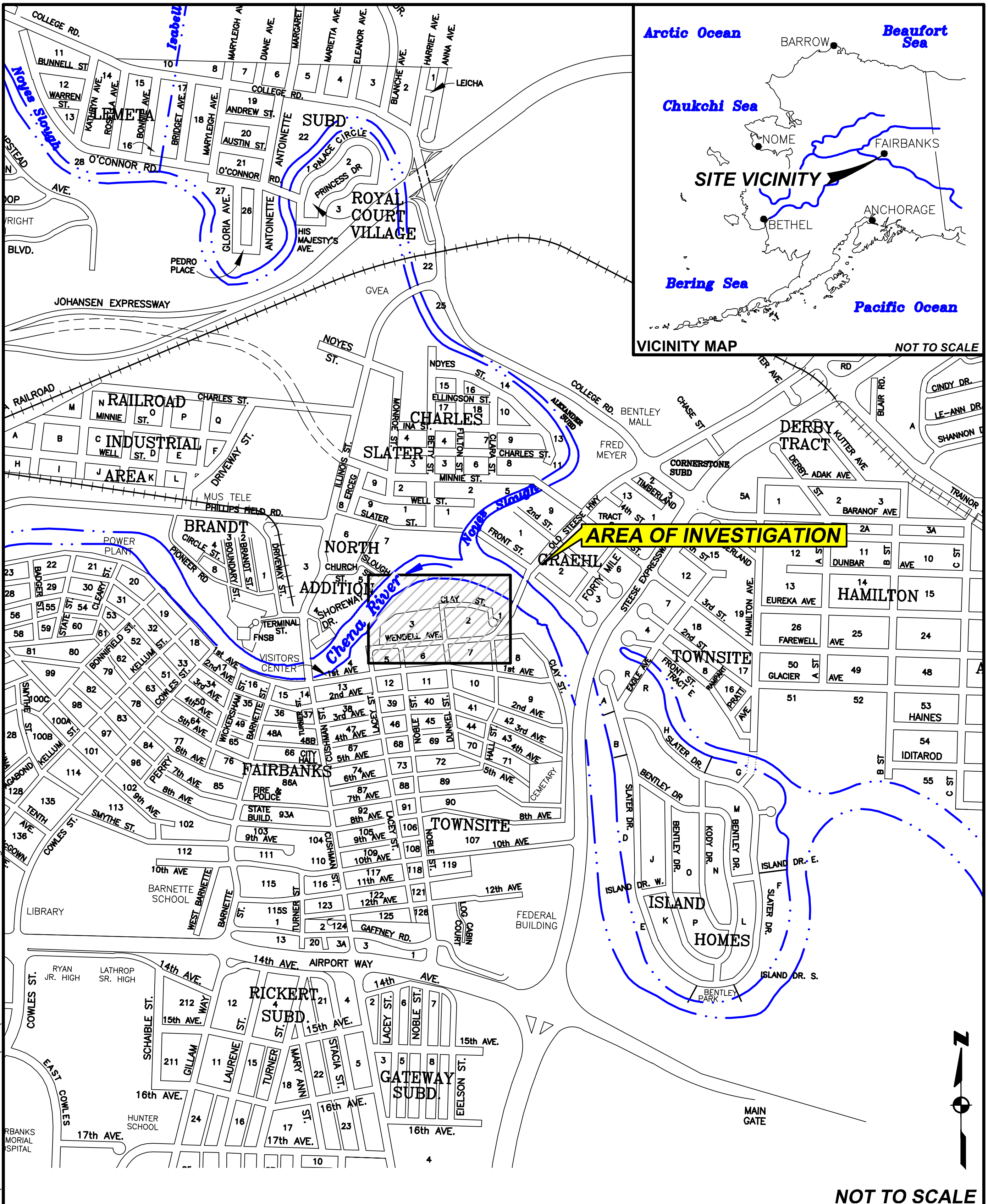
ADEC 2012b. ADEC Laboratory Data Review Checklist for Air Samples.

ADEC 2015. 18 Alaska Administrative Code (AAC) 75, Oil and Other Hazardous Substances Pollution Control, Revised as of 15 June 2015.

- Page Intentionally Left Blank -

FIGURES

- Page Intentionally Left Blank -



W:\PROJECT DRAWINGS\0227323-Wendell\03\0227323-04_01_A.dwg Jul 24, 2015.

ERM

DATE: JULY 2015
CHKD: C.B.
DRAWN: M.L.B.
PROJ. No.: 0227323-3
825 W. 8th Ave., Anchorage, AK 99501, (907) 258-4880

SITE LOCATION MAP

SFY 2016 VAPOR INTRUSION ASSESSMENT AND SSD/SVE SYSTEM OM&M WORK PLAN
WENDELL AVENUE SITE
Fairbanks, Alaska

FIGURE 1

SOURCE: CITY MAP.DWG PROVIDED BY THE NORTH STAR WEB SITE. DATE UNKNOWN.

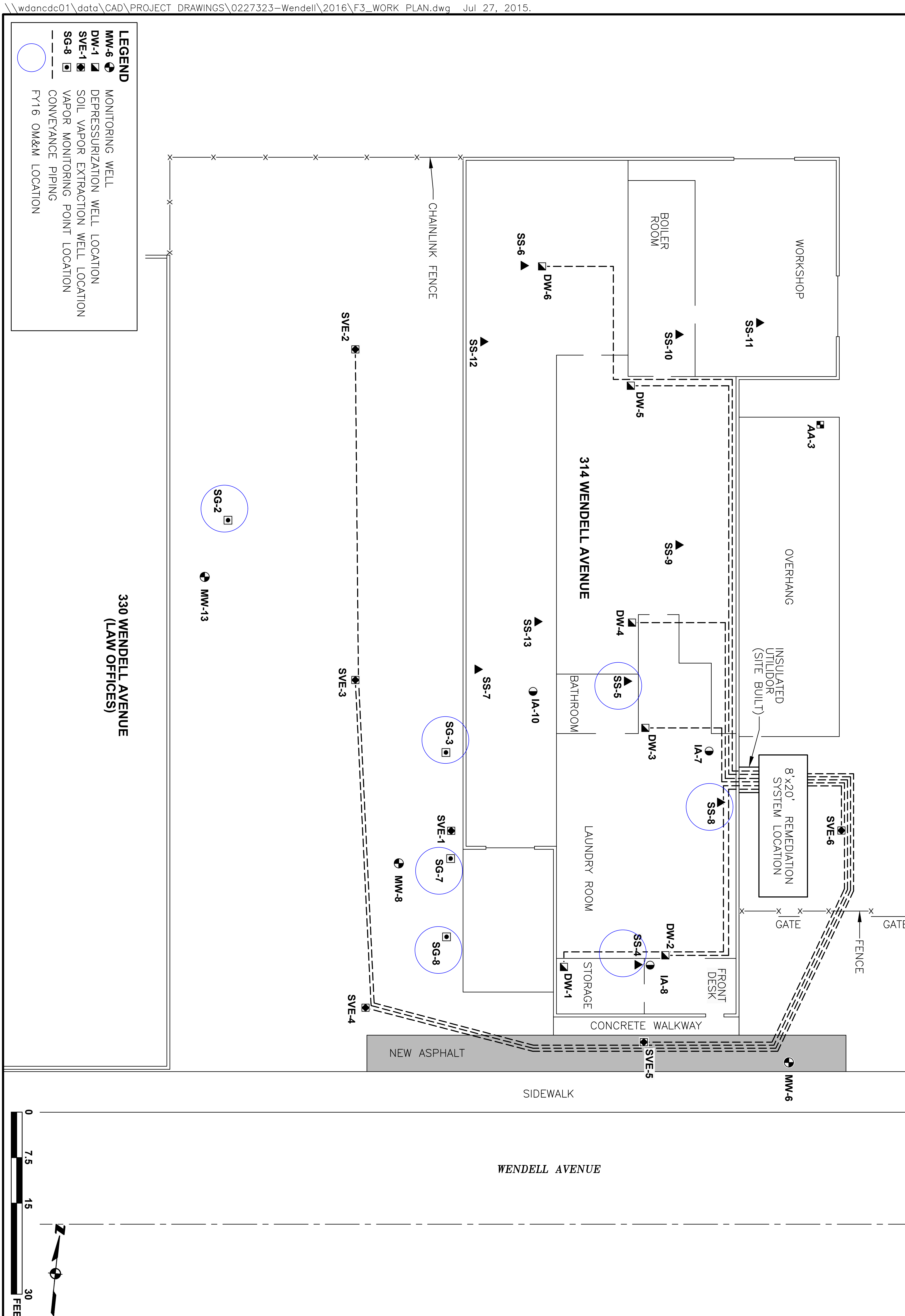
- Page Intentionally Left Blank –

X:\PROJECT DRAWINGS\0227323-Wendell\03\REPORT\0227323-03_04_B.dwg Jul 31, 2015.

SOURCE: AERIAL PHOTO AERIAL.JPG DATED 7/29/15 PROVIDED BY BING MAPS.

ERM	DATE: JULY 2015 CHKD: C.B. DRAWN: M.L.B. PROJ. No.: 0227323 825 W. 8th Ave., Anchorage, AK 99501, (907) 258-4880	WENDELL AVENUE 2016 PROPOSED SAMPLING LOCATIONS SFY 2016 VAPOR INTRUSION ASSESSMENT AND SSD/SVE SYSTEM OM&M WORK PLAN WENDELL AVENUE SITE Fairbanks, Alaska	FIGURE 2

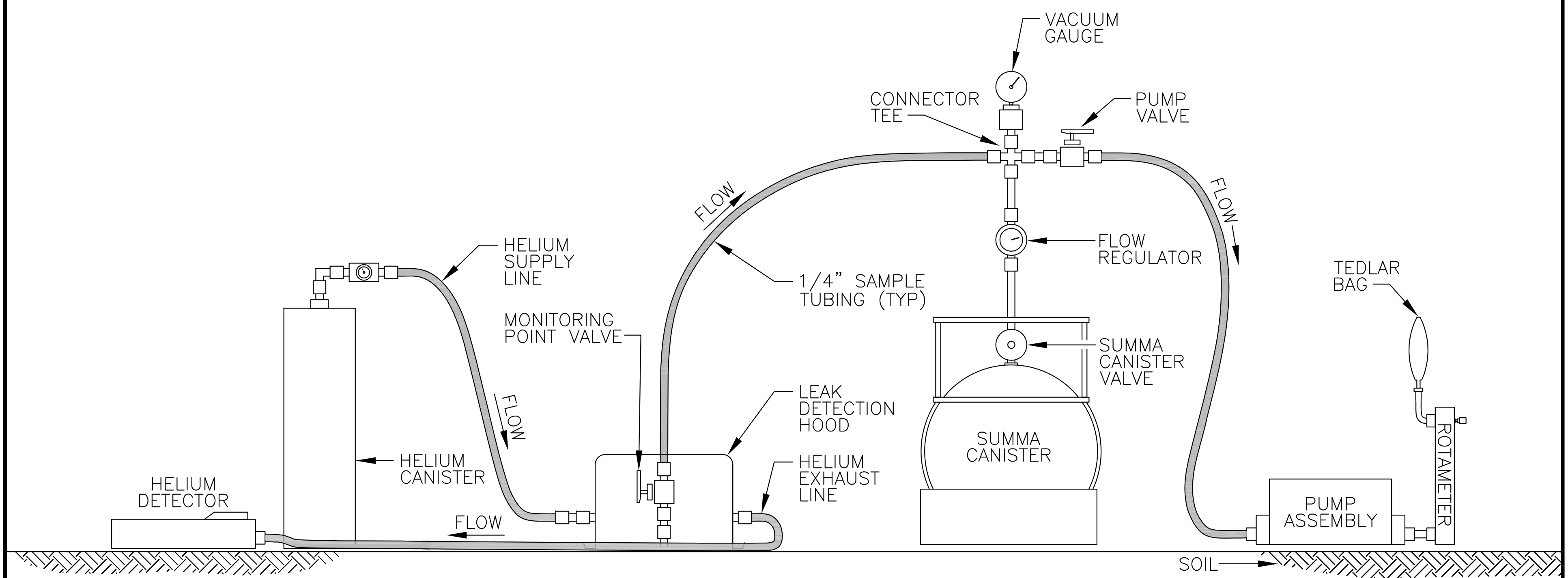
\\wdancdc01\data\CAD\PROJECT DRAWINGS\0227323-Wendell\2016\F3_WORK PLAN.dwg Jul 27, 2015.



ERM	DATE: JULY 2016 CHKD: N.B.B DRAWN: N.B.B PROJ. No.: 0227323 825 W. 8th Ave., Anchorage, AK 99501, (907) 258-4880	**SSD/SVE SYSTEM PLAN VIEW WITH MONITORING LOCATIONS** SFY 2016 VAPOR INTRUSION ASSESSMENT AND SSD/SVE OM&M WORK PLAN WENDELL AVENUE SITE Fairbanks, Alaska	FIGURE **3**

- Page Intentionally Left Blank -

\\wdancdc01\data\CAD\PROJECT DRAWINGS\ADEC\ANIAK\2013\WORK PLAN\0191259-WP_F4.dwg Jul 27, 2015.



NOT TO SCALE

ERM

DATE: JULY 2015
CHKD: CB
DRAWN: NB
PROJ. No.: 0227323

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

LEAK DETECTION SCHEMATIC

SFY 2016 VAPROR INTRUSION ASSESSMENT AND SSD/SVE SYSTEM
OM&M WORK PLAN
WENDELL AVENUE SITE
Fairbanks, Alaska

FIGURE
4

- Page Intentionally Left Blank -

APPENDIX A

Wendell Avenue Conceptual Site Model

- Page Intentionally Left Blank -

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: 314 Wendell Avenue, Fairbanks, Alaska
Hazard ID: 3821

Completed By: OASIS Environmental, Inc.
Date Completed: August 2011

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1) *Check the media that could be directly affected by the release.*

(2) *For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.*

Media / Transport Mechanisms

☑ Surface Soil (0-2 ft bgs)
- Direct release to surface soil — check soil
- ☑ Migration to subsurface — check soil
- ☑ Migration to groundwater — check groundwater
- ☑ Volatilization — check air
- ☐ Runoff or erosion — check surface water
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

☑ Subsurface Soil (2-15 ft bgs)
- Direct release to subsurface soil — check soil
- ☑ Migration to groundwater — check groundwater
- ☑ Volatilization — check air
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

☑ Ground-water
- Direct release to groundwater — check groundwater
- ☑ Volatilization — check air
- ☑ Flow to surface water body — check surface water
- ☑ Flow to sediment — check sediment
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

☑ Surface Water
- Direct release to surface water — check surface water
- ☑ Volatilization — check air
- ☑ Sedimentation — check sediment
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

☑ Sediment
- Direct release to sediment — check sediment
- ☑ Resuspension, runoff, or erosion — check surface water
- ☐ Uptake by plants or animals — check biota
- ☐ Other (list):

(3) *Check all exposure media identified in (2).*

(4) *Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5) *Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.*

Exposure Media / Exposure Pathway/Route / Current & Future Receptors

Exposure Media	Exposure Pathway/Route	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ soil	☑ Incidental Soil Ingestion	C/F	C/F	C/F	C/F			
	☐ Dermal Absorption of Contaminants from Soil							
	☐ Inhalation of Fugitive Dust							
☑ groundwater	☑ Ingestion of Groundwater	C/F	C/F	C/F	C/F			
	☐ Dermal Absorption of Contaminants in Groundwater	C/F	C/F	C/F	C/F			
	☑ Inhalation of Volatile Compounds in Tap Water	C/F	C/F	C/F	C/F			
☑ air	☑ Inhalation of Outdoor Air	C/F	C/F	C/F	C/F			
	☑ Inhalation of Indoor Air	C/F	C/F	C/F	C/F			
	☐ Inhalation of Fugitive Dust							
☑ surface water	☑ Ingestion of Surface Water	C/F	C/F	C/F	C/F			
	☐ Dermal Absorption of Contaminants in Surface Water							
	☑ Inhalation of Volatile Compounds in Tap Water	C/F	C/F	C/F	C/F			
☑ sediment	☑ Direct Contact with Sediment	C/F	C/F	C/F	C/F			
☐ biota	☐ Ingestion of Wild or Farmed Foods							

Print Form

Human Health Conceptual Site Model
Scoping Form

Site Name: 314 Wendell Avenue, Fairbanks, Alaska

File Number: Hazard ID: 3821

Completed by: OASIS Environmental, Inc.

Introduction
The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☐ USTs
- ☐ ASTs
- ☐ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☒ Other: Former Dry Cleaning Operations

Release Mechanisms *(check potential release mechanisms at the site)*

- ☒ Spills
- ☒ Leaks
- ☒ Direct discharge
- ☐ Burning
- ☐ Other:

Impacted Media *(check potentially-impacted media at the site)*

- ☒ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☒ Air
- ☒ Sediment
- ☒ Groundwater
- ☒ Surface water
- ☐ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☐ Subsistence harvester (i.e. gathers wild foods)
- ☐ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☒ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☒

If the box is checked, label this pathway complete: Complete

Comments:

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☐

If both boxes are checked, label this pathway complete:

Comments:

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☒

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☒

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☐

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☒

If all of the boxes are checked, label this pathway complete:

Comments:

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☒

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are assumed to be protective of this pathway.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.
- Chromium is present in soil that can be dispersed as dust particles of any size.

Generally, DEC direct contact soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because it is assumed most dust particles are incidentally ingested instead of inhaled to the lower lungs. The inhalation pathway only needs to be evaluated when very small dust particles are present (e.g., along a dirt roadway or where dusts are a nuisance). This is not true in the case of chromium. Site specific cleanup levels will need to be calculated in the event that inhalation of dust containing chromium is a complete pathway at a site.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

APPENDIX B

SSD/SVE and OM&M Data Sheet

- Page Intentionally Left Blank -

Wendell Ave SVE/SSD System OM&M Data Sheet

Wendell Ave - SVE/SSD OM&M Data Sheet

Date: **Time:** **Ambient Temp (°F):** **Technician:** **Field Instrument Used/Last Calibrated:**

SSD System

Depressurization Wells							SSD System Mechanical Parameters		Indoor Vapor Monitoring Points				
Line	Vacuum (inWC)	Flow (scfm)	Valve % Open	Hex (ppm)	% CO2	%O2			Point ID	Vacuum (inWC)	Hex (ppm)	% CO2	% O2
DW-1	<54	~10					Dilution Valve % open	Closed	SS-4	> 0.02			
DW-2	<54	~10					Knockout drum level	Empty	SS-5	> 0.02			
DW-3	<54	~10					Manifold Vacuum (inWC)	Max < 54 inWC	SS-8	> 0.02			
DW-4	<54	~10					Blower Vacuum (inWC)	Δ < 10 inWC					
DW-5	<54	~10					Exhaust Temp Digital (°F)	< 215 °F					
DW-6	<54	~10					Exhaust Temp Gauge (°F)	< 215 °F					
Spare							Exhaust Flow (cfm)	~60					
Spare							Filters Checked/Cleaned?						

SVE System

Extraction Wells							SVE System Mechanical Parameters		Outdoor Vapor Monitoring Points				
Line	Vacuum (inWC)	Flow (scfm)	Valve % Open	Hex (ppm)	% CO2	%O2			Point ID	Vacuum (inWC)	Hex (ppm)	%CO2	%O2 (*At least one reading below 20.9%*)
EW-1	<81	~15					Dilution Valve % open	Closed	SG-2 @ 4' bgs	> 0.1			
EW-2	<81	~15					Knockout drum level	Empty	SG-2 @ 8' bgs	> 0.1			
EW-3	<81	~15					Manifold Vacuum (inWC)	Max < 81 inWC	SG-3 @ 4' bgs	> 0.1			
EW-4	<81	~15					Blower Vacuum (inWC)	Δ < 10 inWC	SG-3 @ 8' bgs	> 0.1			
EW-5	<81	~15					Exhaust Temp Digital (°F)	< 275 °F	SG-7 @ 5' bgs	> 0.1			
EW-6	<81	~15					Exhaust Temp Gauge (°F)	< 275 °F	SG-7 @ 9' bgs	> 0.1			
Spare							Exhaust Flow (cfm)	~75	SG-8 @ 5' bgs	> 0.1			
Spare							Filters Checked/Cleaned?		SG-22 @ 8' bgs	> 0.1			
Field Notes:									SG-24 @ 8' bgs	> 0.1			

Additional Mechanical and Shared Elements

Control Room			Exhaust Stack/Heat Trace	Laboratory Sample
Parameter	SSD	SVE System		
Motor Speed (Hz)			Exhaust Stack Drained?	Effluent Sample ID
IDEC Hourmeter Reading/Time			Exhaust Stack (Hex (ppm), %O2, %CO2)	Summa Canister ID
Hobbs Hourmeter Reading/Time			Exhaust Stack Colortec (ppm)	Time/Date
Previous IDEC Hourmeter Reading/Date/Time			Heat Trace On?	Initial Vacuum ("Hg)
Previous Hobbs Hourmeter Reading/Date/Time			LEL Monitor Reading (%LEL)	Final Vacuum ("Hg)
Total Hours Since Last Event IDEC/Hobbs			GVEA Meter Reading (kW-hr)	
Percent Operability				

Field Notes:

Itemized values are the operational target for this monitoring parameter. Observed values should be entered and compared to the target values to determine if operational adjustement or maintenance is required

NR = not recorded

##/## = "/" between readings indicates guage reading "before" and "after" adjustment

SG-1 destroyed: SS-6, SS-7, SS-9, SS-10, SS-11, SS-12, SS-13 no longer safely accessible due to building condition

- Page Intentionally Left Blank -