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# Work Plan for Vapor Intrusion Mitigation System Installation

## Washington Industries, Inc., and Perine Properties
## 825 South Dakota Street and 812/820 S. Adams Street
## Seattle, Washington



**Prepared For:**

**Mr. John Drake**
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EPI Project Number: 64001.0

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## FIGURES

| Abbreviation/ Acronym | Definition |
|---|---|
| ASIL | Acceptable Source Impact Level |
| CUL | Cleanup level |
| Ecology | Washington State Department of Ecology |
| EPI | Environmental Partners, Inc. |
| GAC | Granular activated carbon |
| HVOC | Halogenated volatile organic compound |
| in. w.c. | Inches of water column |
| MTCA | Model Toxics Control Act, 70.105D RCW and WAC 173-340 |
| NOC | Notice of Construction |
| NWP | Northwest Plating |
| PCE | Tetrachloroethene |
| PSCAA | Puget Sound Clean Air Agency |
| SEPA | State Environmental Protection Agency |
| SES | Sound Earth Strategies |
| TAP | Toxic Air Pollutant |
| TCE | Trichloroethylene |
| VFD | Variable frequency drive |
| VIA | Vapor Intrusion Assessment |
| VIMS | Vapor Intrusion Mitigation System |
| WAC | Washington Administrative Code |

## 1.0 INTRODUCTION

Environmental Partners, Inc. (EPI) has prepared this Work Plan for Vapor Intrusion Mitigation System (VIMS) Installation (Work Plan) at the request of Mr. John Drake, the owner of the Washington Industries, Inc. property located at 825 South Dakota Street, in Seattle, Washington (WII Property) and Lybeck Murphy, Counsel for Washington Industries, Inc. (WII). The WII Property is the source property for releases of volatile organic compounds (VOCs) to soil and ground water. Volatile vapors originating from the release(s) on the WII Property have impacted the property immediately to the south of the WII Property, located at 812 and 820 South Adams Street in Seattle, Washington, and owned by Mr. John Perine (Perine Property). The WII and Perine Properties are indicated on Figure 1.

The full extent of the contamination originating from the historic releases on the WII Property are not currently fully characterized. Characterization of current conditions at the Site is in the planning and approval process with Washington Industries and approval for those actions is reportedly pending. The Site is also pending enrollment into the Washington Department of Ecology (Ecology) Voluntary Cleanup Program (VCP) and this Work Plan is being provided concurrent with the necessary enrollment documents.

This Work Plan presents an approach for mitigating the potential intrusion of volatile vapors into the buildings on the Perine Property, which are associated with the Site. It is anticipated that Mr. Perine will cooperate with the installation of the planned VIMS.

The work documented herein serves to meet the WII's ongoing efforts to comply with the requirements of the Model Toxics Control Act (70.105D Revised Code of Washington) and its implementing regulations (Washington Administrative Code [WAC] 173-340; collectively referred to as "MTCA").

With the submission of this Work Plan and the VCP enrollment documents, and the anticipated acceptance of the Site into the VCP, WII is requesting an Advisory Opinion from Ecology with regard to this VIMS.

## 2.0 BACKGROUND AND PROPERTY LAYOUT

The WII Property contains one approximately 11,625-square-foot, combination brick and concrete block commercial/industrial building. The building on the WII Property is divided into two primary lease spaces, as indicated on Figure 2: the Former AV-Pro lease space and the Former Northwest Plating (NWP) lease space. The Former AV-Pro lease space includes roughly the western third of the building. AV-Pro is also a current tenant on the adjacent Perine Property. The Former NWP lease space includes approximately the eastern two thirds of the building. Neither of these lease spaces on the WII Property is currently occupied.

The Perine Property contains two separate buildings that share an internal demising wall. The western third of the Perine Property contains an approximately 11,275-square-foot metal building that is currently leased to AV-Pro. The eastern two thirds of the Perine Property contains an approximately 24,600-square-foot concrete block building that is occupied by the Perine Danforth Company. Both buildings are immediately adjacent to the south of the building on the WII Property, with a "zero" lot line setback for the building walls. The building occupied by the Perine Danforth Company appears to

share the south wall of the Former NWP lease space. The layout of the buildings and the properties is provided on Figure 2.

Previous investigations have identified halogenated volatile organic compounds (HVOCs), primarily consisting of trichloroethene (TCE) and tetrachloroethene (PCE), in soils and ground water on the subject properties from historical releases on the WII Property. TCE and PCE have been detected in soil and ground water samples at concentrations greater than potentially applicable cleanup levels (CULs) throughout the Site and on the Perine Property.

As a component of MTCA compliance, EPI performed indoor air quality sampling as part of a vapor intrusion (VI) assessment within the buildings on the subject properties in March 2013. One of the objectives of the VI assessment was to assess whether there is a potential for unacceptable worker exposure on the Perine Property. The results of that assessment are presented in a document titled *Vapor Intrusion Assessment* dated May 17, 2013 and prepared by EPI. The VI Assessment was provided to Mr. Perine and Counsel.

Based upon the findings of the VI Assessment WII has authorized this VIMS Work Plan to mitigate potential vapor risks at the Perine Property.

## 3.0 VAPOR INTRUSION MITIGATION SYSTEM DESIGN

The design parameters for the VIMS are based on the results of a vacuum extraction pilot test conducted on the Perine Property in 2012 by Sound Earth Strategies (SES) on behalf of the Perine Danforth Company. This section presents an analysis of the pilot test data and discusses the VIMS design criteria.

### 3.1 Pilot Test Data Review

SES performed a pilot test on September 10 and 11, 2012 to evaluate the potential effectiveness of a sub-slab depressurization system on the Perine Property. SES presented the pilot test findings and two additional options for mitigating vapors within the Perine Property building in a memorandum titled *Pilot Testing For Sub-Slab Depressurization System Design* (Sub-Slab System Design Memo), dated October 15, 2012. This Work Plan and the design of the VIMS are based on the findings of that work. Where necessary, EPI has used best professional judgment when interpreting some components of those findings. In developing this VIMS design, EPI has also applied standard scientific and engineering principals, conservative design assumptions, professional experience and best professional judgment. Additionally, performance monitoring will be used to evaluate the effectiveness of the VIMS. The VIMS has been designed in such a way to allow flexible operation of the system in response to the actual response of the subsurface to system operation.

The Sub-Slab System Design Memo prepared by SES on behalf of Perine identified the following primary design parameters:

- Based on the pilot test results from the 812 Building (western third of the Perine Property), the estimated radius of influence (ROI) for a vertical vapor extraction point is 15 feet.

- Based on the pilot test results from the 820 Building (eastern third of the Perine Property), the estimated ROI for a vertical extraction point is 10 feet.

### 3.2 Design Criteria

The VIMS presented herein will use sub-slab depressurization. Sub-slab depressurization creates a negative relative pressure between the atmospheric pressure inside a building and the pressure beneath the floor slab. This conditions results in a downward pressure gradient across the floor slab between the interior of the building and the underlying soil pores, which may contain HVOCs. This negative pressure gradient prevents intrusion of the soil gas into the building interior. By monitoring the lateral distribution of this negative pressure gradient relative to the known impacts to soil and ground water it is possible to demonstrate the effectiveness of the system. The effectiveness of the system can be further evaluated through the collection or indoor air samples and collection of performance samples from the VIMS effluent stack.

A VIMS is not intended as a remediation system for soil and ground water. Rather, the system is intended to mitigate potential threats to indoor air for spaces above the soil and ground water impacts. Ultimate mitigation of potential VI threats is accomplished through the long-term remediation of the contamination at the Site. Such remedial actions are anticipated to take a significant period of time to implement and complete and the VIMS will address the VI risks during remedial action implementation.

During the VI Assessment in March 2012, EPI performed sub-slab differential pressure gradient monitoring over the course of a 2-day test. Testing was performed within the Perine Property building from two separate locations beneath the concrete floor. Testing was performed during normal working hours and while the existing HVAC system was functioning under normal conditions. An evaluation of the differential pressure between the sub-slab and the indoor air resulted in a maximum change in the differential pressure gradients of 0.05 inches of w.c. These shifts were induced by barometric fluctuations, the operating HVAC system and normal pressure variations caused by temperature shifts and the opening of doors, windows, and service bays. This is a relatively minor pressure gradient and indicates that significant vacuums beneath the floor slab are not required in order to protect indoor air quality.

For the sake of mitigating vapors within the Perine Property building and using a relative safety factor of 50 percent, it is assumed that a minimum vacuum pressure of 0.075 in. w.c. should be maintained under those portions of the slab where HVOCs are present. Since HVOCs are not present beneath all areas of the Perine Property it is not be necessary to install recovery piping in all areas of the Perine Building or to have the vacuum ROI be present beneath all areas of the building, but only in those areas were prior impacts have been identified

A review of the pilot test data indicate that an applied vacuum of approximately 40 in. w.c. within the vacuum supply piping will induce vacuum responses at or above at least 0.075 in. w.c. in perimeter observation points. The system can be valved and controlled to adjust flow and vacuum in different areas of the property in order to assure property vacuum coverage. A vacuum blower capable of producing a minimum of 40 in. w.c. vacuum at an induced air flow rate of approximately 125 standard cubic feet/minute (SCFM) will sustain a moderate flow rate and allow for adjustments in flow between the various extraction pipes as may be necessary to maintain the required vacuums . Horizontal

recovery piping will be placed in locations that will sufficiently cover areas where soil and ground water are impacted with a nominal vacuum of 0.075 in. w.c. Figure 2 depicts the proposed locations for vapor recovery piping. These locations will be field-verified and relocated as appropriate, depending upon access inside the Perine Property building.

Additional extraction piping will be installed on the WII Property parallel and adjacent to the north wall of the Perine Property building. Extraction from this piping will assist in maintaining a negative vacuum and limit, to the extent possible, the migration of vapors from the WII Property to the Perine Property in response to the induced vacuums beneath the Perine building.

## 4.0 VIMS LAYOUT

This section describes the layout on the subject properties of the extraction piping and other components that comprise the VIMS.

### 4.1 Horizontal Recovery Piping

Figure 2 depicts the locations of the proposed horizontal recovery piping and associated conveyance piping to be installed beneath the concrete floors of the buildings on the Perine Property and Former NWP lease space. The horizontal piping will be installed using the following methods:

- The existing concrete in the appropriate locations will be saw cut to expose a trench in the concrete a minimum of 12 inches wide. The trenches will be extended at least 1 foot beyond the ends of the proposed well piping locations. Concrete from trenching operations will be sent off-site for disposal or recycling. Concrete dust generation in the building will be minimized by using water during cutting. Water generated by concrete-cutting activities will be containerized and hauled off-site by the concrete-cutting subcontractor.

- Soils will be removed from the trenches to 18 inches below ground surface on the Perine Property. Soils will be stored in 55-gallon drums pending analytical results for disposal. On the Former NWP lease space, soils will be removed from trenches to a depth of 3 feet to ensure sufficient depth adjacent to building footings.

- Horizontal recovery piping will consist of Schedule 40, 4 inch-diameter slotted PVC well screen. The screened sections will have 0.02 inches factory-machined slots to allow for ample flow with minimal head loss. Each length of horizontal recovery piping will be connected to vacuum supply piping in the middle of the well screens to evenly distribute the vacuum along the length of the recovery piping, as shown on Figure 2. The recovery piping screens will be wrapped in woven geotextile fabric to prevent the intake of soil particles into the piping.

- The recovery piping trenches will be backfilled with 4 inches of pea gravel (3/8 inch). Piping will be installed on top of the pea gravel bedding and then backfilled with pea gravel. Once the trench is backfilled to the original soil level, a woven geofabric material will be placed on top of the sand within the trench to prevent concrete (placed during floor repair) from infiltrating into the pea gravel.

- A minimum of one cleanout port will be installed at each "tee'd" connection point of the recovery well screen assembly to the vacuum piping, as depicted on Figure 2. The cleanout port will be piped to allow for access to recovery screens and also for the collection of applied vacuum data.

- Concrete will be added above the backfill material and geofabric and, to the extent practicable, will be colored and finished to match the existing concrete within each location.

### 4.2 Vacuum Supply Piping

Vacuum supply piping will convey recovered vapors to the treatment equipment and will be installed in approximately the locations depicted on Figure 2. Final piping locations within the Perine Property building will be based on access considerations.

The following guidelines will be followed when installing vacuum supply piping:

- Vacuum supply piping will be installed in a similar fashion to the processes described above, except that native soils excavated from the trenches will be used to backfill around the piping, if determined suitable as backfill. Additionally, soil from vacuum supply piping trenches will be removed to only a depth of 1 foot below ground surface. Vacuum supply trenching will be installed in the locations depicted on Figure 2.

- Steel 4-inch-diameter couplings with NPT threads will be installed and flush mounted with the concrete at locations where vacuum supply piping exits the concrete floor and transitions aboveground. Steel couplings will be used within the concrete to limit the potential for breakage and necessary replacement.

- Transitions from below-ground portions of the vacuum supply piping to above-ground portions will be installed in locations that will allow for the piping to penetrate walls and minimize disruptions to work spaces within the Perine Property building. The locations of all such transitions will be discussed with and approved by Perine prior to installation.

- Where above-ground vacuum supply piping traverses interior walls, channel strut and brackets will be used to attach piping to the walls. Concrete lag bolts will be used when attaching piping to concrete CMU blocks, as necessary. The use of such wall penetrations and interior piping will be minimized to the extent possible.

- Where reasonable, piping runs will minimize the use of elbows, tees, and other fittings to reduce head loss and maximize the available vacuum at the recovery wells.

- Penetrations of piping through the interior walls will be required in order to successfully route all of the vapor recovery piping to a single location on the WII Property, as shown on Figure 2. All wall penetrations will be adequately sealed with appropriate materials such as concrete, epoxy, insulation, flashing, or other materials to ensure waterproof, weather-tight completions through the interior and exterior building walls.

### 4.3 VIMS Equipment

All vacuum supply piping will converge in the location shown on Figure 2. The VIMS equipment will be located on the WII property to limit disruption to the Perine Property tenants and to facilitate ease of operation and maintenance. The following equipment components will be required to allow for sufficient flexibility in vapor recovery, efficient treatment processes, and reasonable operational and maintenance considerations.

The treatment equipment components are described below:

- **Vacuum Blower**— The ultimate performance goal of the VIMS is to induce only a sufficient vacuum beneath the concrete slab to prevent contaminant vapor migration into the building. A blower capable of operating efficiently over a range of flows and vacuums will be used. A blower capable of maintaining up to 40 in. w.c. vacuum in supply piping is the design goal. The operation of the system will be based upon vacuum performance monitoring at selected locations beneath the floor slab (See Section 6.0). The actual performance of the VIMS will depend on the dynamic responses of the soils in which the recovery piping is placed. A Gast Model R6340R-50, or comparably similar regenerative blower, should be sufficient to produce the vacuum and flow requirements for this purpose. A variable frequency drive (VFD) will be utilized to control the speed at which the blower operates. This will allow for better flow and vacuum control and savings in power consumption costs.

- **Liquid Separator**—A liquid-separating knockout tank will be used upstream of the vacuum blower to remove any liquids, soil particles, and/or PVC shavings from piping prior to entry into the vacuum blower. A 19-gallon liquid separator will be sufficient as the airstream that will be processed by this equipment is expected to be fairly dry. The liquid separator will contain an internal float switch that will shut off the blower if excessive water enters the tank.

- **Flow Meters**—Each vacuum supply pipe will have a flow meter for each recovery line. Flow meters will range from 0 to 50 scfm.

- **Vacuum Adjustment Valves**—Each vacuum supply pipe will additionally have individual flow-controlling gate valves. These valves will be used to control the amount of vacuum applied to each recovery well. The ability to adjust the vacuum at each individual recovery well will allow for fine-tuning of the vacuum field beneath the concrete slab.

- **Granular Activated Carbon (GAC)**—GAC will be utilized as the treatment methodology for vapors collected from the VIMS. It is estimated that two 55-gallon GAC adsorbing media canisters will be used in series to adsorb contaminant vapors and render them incapacitated. The size of the GAC units may be adjusted based upon performance and compliance with permit requirements (See Section 6.0).

- **Control Panel**—A control panel will house the electrical components of the VIMS including relays and motor function modes. An electrician will supply all of the appropriate materials

and components of the control panel and will ensure that it is installed according to all appropriate code requirements. The control panel will be fitted with an auto-dialer that notifies EPI personnel of any equipment shutdown events.

- **Sample Ports, Gauges, and Ancillary Equipment**—Air-stream sampling ports, gauges (vacuum, pressure, and temperature), pressure switches, and other ancillary equipment will be used to monitor the performance of the VIMS.

- **Exhaust Stack**—Emissions from the treatment equipment and GAC treatment train will be discharged through a 4-inch diameter exhaust stack. The exhaust stack will exit the NWP building and will extend a minimum of 6 feet above the roof of the building. The exhaust stack may be modified (e.g., height and/or diameter) based on Puget Sound Clean Air Agency (PSCAA) modeling in support of an Air Discharge Permit.

## 5.0 PERMITTING

The VIMS will require permits for air emissions from the treatment equipment and for the electrical supply. The following subsections describe the potential permitting requirements.

### 5.1 Air Discharge Permit, Notice of Construction

Based on previously collected data, emissions from the VIMS are expected to exceed the thresholds for exemption from the PSCAA Toxic Air Pollutants (TAPs). As a result, the discharged vapors from the VIMS will need to be controlled, monitored, and permitted to ensure compliance. Article 6 of the PSCAA regulations cites the requirement for compliance with the standards presented in the table listed in WAC 173-460-150. That table presents the Acceptable Source Impact Levels (ASILs), and other regulatory criteria for specific compounds with respect to emission rates from point sources such as the discharge stack from a VIMS.

To request an Air Discharge Permit, PSCAA requires the following information:

- Pre-startup concentrations of TAPs;
- Control technology to be used to control the emissions; and
- A demonstration that the control technology will decrease levels of TAPs to below ASILs.

Following submittal and acceptance of the proposed treatment methodology, PSCAA will issue a Notice of Construction (NOC). While it is currently anticipated as being unlikely, it is possible that the PSCAA will require the submittal and acceptance of a State Environmental Policy Act (SEPA) Checklist for the VIMS discharge prior to issuance of a NOC. A SEPA Checklist submittal, if required, will include a 30-day public review and comment period.

### 5.2 Electrical Permit

The VIMS will require electrical power to operate. It is assumed that a separate 50-amp electrical panel and associated meter will be installed to provide power for the VIMS. The separate meter will allow for the electrical costs for the VIMS equipment to be tracked separately. It is likely that three-phase, 480-

volt power will be necessary and/or recommended in order to provide sufficient power at a reasonable cost over the course of the system's expected lifetime. If three-phase power is not available for a reasonable cost, single-phase 230-volt power will be used to power the equipment and vacuum blower.

Electrical permitting will be the responsibility of the electrical contractor performing the work. The Washington State Department of Labor and Industries is the inspecting agency and will be the agency that provides the final permit. All electrical work will be performed as necessary to meet local, state, and federal code requirements.

## 6.0 PERFORMANCE MONITORING

Performance monitoring will be conducted to evaluate the effectiveness of the VIMS and to adjust the VIMS operation to meet the goal of maintaining a vacuum beneath the floor slab in the area of impacted soil and ground water. The following subsections describe the performance monitoring procedures.

### 6.1 Sub-Slab Vacuum Monitoring

Performance monitoring of the system will be accomplished through vacuum monitoring beneath the floor slab at various points on the Perine Property. Existing monitoring points such as monitoring wells and vapor-sampling ports will be used to monitor vacuums once the system is operating. If it is determined that additional monitoring points are appropriate, they can be installed at a later date without disrupting the system operation.

Vapor samples may be collected from individual runs of recovery piping to evaluate the relative concentrations of vapors recovered from specific areas. These data may be used to adjust system operation.

The VIMS will be operated to maintain a negative pressure gradient beneath a broad area of the floor slab of the Perine Building and to maintain a negative pressure gradient toward the NWP Property. The extraction line on the NWP Property, along the north wall of the Perine Building, is expected to have the majority of flow and vacuum in order to maximize this northerly vacuum gradient.

### 6.2 Interior Air Sampling

After startup and initial operation of the VIMS and confirmation that appropriate vacuum fields have been established, two interior air samples and one background air sample will be collected within the Perine Building. These samples will be collected using 6-Liter summa canisters fitted with an 8-hour inlet nozzle. The sample period will be during a normal work shift selected in cooperation with Perine. These data will be used to demonstrate and confirm that interior air quality does not pose an unacceptable risk to the on-site occupants.

Interior air samples will be collected on two occasions to confirm that the VIMS is operating as planned and is protective of the Perine Property occupants. If those data are favorable and demonstrate an appropriate level of protectiveness, the operation of the VIMS will be based on vacuum measurements beneath the floor slab thereafter.

### 6.3 Discharge Monitoring

As a condition of the PSCAA NOC, the vapors discharged to the atmosphere from post-carbon treatment must be monitored for compliance with discharge limits. The exact monitoring and compliance requirements and discharge limitations will be presented in the permit. EPI will follow permit requirements and will monitor the influent and effluent concentrations of each GAC canister to determine breakthrough, the treatment efficiency of the individual GAC units, and to demonstrate compliance with ASILs and small quantity emissions rates (SQERs), as they apply to the specific permit conditions.

## 7.0 OPERATION AND MAINTENANCE

This section describes the operation and maintenance of the VIMS.

### 7.1 Operation

Operation of the VIMS will be based on performance monitoring data. Vacuum responses in sub-slab locations during operation will dictate operational changes to the VIMS flow and vacuum exerted by the vacuum blower along individual extraction piping. If induced vacuum fields beneath the slab are considered insufficient to perform the intended function, vacuums may be manipulated through valves on the vacuum supply pipes and the VFD to produce more or less vacuum beneath particular areas of the slab. As noted above, the extraction line on the WII Property, parallel to the north wall of the Perine Building, will receive maximum flow and vacuum in order to maintain a vacuum gradient back onto the NWP Property, while the piping on the Perine Property will be used to maintain a negative vacuum gradient beneath the floor slab relative to the interior of the building.

The VIMS is designed to operate continually and will not be shut down unless unavoidable for maintenance or other operational considerations. The VIMS will have internal logic and controls and may be shutdown automatically based on the following equipment signals::

- High water in the liquid separator;
- Over-amperage or high-temperature on the blower motor, and
- High vacuum or high pressure conditions on influent and/or effluent piping;

EPI will be notified by the auto-dialer in the event of such a shut down and will schedule an inspection at the earliest possible opportunity.

The system may also be shut down for periodic GAC unit changeouts. Such changeouts are typically very short in duration and EPI will maintain at least one spare GAC unit on-site to limit the need for longer-term shut downs while waiting for a replacement GAC unit. It is possible that during initial operation that GAC changeout may be more frequent and that the need for changeout becomes less frequent over time.

Unanticipated shut downs based upon equipment failure, vandalism, theft, or power failure will be addressed as expeditiously as possible. Additional operational considerations will be evaluated as the VIMS is operated and the performance is monitored.

### 7.2 Maintenance

Inspections of the equipment will be performed during routine monitoring events. Equipment will be inspected to ensure that it is in good condition. Any equipment that appears to be malfunctioning, or is not operating within the intended design performance will be repaired or replaced or a more suitable replacement part will be installed on the equipment.

All equipment will be operated, maintained, and serviced according to the manufacturers' recommendations. There will be an emphasis on preventative maintenance rather than repair of failed equipment, whenever possible.

### 7.3 Waste Disposal

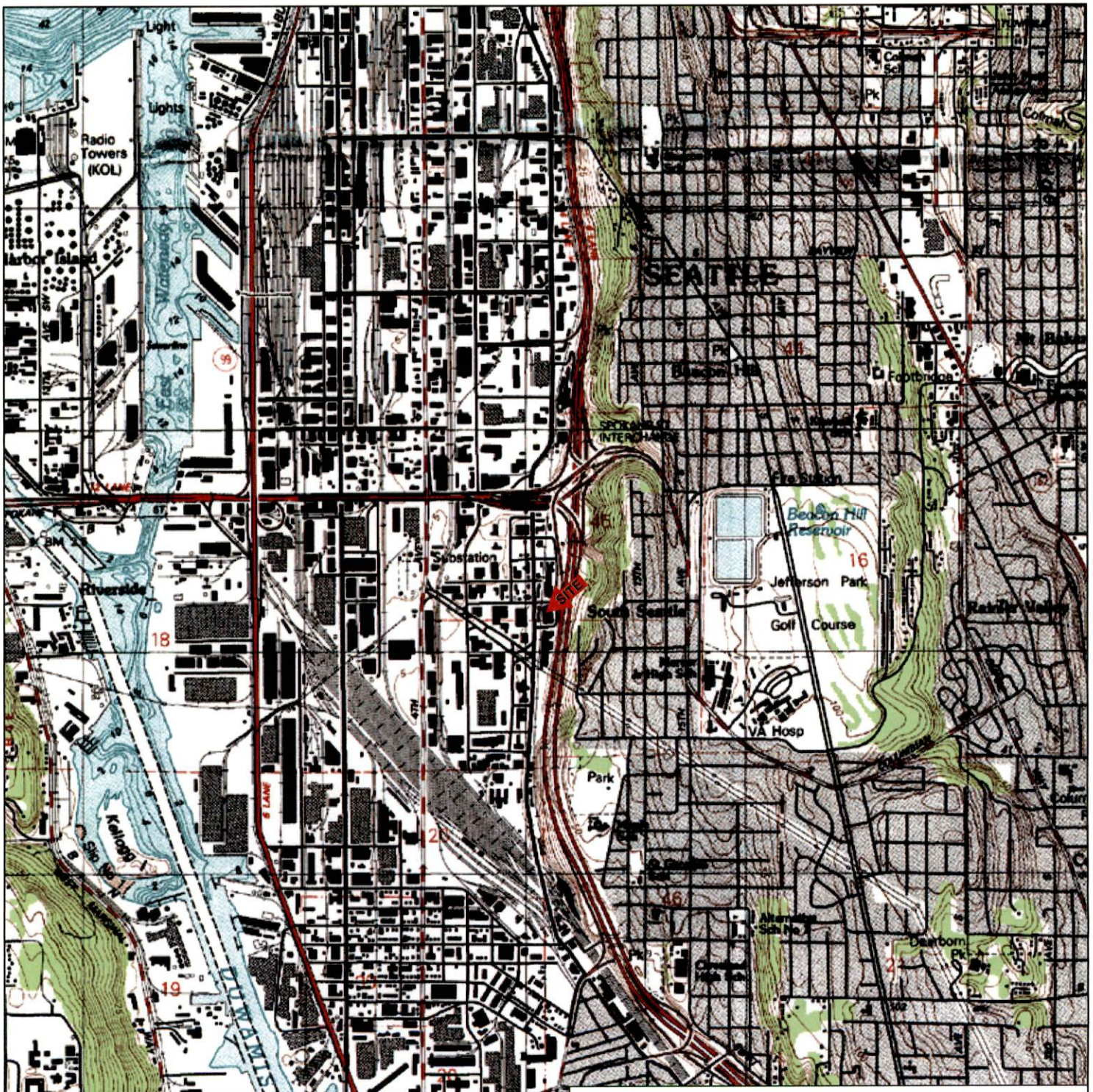
Carbon will be changed out once concentrations in the upstream (leading) GAC canister reach "breakthrough." Breakthrough will be monitored between the first and second (lagging) canisters on a periodic basis using colorimetric GasTec© tubes for TCE, or other gases as required by the PSCAA NOC Once TCE (or other compounds) is/are detected between the leading and lagging canisters, the lagging canister will replace the leading canister, and a new canister will be placed in the lagging canister position.

Waste GAC canisters will be sent back to Siemen's Water Technologies, or similar supplier, to be reactivated and recycled. Disposal of spent carbon will be performed in accordance with applicable hazardous waste disposal protocols. Spent GAC units will be handled, transported, and tracked in accordance with applicable regulations.

## 8.0 LIMITATIONS

To the extent that preparation of this Work Plan has required the application of best professional judgment and the application of scientific principles, certain results of this work have been based on subjective interpretation. We make no warranties express or implied, including and without limitation, warranties as to merchantability or fitness for a particular purpose. The information provided in this Work Plan is not to be construed as legal advice.

# Tables




**NOTES:**

SOURCE: USGS 7.5 MINUTE QUADRANGLE (TOPOGRAPHIC)

SEATTLE SOUTH, WA
1983

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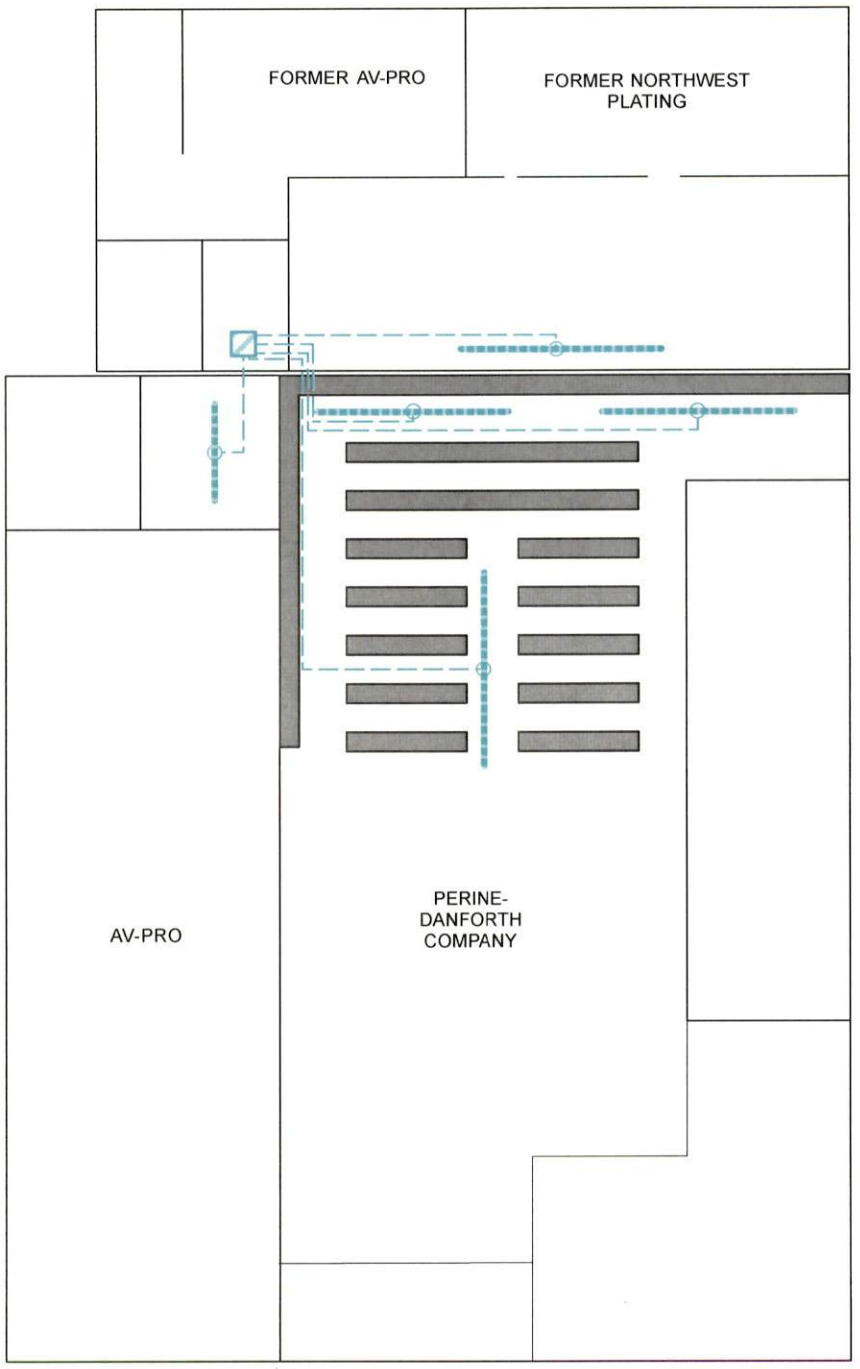
SCALE = 1:25,000

**FIGURE 1**

GENERAL VICINITY MAP

| | | | |
|---|---|---|---|
| *PREPARED BY* | EPI ENVIRONMENTAL PARTNERS INC | | |
| *PROJECT* | VAPOR INTRUSION MITIGATION SYSTEM WORK PLAN | | |
| *LOCATION* | 825 SOUTH DAKOTA STREET AND<br>812 AND 820 SOUTH ADAMS STREET<br>SEATTLE, WASHINGTON | | |
| *PREPARED FOR* | WASHINGTON INDUSTRIES, INC. | | |
| *DATE*<br>6/11/13 | *DRAWN BY*<br>ALW | *REVIEWED BY*<br>ARM | *PROJECT NUMBER*<br>64001.0 |




N

0 10 20 40

SCALE: 1" = 40'

**NOTES:**

- HORIZONTAL RECOVERY WELL
- VACUUM SUPPLY PIPING
- SHELVING UNITS
- CLEANOUT
- VAPOR INTRUSION MITIGATION SYSTEM EQUIPMENT

**FIGURE 2**
PROPOSED LAYOUT OF VAPOR INTRUSION MITIGATION SYSTEM

| | | | |
|---|---|---|---|
| **PREPARED BY** | epi ENVIRONMENTAL PARTNERS INC | | |
| **PROJECT** | VAPOR INTRUSION MITIGATION SYSTEM WORK PLAN | | |
| **LOCATION** | 825 SOUTH DAKOTA STREET AND 812 AND 820 SOUTH ADAMS STREET SEATTLE, WASHINGTON | | |
| **PREPARED FOR** | WASHINGTON INDUSTRIES, INC. | | |
| **DATE** 6/11/13 | **DRAWN BY** ALW | **REVIEWED BY** ARM | **PROJECT NUMBER** 64001.0 |