



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

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March 6, 2014

Mr. Howard Giske  
Whitehead Company  
PO Box 81144  
Seattle, WA 98108

**Re: Opinion Pursuant to WAC 173-340-515(5) on Proposed Remedial Action for the Following Hazardous Waste Site:**

- **Name:** Whitehead Tye Property
- **Address:** 730 S Myrtle Street, Seattle, WA 98108
- **Facility/Site No.:** 9809
- **VCP No.:** NW2792
- **Cleanup Site ID No.:** 12115

Dear Mr. Giske:

Thank you for submitting documents regarding your proposed remedial action for the **Whitehead Tye Property** facility (Site) for review by the Washington State Department of Ecology (Ecology) under the Voluntary Cleanup Program (VCP). Ecology appreciates your initiative in pursuing this administrative option for cleaning up hazardous waste sites under the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

This letter constitutes an advisory opinion regarding a review of submitted documents/reports pursuant to requirements of MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following release(s) at the Site:

- Total gasoline-range petroleum hydrocarbons (TPHg), total diesel-range petroleum hydrocarbons (TPHd), total oil-range petroleum hydrocarbons (TPHo), pentachlorophenol (PCP), metals, and chlorinated solvents including tetrachloroethylene (PCE) and associated daughter products in Soil;
- TPHg, TPHd, TPHo, PCP, and PCE and associated daughter products in Groundwater; and,
- TPHo, polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), and metals (copper, lead, mercury,) in down gradient catch basin solids.



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Ecology is providing this advisory opinion under the specific authority of RCW 70.105D.030(1)(i) and WAC 173-340-515(5).

This opinion does not resolve a person's liability to the state under MTCA or protect a person from contribution claims by third parties for matters addressed by the opinion. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). The opinion is advisory only and not binding on Ecology.

Ecology's Toxics Cleanup Program has reviewed the following information regarding your proposed remedial action(s):

1. Floyd|Snider, *Remedial Investigation/Feasibility Study, Fox Avenue Site, 6900 Fox Avenue South, Seattle WA*, February 25, 2011.
2. Floyd|Snider, *Draft March 2013 Waste Characterization Soil Sample Results Compared to MTCA Criteria, 730 South Myrtle Street, Seattle WA*, June 6, 2013.
3. KPFF Consulting Engineers, *Seattle Iron & Metals Corporation Engineering Report, 730 South Myrtle Street, Seattle WA*, October 1, 2013.
4. SoundEarth Strategies (SES), *Subsurface Investigation Workplan, Whitehead Tye Property, 730 South Myrtle Street, Seattle WA*, November 6, 2013.
5. SES, *Phase I Environmental Site Assessment, Whitehead Property 730 South Myrtle Street, Seattle WA*, December 12, 2013.

The reports listed above will be kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only. Appointments can be made by calling the NWRO resource contact at (425) 649-7235 or sending an email to [nwro\\_public\\_request@ecy.wa.gov](mailto:nwro_public_request@ecy.wa.gov).

The Site is defined by the extent of contamination caused by the following releases:

- TPHg, TPHd, TPHo, PCP, metals, and chlorinated solvents including PCE and associated daughter products in Soil;
- TPHg, TPHd, TPHo, PCP, and PCE and associated daughter products in Groundwater;
- TPHo, PCBs, PAHs and metals in down gradient catch basin solids.

The Site is more particularly described in **Enclosure A** to this letter, which includes a detailed Site diagram. The description of the Site is based solely on the information contained in the documents listed above.

Based on a review of supporting documentation listed above, pursuant to **requirements contained in MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter**

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**173-340 WAC, for characterizing and addressing the following release(s) at the Site, Ecology has determined:**

- As stated in Section 1.1 of the Subsurface Investigation Workplan (Workplan) submitted by SES, “The purpose of the Workplan is to identify the suggested subsurface investigation scope of work to evaluate the Recognized Environmental Conditions (RECs) identified for the Property during SoundEarth’s Phase I Environmental Site Assessment (ESA) research.” Based on a review of RECs identified in the ESA and other available information regarding current and past practices at the Site, it is Ecology’s opinion that the Workplan is insufficient to fully characterize the potential environmental impacts at the Site. Ecology recommends development of a conceptual site model (CSM) as a tool to identify potential contaminant sources and exposure pathways at the Site. Based on the data gaps and uncertainties identified in the CSM, data quality objectives (DQOs) clearly defining the qualitative and quantitative objectives of the Site investigation should be defined and used to guide development of a comprehensive Workplan. The Workplan should address all of the potential contaminant sources identified in the ESA, herein, and any other sources identified during development of the CSM for the Site. At a minimum, the following issues should be addressed in the CSM, DQOs, and Workplan.
  - PCBs, TPHo, TPHd, and metals have been detected in storm drain solid samples collected in catch basins located downgradient of the Site. The Site is also located aerially downgradient of the SIM facility that is a potential source of metals-laden airborne dust. In addition to the potential contaminants of concern (COCs) noted above, the Tye Lumber operations may have also resulted in surface releases of additional COCs including, but not limited to, PCP and various PAHs. These data indicate that the currently unpaved Property is a potential source for metals-, TPH-, PAH- and PCB-laden sediment entering the storm drain system. Therefore, the Workplan should include collection and analysis of surface soil samples for metals, semivolatile organics (SVOCs), PCBs, and TPH using the appropriate analytical methodology being used for other sites in the Lower Duwamish Waterway area. Ecology can provide more guidance on the analytical methodology upon request. Additionally, a representative percentage of the surface soil samples should include analysis of dioxins/furans.
  - Additional detail should be provided regarding the scope of the proposed ground-penetrating radar (GPR) survey and a discussion of how identified anomalies will be investigated during the subsurface investigation. Specifically, data from the GPR survey should be used to assist in identifying the location of the two former 1,000-gallon diesel USTs removed in November 1989 and two former 1,000-gallon gasoline USTs identified in 1986 records. These are potential historical sources within and adjacent to the former mill building footprint, and potential historical sources associated with the two former auto repair facilities. A

contingency for additional soil borings/monitoring wells should be added to the Workplan to investigate anomalies identified during the GPR survey.

- The Workplan should identify the location of the four former USTs and characterization of soil and ground water in the vicinity of the former USTs. If existing documentation is not sufficient to determine the locations of the former USTs, then additional investigations including a GPR survey in City of Seattle rights of way (ROW) and additional subsurface investigations may be required.
- PCE was detected above the MTCA Method A soil cleanup level of 0.05 mg/kg at locations GP-5, GP-7, and GP-8 at depths of 2-, 3-, and 5-feet below ground surface (bgs), respectively (Floyd|Snider 2013). The depth to water in the uppermost groundwater bearing unit occurs from 7 to 13 feet bgs at the adjacent Fox Avenue Site (Floyd | Snider 2011). These detections of PCE in soils above cleanup levels in the vadose zone within the former mill building footprint suggests a separate release of chlorinated solvents at the Site. Additional sampling to delineate the horizontal and vertical extent of PCE in soil should be included in the Workplan.
- TPHo has been detected above the MTCA Method A soil cleanup level in a sample collected from GP-10 at a depth of 0 – 5 feet bgs (Floyd|Snider 2013). The sample depth and location suggests an on-Site source; the Workplan should include delineation of the horizontal and vertical extent of TPHo at this location.
- In early 1986, Ecology representatives observed a white milky liquid being discharged to the ground at the northwest corner of the Property. Characterization of surface soil in the vicinity of this historical release of white fluid should be included in the Workplan.
- Investigation of soil and groundwater in the vicinity of the former steam dry kilns should be included in the Workplan.
- Potential impacts associated with on-going operations including truck parking and storage/shipping of freight at the Property should be characterized.
- A table presenting the intended analyses for each soil and groundwater sample by location and anticipated collection depth is required. Ecology anticipates that additional analyses beyond PCP, TPH in unspecified select samples and dioxins/furans in one soil sample will be required to meet the DQOs developed for the Site. The current level of detail in the Workplan is not sufficient to determine the intended analyses for individual samples. For instance, the following analyses should be included in the Workplan.
  - Surface soil samples should be analyzed for metals, PCBs, SVOCs, dioxins/furans, and TPH as discussed above.
  - Stoddard solvent was detected in GP-4 and GP-2 (Floyd|Snider 2013) at a depth of 12-13 feet bgs. Because Stoddard solvent was commonly used

during wood preserving operations and elevated concentrations of PCP were detected in samples from both GP-4 and GP-2, all soil and groundwater samples with suspected PCP impacts should also be analyzed by NWTPH-Gx. In addition, dioxins/furans are known to be associated with PCP and should be analyzed in a representative percentage of samples.

- Samples collected in the vicinity of the former automotive repair facilities (B06, B07, and B08) should be analyzed according to Table 830-1 of the MTCA regulation and Table 7.2, page 95, in the *Guidance for the Remediation of Petroleum Contaminated Sites*, Ecology Publication No. 10-09-057, September 2011 for waste oil contamination. The additional parameters listed on Table 830-1 of the MTCA regulation should be analyzed in the samples with the greatest TPH concentrations.
  - Given the length of historic operations at the Site, samples collected in the vicinity of the former refuse burner should be analyzed for the full range of TPH, PCBs, SVOCs, dioxins/furans and metals.
  - Site knowledge and the CSM should be used to determine an appropriate analytical list for sample locations B11 and B10.
- Ecology understands that the Whitehead Company is currently working with their tenant, Seattle Iron & Metals (SIM) to re-grade the Property and install storm water control measures. Due to the time-sensitive nature of this work, Ecology understands that construction of these upgrades may occur prior to completing all Site characterization activities. Ecology has identified the following issues with regard to coordinating Site characterization activities and implementing the storm water control measures:
    - Characterization of the surface soils at the Property should be conducted prior to grading, filling and paving operations. Contaminated soil needs to be segregated during removal and prior to disposal in accordance with federal, state, and local laws.
    - Where characterization is not complete prior to construction and paving at the Property, all excavated materials should be removed from the Property and disposed in accordance with federal, state, and local laws. This will reduce the potential for cross-contamination during grade and fill operations. The cut surface should then be sampled to document the condition of the soil remaining in place.
    - Where imported fill will be added for grading purposes, the surface beneath the fill horizon needs to be sampled to document surface conditions below the fill and pavement.
    - In areas excavated or trenched to install storm water control features, bottom/sidewall sampling needs to be conducted to document remaining

conditions. Where contamination is encountered, over-excavation is recommended to prevent future remedial actions that could adversely affect the permanent storm water control features.

- Where subsurface characterization is found to be incomplete prior to installation of the storm water control structures, future characterization may be required to address remaining contamination. The pavement and structures at the Property will not be considered a barrier to future required characterization and cleanup efforts.
- Once Site characterization is complete, a Remedial Investigation (RI) report that summarizes all previous investigations and shows the nature and extent of contamination (from all potential sources) in all media must be provided. Data gaps for the Property should be identified and discussed in the RI. The RI must provide summaries of the former Site uses that could have resulted in releases, including a history of the use and locations of tanks and service areas. Cross-sections and plan-view graphics are needed to show the relationship of the Site contamination to current and former Site features, parcel boundaries, Site geology, subsurface utilities, and points of compliance. Description and interpretation of geologic and hydrogeologic conditions for and in the vicinity of the Site is needed. Boring logs and test pit logs need to be included with the RI evaluation and appended to the RI.
- Summary tables should include all compounds that have been detected in each media throughout the history of the Site, and the proposed cleanup level for each compound. An annotated outline of an RI Report is presented in **Enclosure B** to provide an understanding of Ecology's expectations for conducting and documenting the RI.
- A Terrestrial Ecological Evaluation (TEE) may be required unless it is determined the Site qualifies for an exclusion. The TEE decision-making process must be documented per WAC 173-340-7490 to determine if cleanup levels that are protective of terrestrial species are applicable to the Site. A TEE process interactive user's guide can be found at <http://www.ecy.wa.gov/programs/tcp/policies/terrestrial/TEEHome.htm>

**This opinion does not represent a determination by Ecology that a proposed remedial action will be sufficient to characterize and address the specified contamination at the Site or that no further remedial action will be required at the Site upon completion of the proposed remedial action.** To obtain either of these opinions, you must submit appropriate documentation to Ecology and request such an opinion under the VCP. **This letter also does not provide an opinion regarding the sufficiency of any other remedial action proposed for or conducted at the Site.**

Please note that this opinion is based solely on the information contained in the documents listed above. Therefore, if any of the information contained in those documents is materially false or misleading, then this opinion will automatically be rendered null and void.

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The state, Ecology, and its officers and employees make no guarantees or assurances by providing this opinion, and no cause of action against the state, Ecology, its officers or employees may arise from any act or omission in providing this opinion.

Again, Ecology appreciates your initiative in conducting independent remedial action and requesting technical consultation under the VCP. As the cleanup of the Site progresses, you may request additional consultative services under the VCP, including assistance in identifying applicable regulatory requirements and opinions regarding whether remedial actions proposed for or conducted at the Site meet those requirements.

If you have any questions regarding this opinion, please contact me at (425) 649-7257 or by email at [masa461@ecy.wa.gov](mailto:masa461@ecy.wa.gov).

Sincerely,



Maureen Sanchez

Site Manager

Toxics Cleanup Program

Enclosures: A: Site Description and Diagrams  
B: Remedial Investigation Outline

cc: Chris Carter, SoundEarth Strategies, Inc.  
Sonia Fernandez, VCP Coordinator, Ecology

**Enclosure A**

**Site Descriptions and Diagrams**



### Site Description

*This section provides Ecology's understanding and interpretation of site conditions, and is the basis for the opinions expressed in the body of the letter.*

**Site:** The Site is defined by TPHg, TPHd, TPHo, PCP, and chlorinated volatile organic compounds (CVOCs) in soil and groundwater. Additionally the Site may be contributing TPHo, PCBs, PAHs and metals to down gradient storm water catch basins. The Site is located at 730 South Myrtle Street in Seattle, WA (Property) on King County tax parcel 273410-0270. The property encompasses approximately 3.2 acres.

**Area and Property Description:** The Site is located within an industrial area. The property is bounded on the north by Cascade Columbia Distribution (formerly Great Western International Chemical Company from 1960 to 2001, referred to herein as the Fox Avenue Site, on the east by a night club (formerly a gasoline service station from 1918 to 1964), on the south by Seattle Iron and Metals sorting yard beyond South Myrtle Street, and on the west by Seattle Boiler Works offices and warehouses beyond Fox Avenue.

**Site History and Current Use:** Sanborn maps from 1917 to 1966 indicate that Corson Avenue historically ran northeast to southwest through the Site dissecting the property into a small eastern portion and a larger western portion.

The first development on the eastern portion of the property was three residential structures and several sheds in 1917. The residences were removed by 1936 and an automotive and truck repair facility was constructed in the southeastern portion of the Site in 1944. By 1966 the repair shop had been removed and the eastern portion of the property was being used as a lumber sorting yard.

The western portion of the Property was initially developed with a 17,010-square foot (sq ft) mill building, 13,973 sq ft lumber warehouse, and a lumber shed in 1918. In 1929 the sawmill was expanded to include a boiler house fueled by a sawdust refuse burner, dry kiln, and lunchroom. An additional dry kiln was added in 1947. Operations at the Site included wood treatment with preservatives including PCP at a dip tank located in the City of Seattle Myrtle Street ROW adjacent to the southern Property boundary. A small building on the southern portion of the eastern Property was used for automotive repair in the 1960s.

Records indicate that the mill was operated by Williams Fir Finish Company in 1929 and by Tyee Lumber and Manufacturing Co. (Tyee) from 1929 until 1986. The property was purchased by Whitehead Co., Inc. and Reliable Transfer and Storage Co., Inc. in 1986. At some point prior to the purchase, Corson Avenue was abandoned and the eastern and western portions of the Property were united. Tyee Dry Kilns leased the Property from 1986 to 1989, who continued limited operations of dry kilns during this time. The PCP dip tank and related UST were reportedly removed in 1986 concurrent with the property transfer. The Property has been leased to Seattle Iron and Metals since 1999 which currently uses the unpaved Site for freight and truck storage. With the exception of a metal pre-1985 shed located on the eastern Property boundary, the structures associated with the mill were removed from the Site, reportedly between 1986 and

1989. Locations of current and former Site features are shown on **Figure 1**.

**Sources of Contamination:** The following potential sources of contamination have been identified:

- Off Site
  - Ground water impacted with PCP and chlorinated volatile organics from the adjacent Fox Avenue Site.
  - Former approximately 2,500-gallon capacity PCP dip tank and 300-gallon PCP UST located in City of Seattle Myrtle Street ROW adjacent to the southern Property boundary.
  - Historic (1918 to 1964) gasoline service station on adjoining property east of the Property.
- On Site
  - Four historic storage tanks with undocumented locations (two 1,000-gallon diesel USTs removed on November 22, 1989, and two 1,000-gallon leaded gasoline USTs listed as associated with the Site address in records from 1986).
  - Historic operations associated with the former mill building.
  - Historic operations associated with the former refuse burner.
  - Historic operations associated with the two former automotive repair facilities located on the eastern portion and the east corner of the western portion of the Property.
  - Historic operations associated with steam dry kilns.
  - Documented release of “white liquid” in northwest corner of the Property during Tye Lumber operations in 1986.
  - Current use of the Property for truck and freight (including containers of metal shavings) storage.

**Physiographic Setting:** The Site is situated at an elevation of approximately 15 feet above mean sea level. The Site is relatively flat with a slight ridge running east to west near the midpoint of the Property.

**Surface/Storm Water System:** The nearest surface water body to the Site is the Duwamish River located approximately 500 feet west of the Property. Storm water from the southern two thirds of the Property flows overland to the South Myrtle Street ROW and flows to the west where it is captured by City of Seattle catch basins and conveyed to the Duwamish River. Storm water from the northern third of the property flows overland onto adjacent property before

reaching Fox Avenue where it is intercepted by a City of Seattle storm drain. The captured storm water flows north to Brighton Avenue before it is discharged to the Duwamish River.

**Ecological Setting:** The Site is unpaved and is surrounded on all sides by roadways and industrial properties.

**Geology:** The Site is located in the Duwamish River Valley. Soils within the valley typically consist of low to moderately permeable shallow alluvial deposits composed of stratified silt, clay, silty sand, and sand. The Duwamish River valley is underlain by a single, large alluvial aquifer system which is divided into two distinct zones. The upper zone consists of sand and silty sand, and generally extends from the water table to depths of 70 to 80 feet bgs. Deposits in the lower zone are typically separated from the upper zone by upward gradients.

Boring logs indicate that subsurface soils at the Site generally consist of silty sand to a depth of 7 to 10 feet overlying a 3 to 5 foot thick layer coarse sand above a silty sand layer to the maximum depth investigated (30 ft bgs).

**Ground water:** Ground water was encountered at the Site within a perched aquifer composed primarily of sand at approximately 10-11 feet bgs. Two water bearing zones (1st WBZ and 2nd WBZ) have been identified in the vicinity of the Fox Avenue Site (Floyd|Snider 2011). The 1st WBZ is the upper most ground water bearing unit and is comprised primarily of native alluvium deposits of sand to slightly silty to very silty sand. The 2nd WBZ is a semi-confined aquifer composed of silty sands with interbeds, stringers and lenses of dense to very dense, silty sand to sandy silt. The depth of the 2nd WBZ ranges from 15 to at least 80 feet bgs in the vicinity of the Site. In some areas a thin low permeability silt horizon separates the two zones and acts as a confining layer for the 2nd WBZ. Ground water in the vicinity of the Site reportedly flows towards the southwest towards the Duwamish River.

**Release and Extent of Soil and Ground water Contamination:** The extent of soil contamination at the Site has not been evaluated; however, investigations completed at the Site and as part of the Fox Avenue RI/FS to date have provided some information concerning potential soil impacts.

Fox Avenue RI/FS data. Vadose zone soils impacted with PCE and TCE have been documented along the northwestern Property boundary (Floyd|Snider 2011). Based on Figures presented in Fox Avenue RI/FS (see **Figures 2 and 3**), the horizontal and vertical extent of CVOCs in soil from the up gradient source has been documented in soil approximately 20 feet inside the northern Property boundary within the vadose zone.

Ground water impacted by CVOCs (specifically PCE, TCE, cis-1,2-DCE, 1,1-DCE, and vinyl chloride), PCP, and mineral spirits extends over the western third of the Property in the 1st WBZ. With the exception of vinyl chloride, the maximum CVOC concentrations on the Property within the 1st WBZ are generally along the northern property boundary immediately adjacent to the Fox Avenue Site. Maximum concentrations of vinyl chloride within the 1st WBZ are southwest of the Fox Avenue Site as would be expected for a degradation product.

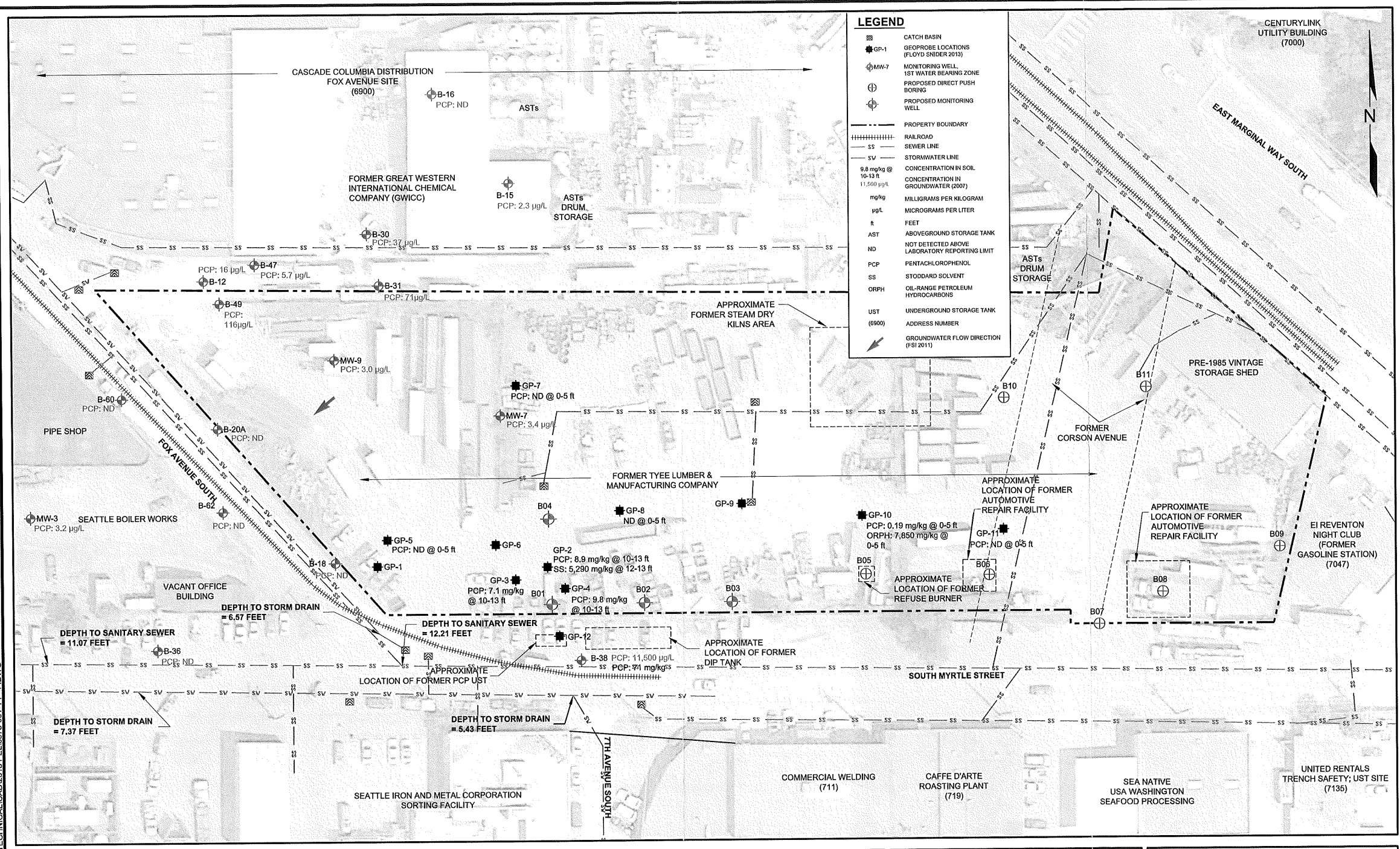
Ground water in the deeper 2nd WBZ has been impacted with PCE, TCE, cis1,2-DCE, vinyl chloride, BTEX, and mineral spirits. Maximum contaminant concentrations on the Property in the 2nd WBZ are centered around GP-25 and MW-10 located approximately 40 feet south of the Fox Avenue property line.

PCP Former Dip Tank and UST. Elevated concentrations of PCP in soil have been detected in three borings collected in the vicinity of the former off-Property PCP dip tank and UST. Mineral spirits and stoddard solvent have been reported above the detection limit in all three soil samples with elevated PCP concentrations.

Surface Soil/Shallow Vadose Zone Soil. PCE was detected above the MTCA Method A cleanup level of 0.05 mg/kg in three shallow (2, 3, and 4 – 5 feet bgs) vadose zone soil samples collected in the vicinity of the former mill foot print.

TPHo was detected in vadose zone soil (0 – 5 feet bgs) above the MTCA Method A cleanup level in a sample collected approximately 30 to 40 feet of the former refuse burner.

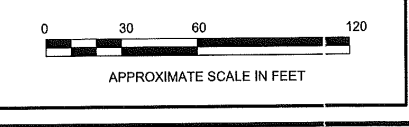
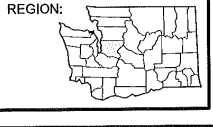
11/6/2013  
 P:\0973 WHITEHEAD\TECHNICAL\CAD\2013 PEL\0973-001\_PP\_F.DWG



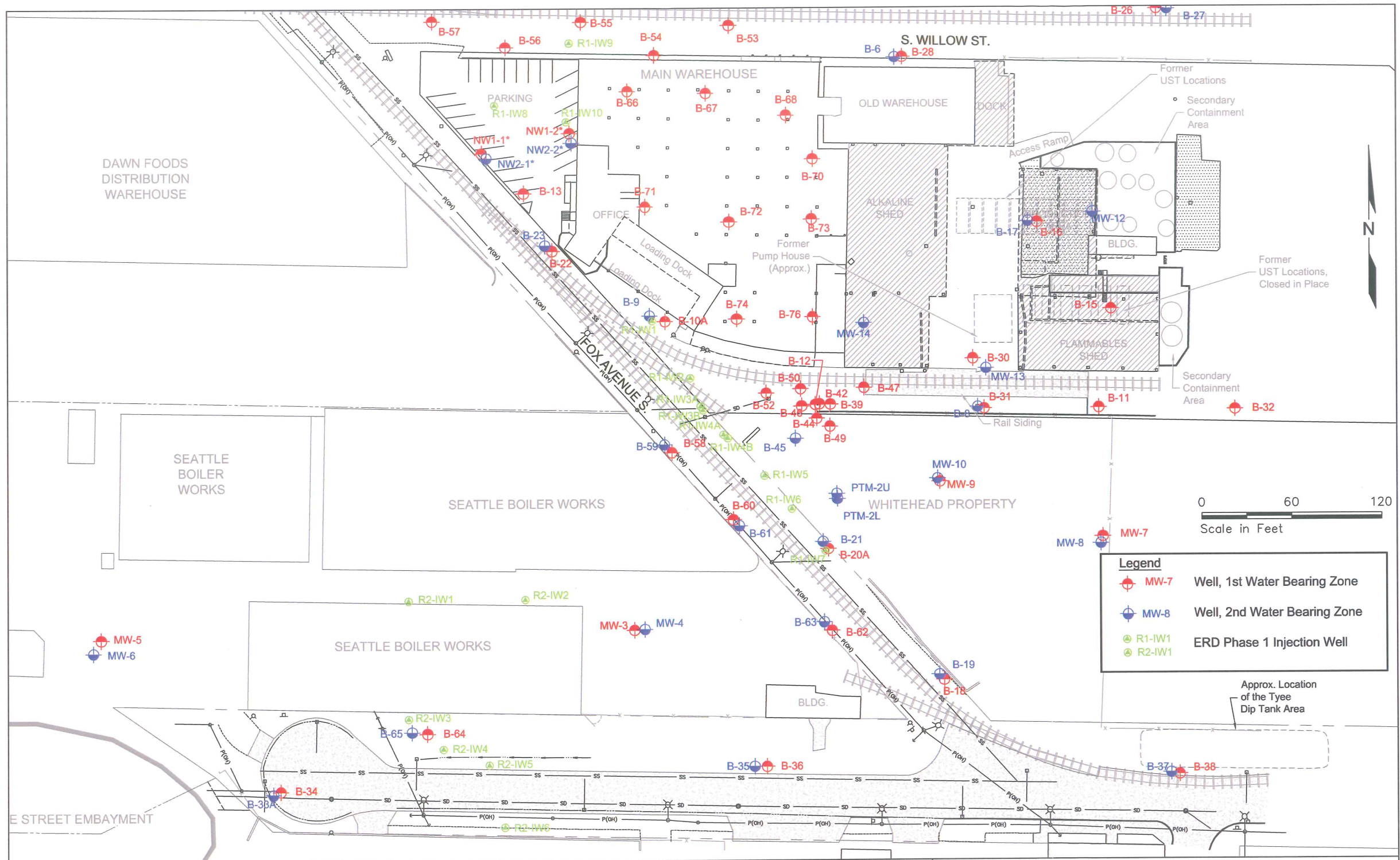
**SoundEarth**  
 Strategies  
 WWW.SOUNDEARTHINC.COM

DATE: 10/01/13  
 DRAWN BY: JQC  
 CHECKED BY: CGC  
 CAD FILE: 0973-001\_PP

PROJECT NAME: WHITEHEAD PROPERTY  
 PROJECT NUMBER: 0973-001-03  
 STREET ADDRESS: 730 SOUTH MYRTLE STREET  
 CITY, STATE: SEATTLE, WASHINGTON



**FIGURE 2**  
 PROPOSED EXPLORATION  
 LOCATION PLAN

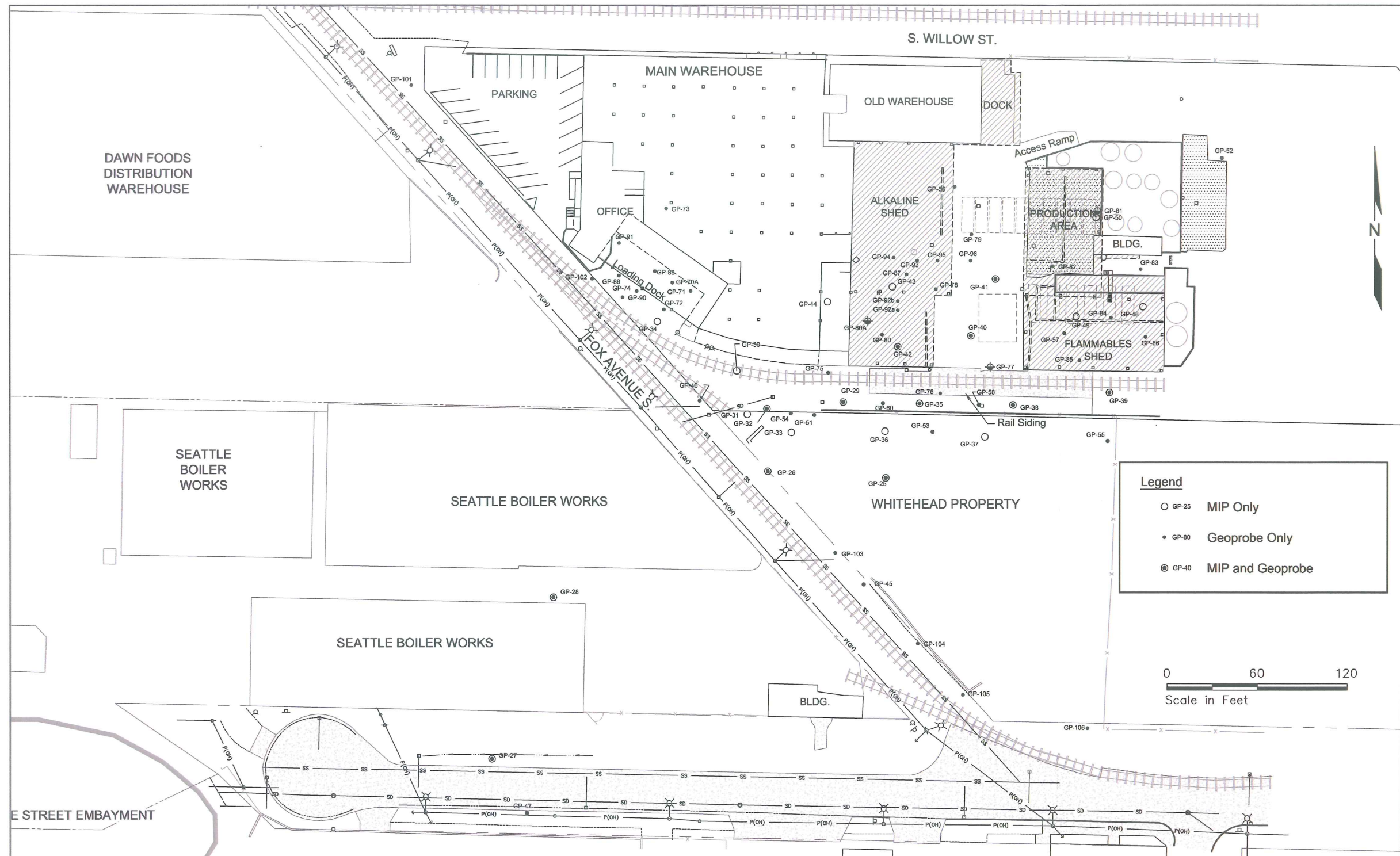


**FLOYD | SNIDER**  
strategy • science • engineering

**Remedial Investigation/Feasibility Study  
Fox Avenue Site  
Seattle, Washington**

**Figure 3.1  
Groundwater Well Locations**

DWG NAME: C:\project\Clients\Floyd and Snider\Fox Ave 2010\CAD\FoxAve2010\_013.dwg  
DATE: 2/8/2011 11:51 AM



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**Remedial Investigation/Feasibility Study  
Fox Avenue Site  
Seattle, Washington**

**Figure 3.2  
Boring Locations  
(2008 to 2010)**

DWG NAME: C:\project\Clients\Floyd and Snider\Fox Ave 2010\CAD\FoxAve2010\_012.dwg  
DATE: 2/8/2011 12:11 PM

**Enclosure B**

**Remedial Investigation Outline**



## **Outline for Remedial Investigation Report For Discussion Purposes**

*The following annotated outline is a suggested schematic for elements to be included in a Remedial Investigation report. It is not intended to replace MTCA's specific requirements as presented in 173-340-350(7) WAC.*

*The main purpose of the outline is to facilitate the preparation of a document that is clear, comprehensive, and to the point. A secondary, but important, purpose for this project is to make document preparation and review more efficient.*

### INTRODUCTION

*(concise, bulleted if possible)*

- Site name, VCP number, Name, address, and phone number of project consultant, Current owner/operator
- Purpose of document *(very brief restatement of what an RI is for, reference the WAC)*

### SITE IDENTIFICATION AND DESCRIPTION

*(focus on defining the site in the context of its' location)*

- Site discovery and regulatory status *(describe how the site was identified and where it is in the MTCA process)*
- Site and property location/definition *(define actual MTCA site location relative to property or study area)*
- Neighborhood setting
- Physiographic setting/topography

Figure – Vicinity Map *(preferably with topography)*

Figure – Property/Site Map *(preferably with topography)*

Appendix – Legal description of property, present owner and operator, chronological listing of past owners and operators

### PROPERTY DEVELOPMENT AND HISTORY

*(this section focuses on the built environment, both current and historical, and presents the sources of contamination and release mechanisms)*

- Past site uses and facilities
- Current site use and facilities
- Proposed or potential future site uses
- Zoning *(if appropriate)*
- Transportation/roads
- Utilities, water supply

- Potential sources of site contamination
- Potential sources of contamination from neighboring properties (*discuss nearby sources if known*)

Figure – Historical site features (*may be combined with Figure 2*)

Figure – Potential contaminant sources

Figure – Utilities (*may be combined with Figure 2*)

Table – Potential Contaminants

### ENVIRONMENTAL INVESTIGATION/INTERIM ACTION SUMMARY

*(Concise summary presentation of the investigations that have been done at the site, along with prior remedial actions. Focused mostly on figures and tables. Details of and methods used in former investigations and remediation in appendices)*

- Constituents of Concern (*brief discussion about which specific compounds were chosen for analysis and why*)
- Soil
- Surface water
- Ground water
- Sediment
- Air/soil vapor
- Natural resources/wildlife
- Cultural history/archeology
- Interim actions (*brief intro to prior remediation activities*)

Figure – Soil investigation data points (*show potential source areas*)

Figure – Surface water/groundwater investigation data points (*show potential source areas*)

Figure – Air investigation data points (*show potential source areas*)

Figure – Prior remediation activities

Table – Exploration Summary

Table – Analytical Schedule per media (*include analytical methods and reporting limits, as possible*)

Appendix – Previous Investigations (*detailed discussion goes here*)

Appendix - Exploration and sampling methodology (*may combine with Previous Investigations*)

Appendix – Boring/ Well logs

Appendix - Prior Interim Actions

## NATURAL CONDITIONS

- Geology  
(*focus on interpretation*)
  - Regional Setting (*brief*)
  - Property Geologic Conditions (*synthesis, not regurgitation of boring logs*)
  - Physical Properties (*unlikely to need this section, but in some cases may be useful to present data on soil adsorptive capacity, organic content, strength, etc.*)

Figure – Plan view of geologic unit distribution (*if helpful*)

Figure - Cross section A-A' (*show borings, wells, screened intervals, water levels*)

Figure – Cross section B-B' (*if necessary*)

- Surface Water  
(*brief description of the surface water system*)
  - Property drainage
  - Area surface water/floodplain issues
  - Regulatory classifications, if any (*e.g surface water classification*)

Figure – Surface water Conditions (*only if information not already in a prior figure*)

- Ground Water  
(*focus on interpretation, show on cross-sections*)
  - Occurrence (*aquifers, water levels, confinement, geometry, continuity, physical properties*)
  - Movement (*directions, gradient if important, seasonal fluctuations, tidal influence*)
  - Discharge
  - Recharge (*if significant for site*)
  - Regulatory classifications, if any (*e.g. sole source aquifer*)

Figure – Cross section with ground water information (*if not already included above*)

Figure – Water table/potentiometric surface maps (*for various seasons or tidal conditions, show surface water*)

Appendix – Ground water elevation data (*a table*)

- Natural Resources and Ecological Receptors

*(preparatory to a TEE)*

- Greenbelts and other natural habitat
- Wildlife
- Other Information required to conduct evaluations under -7491, -7492, or if necessary -

7493

Figure – showing natural areas, as appropriate

### CONTAMINANT OCCURRENCE AND MOVEMENT

*(brief text, mostly figures and tables, main point is to provide easy-to-understand figures showing the depth and breadth of contamination)*

- Waste Material (*sludges, fluids, stockpiles*)
- Soil
- Surface Water
- Ground Water
- Sediment
- Air/Soil Vapor

Figures – Cross sections showing soil contamination with depth

Figures – Plan views showing soil contamination across site (*relative to releases if known*)

Figures – Cross section showing ground water contamination with depth (*if appropriate*)

Figures – Plan views showing ground water contamination in each aquifer (*relative to soil contamination and P-head map*)

Figures – XY plots of specific contaminants with time (*as appropriate*)

Figures – Others as appropriate to show the distribution of surface water, ground water, or air data

Tables – All of the analytical data against final cleanup levels (*exceedances highlighted, no need to develop screening levels*)

Tables – Summary of exceedances (*if helpful*)

Appendix – QA report

Appendix – Analytical lab reports

### CONCEPTUAL MODEL

*(putting the whole story together, graphic illustrations are best)*

- Contaminant release/fate and transport/potential or actual receptors
- Data gaps (*is anything missing*)

## CLEANUP STANDARDS

*(developing appropriate cleanup standards based on receptors and pathways)*

- Soil
  - Reasonable maximum exposure
  - Cleanup levels protective of contact, ground water, inhalation, terrestrial species, surface water, sediment
  - Points of compliance
  - Regulatory classifications *(classification of soil as dangerous or solid waste)*
- Ground Water
  - Highest beneficial use/reasonable maximum exposure
  - Cleanup levels protective of potable use, inhalation, surface water, sediment
  - Points of compliance
- Other Media as appropriate
  - Cleanup levels protective of ....
  - Points of compliance

Table – Cleanup Levels *(all potentially applicable values with final selected cleanup level noted)*

## AREAS REQUIRING CLEANUP

*(the final story detailing where the contamination exceeds an applicable cleanup standard, brief text, mostly tables, figures)*

- Constituents of Concern *(a brief summary of compounds that exceed cleanup levels or “indicator hazardous substances” under MTCA. For most service station sites, the COCs should be the same)*
- Soil – vertical and lateral
- Ground water – vertical and later
- Sediment –
- Surface Water
- Soil Vapor/air

Figures – Plan view and vertical sections of areas requiring cleanup

## REFERENCES