

STATEMENT OF BASIS FOR REMEDY SELECTION  
NORTHWEST ENVIROSERVICE INC.

1500 AIRPORT WAY SOUTH  
SEATTLE, WASHINGTON

EPA ID No: WAD 05836 7152

Administrative Order on Consent 1093-02-09-3008(h)

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 10

SEATTLE, WASHINGTON

June 17, 2011

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**EXECUTIVE SUMMARY**

This document presents the Statement of Basis for the U.S. Environmental Protection Agency Region 10's (EPA's) proposed remedy selection pursuant to Administrative Order on Consent 1093-02-09-3008(h) (Order) under the Resource Conservation and Recovery Act (RCRA) at the former Northwest EnviroService Inc. (NWES) Facility. The former NWES Facility is located at 1500 Airport Way South, Seattle, Washington, 98134 (see Figure 1). This Statement of Basis provides background information on the facility and discusses cleanup objectives and the final remedy and institutional controls that the EPA is proposing to ensure the protection of human health and the environment. Upon conclusion of the public comment period, The EPA will issue a final determination and, if substantive comments are received, a Response to Comments.

The NWES Facility operated as a commercial hazardous waste management facility between 1979 and 1995, providing storage and treatment services to companies who generated hazardous waste. Hazardous waste processing ended at the facility in late 1995. Since then, Emerald Recycling has been operating a non-hazardous waste and used oil recycling and treatment facility at the location of the former NWES Facility.

In February 1994, NWES and the EPA entered into an Order pursuant to Section 3008(h) of RCRA. The Order requires NWES to conduct a RCRA Facility Investigation (RFI) and complete a Corrective Measures Study (CMS). After final remedy selection by the EPA, the Order allows NWES to withdraw its consent to implement the remedy selected by the EPA. Exercising this option would require the EPA to negotiate a new Order for remedy implementation. NWES' right to withdraw consent does not exist until the EPA has selected a final corrective measure, NWES initiates a dispute pursuant to the Order over the selected remedy, and the EPA has issued a final decision on the dispute under the dispute resolution provision of the Order.

Soil sampling conducted by the NWES Facility identified volatile organic compounds (VOCs) and metals present in the subsurface soils and semi-volatile organic compounds (SVOCs) and metals in surface soils along the NWES Facility boundary. Hazardous VOC constituents have also been detected in NWES Facility groundwater monitoring wells. The RFI documented that surface soils throughout the NWES Facility have contaminant concentrations that exceed the current EPA Regional Screening Levels (RSLs)<sup>1</sup> for residential exposure and in some cases Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Method B cleanup standards for unrestricted (residential) land use. The EPA finds that corrective action is necessary at the site to address risks associated with exposure to contaminated soil and groundwater.

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<sup>1</sup> EPA Human Health Medium-Specific Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites (USEPA 2010).

This Statement of Basis is prepared pursuant to Section 7.17 of the Order. Under this Section, the EPA will provide the public with an opportunity to submit written comments and an opportunity for a public meeting regarding the EPA's proposed remedy, the final draft CMS, and the EPA's justification for proposing to approve or modify and approve the final draft CMS. The documents listed in the "References" section provide the basis for the EPA's proposed determination. The EPA believes that once the proposed remedy is adequately implemented, the NWES Facility will achieve "corrective action complete with controls".

A determination of "corrective action complete with controls" means that the EPA, under RCRA authority, has determined that human health and ecological risks have been appropriately addressed and as long as the described controls remain in place, additional corrective action activities are not necessary at the NWES facility. This determination is based on proposed cleanup levels, which are protective of the current and reasonably expected future use of the land and groundwater in the vicinity of the NWES Facility.

The Statement of Basis summarizes information that can be found in greater detail in the RFI and CMS Reports and other pertinent documents contained in the EPA's files for the NWES Facility. These documents are being made available for public review during the public comment period, from June 17 through August 1, 2011. Unless otherwise specified, the documents listed in the attached references will be available for public review. The location of these documents and the address for submitting written comments are provided in the last section of this Statement of Basis.

The EPA's proposed remedy will remove and/or prevent contact with soils significantly contaminated with vanadium above the proposed industrial use cleanup standard. Restrictive covenants would be required because the proposed soil cleanup standards are for industrial land use and the shallow aquifer is contaminated. The proposed restrictive covenant will limit land use to industrial purposes, prohibit the use of groundwater, and prohibit activities that could create a new exposure pathway. The EPA may modify the proposed remedy and institutional controls described herein, select another remedy, or require additional work based on new information or public comments. The EPA encourages the public to review the references to gain a more comprehensive understanding of and provide comments on the EPA's proposed remedy selection and corrective action complete determination.

## **NWES FACILITY BACKGROUND AND CORRECTIVE ACTION PROCESS**

The NWES Facility operated as a commercial hazardous waste management facility between 1979 and 1995, providing storage and treatment services to companies who generated hazardous waste. NWES submitted the required permit applications for operation of the NWES Facility, but chose to cease operation as a hazardous waste management facility in 1995 without having received a final permit.

The EPA conducted a RCRA Facility Assessment [*Final PR/VSF Report, Northwest EnviroService, Inc., Seattle, Washington* (RFA Report)] in October 1992. Releases and potential releases of hazardous wastes and/or hazardous constituents from Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) at the NWES Facility are documented in the RFA Report. Groundwater monitoring found hazardous constituents in monitoring wells, including trichloroethene, tetrachloroethene, vinyl chloride, methylene

chloride and benzene. Soil sampling identified VOCs (xylenes, trichloroethene, methylene chloride, trans-dichloroethene and benzene) and metals (chromium, copper, nickel, and lead) present in the subsurface soils. Samples collected by the EPA identified SVOCs (phenanthrene, fluoranthene, pyrene, bis(2-ethylhexyl) phthalate, and chrysene) and metals (lead, zinc, antimony, cadmium, silver, and mercury) in surface soils along the NWES Facility boundary

In February 1994, NWES and the EPA entered into an Order pursuant to Section 3008(h) of RCRA. The Order requires NWES to:

- Complete a RCRA Facility Investigation to identify and characterize any releases of hazardous constituents from SWMUs and AOCs at the NWES Facility, characterize the concentration and extent of contamination released at and from the NWES Facility, support the development of alternatives from which a corrective measure will be selected, and identify any additional SWMUs or AOCs. The April 2004 Revised Final RFI Report was approved with modifications by the EPA on June 16, 2004.
- Complete a Corrective Measures Study to develop and evaluate potential corrective measures to remedy any contamination at and or released from the NWES Facility which exceeds the media-specific target cleanup standards established by the EPA. The Order required NWES to identify the potential corrective measures for the containment, treatment, and/or disposal of contamination and include in the CMS the corrective measure recommended by NWES. The revised CMS is dated April 2011.
- Implement the corrective measure selected by the EPA, or exercise its right to withdraw its consent to implement the corrective measure selected by the EPA. Exercising this option would require the EPA to negotiate a new Order for remedy implementation.

Upon determination by the EPA that the remedy has been appropriately implemented, the Agency may issue a determination of “corrective action complete” either with or without controls. Whether the determination made by the EPA includes controls depends on the degree of cleanup. If the cleanup meets unrestricted land use cleanup levels, then the determination that corrective action is complete without controls may be issued. If the cleanup does not meet unrestricted land use cleanup levels, then the EPA will require ongoing operation and maintenance of the remedy, including institutional controls as necessary.

## **PHYSICAL SETTING**

The NWES Facility occupies approximately 1.25 acres in the northeast portion of the industrial district of Seattle. It is located between Interstate 5 and Airport Way South, and extends from South Atlantic Street to South Holgate Street. It is approximately one mile east of the East Waterway of the Lower Duwamish Waterway, and overlies filled tidelands. Beyond Interstate 5 to the east, a steep hillside leads to the Beacon Hill neighborhood of Seattle.

The southern portion of the NWES Facility contains several buildings including an administration building. In 1996, NWES requested that the Washington State Department of Ecology (Ecology) accept closure certification for this portion of the NWES Facility. In January 1997, Ecology determined that closure was not required as there were no hazardous waste

management units located on this portion of the property. Ecology also determined that no further action would be required so long as certain requirements were met, including a restrictive covenant. The EPA agrees that no further action is required for this property and did not require further investigation of the southern portion of the NWES Facility during the RFI. Figure 1 outlines the northern portion of the NWES Facility.

During the RFI, push-probe sampling was used to investigate hydrogeologic conditions. Figure 2 shows the locations of the monitoring wells and push-probes used to create hydrogeologic cross section figures. The north-south hydrogeologic cross section shows a clay aquitard extending the length of the NWES Facility. The aquitard thickness ranges from 4.7 feet at the southern end to 5.5 feet at the northern end. The RFI showed that the aquitard is much thicker in the downgradient (westerly) groundwater flow direction. At one location across the street from the NWES Facility the aquitard is 19.5 feet thick. Figure 3, the north-south hydrogeologic cross section, shows a thin permeable fill layer consisting of gravel or silty sand. Under this layer is a clay layer with intermittent lenses of sand. The shallow aquifer beneath the clay layer consists of sand or gravel with varying amounts of silt. Beneath the shallow aquifer is a clay aquitard with thin sand lenses encountered at some locations. Below the clay aquitard is a lower aquifer consisting of sand or gravel with varying amounts of silt. A few locations showed small amounts of peat or wood debris near the interface between the clay aquitard and the lower aquifer.

Figure 4, the east-west hydrogeologic cross section, shows the shallow aquifer on the eastern edge of the NWES Facility exists in a very thick permeable layer consisting of sand or gravel with varying amounts of silt. The thick permeable layer is broken up by the first clay layer encountered in monitoring well and probe logs in the western portion of the NWES Facility. The probe completed across the street from the NWES Facility shows a permeable layer consisting of sand or sand with gravel that is five feet thick. Beneath this permeable layer is a clay layer that is eighteen feet thick. The shallow aquifer was not encountered at the location across the street from the NWES Facility.

The hydrogeologic logs indicate that the shallow aquifer beneath the NWES Facility pinches out at or upgradient of the very thick clay layer encountered in the probes completed across the street from the NWES Facility. The EPA has determined that the shallow aquifer is an isolated system known as a 'perched aquifer' with no connection to other water bodies in the Lower Duwamish Valley.

## **PROPOSED CLEANUP LEVELS**

Cleanup levels under RCRA are established to ensure that contaminant concentrations do not pose unacceptable risks to human health or the environment. In establishing these levels, the EPA must identify the contaminants of concern (COCs) and the current and reasonably likely future uses of the land and groundwater. These decisions are then used to determine potential exposure routes. In evaluating risk for each potential exposure pathway, the EPA compared site contamination to cleanup levels based on the EPA risk-based screening levels (RSLs). Ecology's MTCA cleanup standards were also considered. Proposed cleanup levels were considered for soil, indoor air, and groundwater, as discussed below.

## Soil Contaminants

In the north end of the NWES Facility, samples were collected from soil beneath the soil/concrete interface and were analyzed for a reduced list of parameters: arsenic, benzene, cadmium, chromium, lead, and vinyl chloride. Only arsenic and lead exceeded unrestricted land use criteria. The EPA RSLs for lead are 400 mg/Kg and 800 mg/Kg for residential and industrial exposures, respectively. None of the soil lead results exceeded industrial RSL concentrations. Lead was not considered further as a COC for soil as only one out of twenty-four samples exceeded both the EPA residential use RSL and the MTCA unrestricted land use cleanup level.

RFI shallow surface soil samples were collected NWES Facility-wide from just below the concrete slab. These samples were analyzed for the Appendix IX VOCs, SVOCs, Organochlorine Pesticides (Pesticides), Polychlorinated biphenyls (PCBs), herbicides and polychlorinated dibenzodioxins/polychlorinated dibenzofurans (PCDDs/PCDFs). One shallow soil sample was collected beneath the oil-water separator and analyzed for benzene, arsenic, cadmium, chromium and lead. Shallow soil and concrete core material samples were also collected at two sump locations. Both samples were analyzed for benzene, tetrachloroethene, and trichloroethene, and one was analyzed for chromium. Soil samples were collected at depth near the soil-water interface at two push-probe locations. These “deep” push probe soil samples were analyzed for benzene, vinyl chloride, arsenic, cadmium, chromium and lead.

Based on the RFI sample results, the EPA determined that benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, indeno[1,2,3-cd]pyrene, antimony, arsenic, chromium (hexavalent), and vanadium are contaminants of concern for soil and established soil target cleanup standards for these compounds. Target cleanup standards for total carcinogenic polyaromatic hydrocarbons (PAHs) (total c-PAH) were also established based on MTCA criteria.

## Proposed soil cleanup standards

Land use at the NWES Facility has been industrial for decades. Land use for adjacent parcels to the north, west and south has also been industrial. A steep bank and fir trees block the view of Interstate 5 which is just east of the NWES Facility. East of I-5 is the Beacon Hill area of Seattle. Given the historic use as a hazardous waste treatment facility and current use as a non-hazardous waste and used oil recycling facility, the EPA is proposing soil cleanup standards suitable for continued industrial use of the NWES Facility. Figure 5 depicts RFI soil sample results above the industrial use cleanup standards proposed by the EPA.

The RFI documented that surface soils throughout the NWES Facility have soil contaminant concentrations that exceed target cleanup standards for unrestricted (residential) land use. The EPA is not proposing unrestricted land use cleanup standards. However, documentation of the extent of contamination above the target cleanup standards for unrestricted use is required to determine which parcels will require a covenant to restrict land use to industrial use. See Table 1 for the COCs in soil, the EPA’s proposed cleanup standards for industrial land use, and target cleanup standards for unrestricted land use. Figure 6 depicts RFI soil sample results above the unrestricted land use target cleanup standards. Individual exceedances for benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene,

benzo[k]fluoranthene, and indeno[1,2,3-cd]pyrene are not depicted for these PAH compounds. Instead, exceedances for the unrestricted land use total c-PAH cleanup standard are depicted.

### Groundwater Contaminants

Groundwater samples from the shallow aquifer were analyzed for VOCs, SVOCs, Pesticides, PCBs, total and dissolved metals, herbicides and PCDDs/PCDFs. Two push probe groundwater samples from the lower aquifer were analyzed for a focused list of VOCs and for total and dissolved lead.

The RFI Report states that the groundwater in the shallow aquifer beneath the NWES Facility is not a potential source of drinking water for the following reasons: 1) the groundwater does not currently serve as a drinking water source, and 2) the groundwater is not present in sufficient quantity. The EPA agrees that the shallow aquifer beneath the NWES Facility does not produce sufficient quantities of water to enable it to be used as a drinking water source as the thickness of this unit is inadequate to install a potable well that meets the requirements set forth in WAC-173-160. Therefore, cleanup standards based on protection of drinking water would not be applicable.

Based on data presented in the RFI Report, the EPA has concluded that the shallow groundwater beneath the NWES Facility consists of a thin saturated perched unit (the shallow aquifer) that has been impacted by historic operations. This saturated unit is bound below and to the west (down gradient) by a low permeability clay unit. Contaminated shallow groundwater from this unit should never reach the nearest downgradient surface water located a mile to the west. Therefore, cleanup standards based on protection of surface water would not be applicable.

Given that there is insufficient shallow groundwater beneath the NWES Facility to be used as a drinking water source and that the contaminated shallow groundwater should not impact surface water, the EPA is proposing that cleanup standards are not required for shallow groundwater beneath the NWES Facility. The EPA is proposing to not require long-term groundwater monitoring for this remedy. In order to ensure that groundwater use does not change in the future, the EPA is proposing to require a restrictive covenant be placed on the titles to the property parcels. The proposed restrictive covenant will prohibit the use of groundwater from the NWES Facility. Restrictive covenants run with the land regardless of any future changes in ownership.

### Indoor Air Contaminants

Contaminants of concern for possible vapor intrusion into indoor air are acrylonitrile, benzene, chloroethane, and 2-methylnaphthalene in groundwater. None of these compounds are COCs in soil. The RFI Report states that the NWES Facility only has processing buildings that are not enclosed, and that concrete and asphalt paving minimizes the potential for air emissions from potential contamination in the subsurface.

Historic groundwater results were compared to vapor intrusion screening levels (VISLs) contained in Table 3c of the Office of Solid Waste and Emergency Response *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils*

*(Subsurface Vapor Intrusion Guidance)* (EPA530-D-02-004, November 2002). With the exception of benzene, the groundwater results are all below concentrations of concern for vapor intrusion. Although historic benzene results were above the 5 mg/L VISL for benzene in groundwater, recent benzene results are below the VISL.

Section 3 of the restrictive covenant prohibits, without prior written approval from Ecology, any activity on the property that may create a new exposure pathway. Potential future construction of an enclosed building is an activity that could create a new exposure (indoor air) pathway. The EPA is not proposing cleanup standards for vapor intrusion as there are no enclosed buildings at this time. The proposed restrictive covenant is sufficiently protective of human health as indoor air concerns only arise in the event of future enclosed buildings. The potential for vapor intrusion can be mitigated by engineering measures in the event future enclosed building construction is proposed and authorized by Ecology.

### **SUMMARY OF SOIL CONTAMINATION AND COMPARISON TO PROPOSED CLEANUP LEVELS**

Only arsenic (one surface soil location in the southern end of the NWES Facility) and vanadium (one surface soil sample taken near the southern end of the NWES Facility) exceed the proposed industrial use cleanup standard. Figure 5 shows locations where soil contamination exceeds the proposed industrial use cleanup standards. See the discussion below regarding chromium.

Of the soil samples, only one arsenic result is above the industrial target cleanup standard. This sample result is less than two times the cleanup level and less than ten percent of the sample results exceed the cleanup standard. According to Washington Administrative Code (WAC) 173-340-740 (7) (e) criteria for determining compliance with soil cleanup levels, the NWES Facility is in compliance with the proposed arsenic soil cleanup level. Therefore, a cleanup action for arsenic contamination is not evaluated or proposed.

The high vanadium result in one surface soil sample is many orders of magnitude above the proposed industrial cleanup standard. Alternative 2 proposes excavation for this relatively small area of vanadium contamination above the industrial cleanup standard. If selected and satisfactorily conducted, this remedy should only leave vanadium contamination above the unrestricted land use cleanup standard. Given the proximity of a stormwater conveyance from Interstate 5, it is possible that not all vanadium above the industrial cleanup standard can be practicably removed. The active tank farm to the south of this area may also be an impediment to complete removal of soil that is contaminated with vanadium above the proposed industrial cleanup standard.

Soil COCs are above target cleanup standards for unrestricted land use at most sample locations for shallow soil. Arsenic in the deep samples is below the 7.0 mg/Kg natural background concentration for Puget Sound soils. Total chromium results for the deep samples were also above the target cleanup standard for unrestricted land use for hexavalent

chromium. Figure 6 shows locations where soil contamination exceeds target cleanup standards for unrestricted land use. Since the EPA is proposing cleanup standards based on industrial use, restrictive covenants will be placed on areas where target cleanup standards for unrestricted land use are exceeded (see Figure 6).

All analyses for chromium were for total chromium rather than hexavalent chromium. Total chromium soil results were conservatively compared to RSLs for hexavalent chromium. Five sample locations contain total chromium above the proposed hexavalent chromium industrial cleanup standard of 56 mg/Kg. The amount of hexavalent chromium, if any, in these samples is unknown. None of the chromium results are above levels of concern for the trivalent form of chromium.

The maximum soil sample result for total chromium is at the same location where vanadium exceeds the proposed industrial cleanup standard. If Alternative 2, vanadium removal, is selected as the final remedy, the soil will be tested before and after the removal for total and hexavalent chromium. If testing for hexavalent chromium shows that the form of chromium at this location is mainly the trivalent form of chromium, then it can be inferred that this is also the case for other locations. In the event further testing shows that the form of chromium present in the soils at the NWES Facility is the more toxic hexavalent form, additional work will be required to assess risk and/or require further cleanup due to any hexavalent chromium remaining above the proposed industrial use cleanup standard.

In May 2009 the EPA proposed revising the draft interim preliminary remediation goals (PRGs) for dioxin in soil (<http://epa.gov/superfund/health/contaminants/dioxin/dioxinsoil.html>). Under the draft interim PRG, the EPA evaluates polychlorinated dibenzodioxins and poly chlorinated dibenzofurans (PCDDs/PCDFs) as a collective constituent, dioxin toxicity equivalents (TEQs). Data for individual congeners are multiplied by toxicity equivalency factors (TEFs) to adjust for relative toxicity and summed to derive the TEQ. The draft interim residential PRG is 72 ng/Kg (nanograms per kilogram or parts per trillion) and the draft interim industrial PRG is 950 ng/Kg.

The RFI includes PCDD/PCDF data but only compared the data to older MTCA standards for 1,2,3,7,8,9-Hexachlorodibenzodioxin and 2,3,7,8-Tetrachlorodibenzodioxin. The EPA recalculated the two RFI TEQs that were above the draft interim residential PRG using the updated TEFs. The TEQs went from 91 ng/Kg to 89 ng/Kg (sample A1-S-001) and from 85 ng/Kg to 80 ng/Kg (sample A8-S-008). PCDD/PCDF contamination is only of concern for unrestricted use at two surface soil sample locations. Remedial action is not proposed for PCDD/PCDF contamination. However the presence of PCDD/PCDF contamination above unrestricted use standards is proposed to be recorded in a restrictive covenant.

## **SUMMARY OF EXTENT OF GROUNDWATER CONTAMINATION**

The shallow aquifer was sampled several times during the RFI. Samples were analyzed for total and dissolved metals, VOCs, SVOCs, Pesticides, PCBs, herbicides, metals,

PCDDs/PCDFs, arsenic, and hexane. Most of the analytes were non-detect. Most of the analytes that were detected were below concentrations of concern for groundwater. Low levels of acrylonitrile, benzene, ethyl chloride (chloroethane), 2-methylnaphthalene, benzo(a)anthracene, benzo(b)fluoranthene, and lead were detected. These constituents are potential contaminants of concern in shallow groundwater. Table 2 summarizes RFI, 2009, and 2010 groundwater data for these potential contaminants of concern.

The lower aquifer was also sampled during the RFI for selected VOCs and total and dissolved lead. The only lower aquifer results that exceeded a drinking water maximum contaminant level (MCL) or MTCA criteria were for total lead. Due to routine turbidity encountered during probe sampling, the samples were also analyzed for dissolved lead. The dissolved lead results for both probes were non-detect.

As discussed above in Proposed Cleanup Levels, neither drinking water standards nor surface water standards represent appropriate cleanup levels in this case. The EPA is proposing that cleanup standards are not required for shallow groundwater beneath the NWES Facility. The proposed restrictive covenant prohibits the use of groundwater from the NWES Facility.

## **EVALUATION OF ALTERNATIVES AND PROPOSED FINAL REMEDY**

The Respondents submitted a draft CMS in 2009 and a revised CMS in 2011. Three alternatives for cleanup or containment were initially screened against NWES Facility characteristics, contaminant characteristics, and technology limitations:

Alternative 1 consists of containment of contaminated soils through engineering and institutional controls. The engineering control consists of maintenance of existing asphalt and concrete pavement to prevent exposure to soils. Institutional controls consist of security measures to limit access and exposure to hazardous substances and restrictive covenants to maintain industrial land use and prohibit groundwater use. Institutional controls are required as the proposed soil cleanup standards are for industrial land use and because the shallow aquifer is contaminated.

Alternative 2 consists of excavation of the vanadium hot spot combined with restrictive covenants. Excavated contaminated soils, after characterization for disposal, would be disposed of at an appropriate off-site facility. Restrictive covenants would be required because the proposed soil cleanup standards are for industrial land use and the shallow aquifer is contaminated.

Alternative 3 consists of in-situ soil flushing which involves injection and recovery of solvent solution to remove soil metals contaminants.

Alternatives 1 and 2 were retained for further development and evaluation against technical criteria: 1) performance, 2) reliability, 3) implementability, and 4) safety. Environmental, human health and institutional assessments were conducted for each alternative. Cost estimates for each alternative were also developed. Both alternatives require institutional controls in the form of an Environmental Covenant. Therefore, if the EPA proposed remedy becomes the final remedy and is adequately implemented, the EPA will issue a corrective action complete with controls determination.

Alternative 3 was not retained beyond the initial screening of the alternatives. Only one sample location has contamination significantly above a proposed industrial cleanup standard. This is a surface soil sample location near the southern end of the NWES Facility which contains vanadium. In-situ soil flushing technology has not been proven effective for vanadium.

## Technical Criteria

### **Performance**

The performance evaluation considers the effectiveness, useful life and reduction in toxicity, mobility and volume of contaminants. According to the September 2009 Agency for Toxic Substances and Disease Registry (ATSDR) *ToxFAQs™ for Vanadium*, vanadium binds strongly to soil and does not dissolve well in water. Alternative 1 can effectively contain the vanadium contaminated soil. However, the existing pavement must be maintained in perpetuity.

Alternative 2, if fully implemented, permanently removes the vanadium contaminated soil exceeding the proposed industrial cleanup standard. Disposal in an appropriate off-site landfill would effectively contain the vanadium contaminated soil.

### **Reliability**

The reliability evaluation considers long-term operation and maintenance requirements and demonstrated and expected reliability. Both alternatives require institutional controls to maintain future use as industrial and to prohibit groundwater use and creation of new exposure pathways. Alternative 1 requires long-term inspection, repair, and replacement as needed of the asphalt/concrete pavement at the site. Effects from failure in the pavement would depend on how soon the repairs are made and whether there is exposure to contaminated soils. Pavement is readily correctable.

Alternative 2, if fully implemented, would not require long-term maintenance at the site. Engineered controls at landfills designed to accept contaminated soils also have been shown to be reliable.

### **Implementability**

The implementability evaluation considers constructability, implementation time, and beneficial results timeframe. Once implemented, both alternatives would immediately achieve beneficial results. Alternative 1 does not require physical construction and implementation as concrete and asphalt pavement is already in place.

Alternative 2 requires physical construction that could be completed in less than a year. It is not known whether vanadium contamination above the proposed industrial cleanup level extends beyond an area that can be readily excavated. It may not be possible to fully implement Alternative 2 while Emerald Recycling continues its operations at the site. The South Tank Farm is in the vicinity of the vanadium contamination. An underground stormwater conveyance from I-5 may also interfere with complete excavation. If complete removal to below the proposed industrial cleanup standard is not possible in the near term, mitigation

would be necessary. The EPA would require a restrictive covenant for the affected parcel to require further excavation where possible during future stormwater line repairs/replacement and/or replacement of tanks.

## **Safety**

Compared to Alternative 1, Alternative 2 has safety risks associated with:

1. Short-term worker exposure to dust during excavation and handling of contaminated soils. Short-term exposure to dust can be mitigated through use of personnel protective equipment and dust suppression measures.
2. Traffic accidents during off-site transport and disposal. The small risk of a traffic accident cannot be completely removed, but can be reduced by avoiding transport during peak rush hour periods or inclement weather.

## Human Health Assessment

Both alternatives minimize short and long term contaminant exposure to the general public. Both alternatives would expose site workers during maintenance or construction activities that temporarily uncover contaminated soil. Most of the contamination is below concentrations of concern for industrial workers. Alternative 1 would have short-term exposure risks for maintenance workers whenever soil contaminated above industrial cleanup standards is exposed.

When fully implemented, Alternative 2 would eliminate future exposure to soil contaminated above proposed industrial cleanup standards. During implementation of Alternative 2, there would be short-term exposure risks to workers.

## Environmental Assessment

Both alternatives result in continued industrial use of the NWES Facility. As such, beneficial environmental effects are not anticipated upon implementation of either alternative. Implementing either alternative should not have adverse effects on environmentally sensitive areas. Soil contamination above proposed industrial use cleanup standards will be removed or contained. Site hydrogeological conditions prevent migration of shallow contaminated groundwater and prevent exposure to downgradient surface water. The proposed restrictive covenant prohibits the use of groundwater from the NWES Facility. The proposed covenant also prohibits, without prior written approval from Ecology, any activity on the property that may create a new exposure pathway.

## Institutional Assessment

Both alternatives require restrictive covenants which will require interaction with land owners and government entities to implement. Alternative 2 has minimal permitting requirements associated with the shallow soil excavation.

## Cost

Estimated costs for each alternative are displayed in Tables 3 and 4. Both alternatives require restrictive covenants for each parcel of the NWES Facility. Alternative 1 also requires security measures, maintenance, inspection and repairs and implementation of an environmental management system. These costs are already implemented as part of the current business practice and additional costs would be minimal. Implementation of Alternative 1 would require perpetual maintenance of sufficient financial assurance to cover the activities required for Alternative 1.

Alternative 2 does not require continued maintenance of site paving or financial assurance. However, it does have costs associated with preparation of a corrective measures implementation work plan, and excavation, characterization, and disposal of the contaminated soil. Therefore, immediate cost to implement Alternative 2 is higher than Alternative 1. It is possible Alternative 2 cannot be fully implemented in one field event due to nearby tanks/utilities. If that happens, financial assurance would be required for future excavation at the time of utilities repairs/replacement and/or replacement of tanks.

## Proposed Remedy

Alternative 2 is identified as the preferred soil corrective measure in the CMS. The vanadium hot spot is many orders of magnitude above the proposed industrial use cleanup standard. The EPA proposes Alternative 2 as the final corrective measure. In the event Alternative 2 cannot be fully implemented, the EPA proposes subsequent application of Alternative 1 in the area(s) where remaining soil contamination significantly exceeds the industrial cleanup standard. Alternative 1 must be maintained until soil contaminated above the proposed industrial cleanup standard can be fully removed.

Industrial use cleanup standards are established based on the assumption that contact with the contaminated media is not prevented through engineering controls. The proposed industrial use cleanup standards do not require the presence of paving to limit worker exposure. Maintaining paving at the NWES Facility is a good business practice. However, the EPA proposes to require implementation of Alternative 1 only where soil contamination remains significantly above proposed industrial cleanup standards.

If analyses conducted during implementation of Alternative 2 show that soils contain hexavalent chromium, Alternative 1 must also be implemented where total chromium concentrations exceed the proposed industrial cleanup standard for chromium that is based on hexavalent chromium. In the event chromium in site soils is of the hexavalent form, the EPA may require additional work to consider corrective measures for hexavalent chromium.

## **THE EPA'S PRINCIPLES FOR GREENER CLEANUPS**

Successful green cleanup practices can help achieve cleanup objectives by ensuring protectiveness while decreasing the environmental footprint of the cleanup activity itself. Some examples include using equipment that emits less particulate matter to the air, sizing equipment accurately to avoid wasted energy, water, and material, and using renewable energy or recycled material to decrease greenhouse gas emissions and conserve resources.

Navigation links to the Greener Cleanups Home page and other pages containing information on green cleanups can be found at this web page:

<http://www.epa.gov/oswer/greencleanups/principles.html>

Region 10's Clean and Green Policy does not change how or why cleanup decisions are made, but supports greener cleanups by promoting sustainable technologies and practices in our cleanup programs. The EPA intends to measure the environmental benefits associated with implementing this Clean and Green Policy. The policy is posted at: <http://yosemite.epa.gov/R10/extaff.nsf/programs/greencleanups>. The EPA strongly encourages all RCRA facilities conducting cleanup to incorporate these practices in cleanup activities. For this proposed cleanup, appropriate practices would include use of cleaner fuels, diesel emissions controls and retrofits, and emission reduction strategies.

### **OPPORTUNITY FOR PUBLIC COMMENT**

The EPA requests comments from the community on the proposed final remedy and if implemented successfully, the proposal to determine that corrective action is complete with institutional controls at the former NWES Facility. The EPA has established a 45-day public comment period from June 17, 2011 to August 1, 2011, to encourage participation in this decision-making process. Comments must be postmarked or emailed by August 1, 2011, and should include all reasonably available references, factual grounds, and supporting materials. The EPA will respond to written public comments received during this time period, and will conduct a public meeting or hearing if it appears that public interest warrants such a meeting. The EPA may allow additional time for public comment on a revised Statement of Basis if the Agency determines that: 1) a different final remedy is needed, or 2) a corrective action complete with controls determination is inappropriate for the NWES Facility. Public comments will be summarized, along with the Agency's response, in the Final Decision and Response to Comments which will be prepared subsequent to the public comment period. If no substantive comments are received during the public comment period, the EPA intends to approve the CMS, select the final remedy and work with Ecology and NWES to finalize the Environmental Covenants.

As noted, the EPA will consider holding a public meeting or hearing if there is sufficient interest. If you are interested in attending a public meeting, please submit a written request stating the nature of the issues proposed to be raised to Laura Castrilli at the address below by June 30, 2011. The EPA will not hold a public hearing if we do not receive sufficient requests by June 30, 2011. If you did not request a hearing, but want to find out if a hearing will take place, please call Laura Castrilli at 1-800-424-4372, extension 4323.

The Statement of Basis for the Proposed Final Remedy Selection and Corrective Action Complete with Controls Determination, the draft Environmental Covenant, and documents concerning RCRA investigation and corrective action efforts at the former NWES Facility are available for public review at the following location:

U.S. Environmental Protection Agency  
Region 10 Library  
1200 6th Avenue  
Seattle, Washington 98101

Local Phone: (206) 553-0256  
Toll free in Region 10: (800) 424-4EPA  
TTY: (800) 877-8339

Hours of operation: 9:00am-noon and 1:00pm-4:00pm, Monday-Friday (except federal holidays).

The draft final CMS, Statement of Basis, and the proposed Environmental Covenant are also available on the following website:

<http://yosemite.epa.gov/R10/owcm.nsf/RCRA/nwenviroservice>.

To submit written comments, or to obtain further information, contact:

Laura Castrilli  
U.S. Environmental Protection Agency, Region 10  
1200 6th Avenue, Suite 900, Mail Stop AWT-121  
Seattle, Washington 98101  
(206) 553-4323  
[castrilli.laura@epa.gov](mailto:castrilli.laura@epa.gov)

## REFERENCES

Revised Final RCRA Facility Investigation Report, Northwest EnviroService, Inc., Airport Way South Facility, Seattle, Washington, April 2004

Revised Section 5 of the Revised Final RCRA Facility Investigation Report, August 11, 2004 (CH2MHILL cover letter and revised section sent via facsimile)

Final Report Corrective Measures Study, Prepared for Northwest EnviroService, Inc., Airport Way South Facility, Seattle, Washington, April 2011, CH2MHILL

EPA Human Health Medium-Specific Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, November 2010 revision, available at:  
[http://www.epa.gov/reg3hwmd/risk/human/rb-concentration\\_table/index.htm](http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm)

Model Toxics Control Act Cleanup Levels and Risk Calculation (CLARC) tool, available at:  
<https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>

Draft Recommended Interim Preliminary Remediation Goals for Dioxin in Soil at CERCLA and RCRA Sites, Public Review Draft, December 2009, Office of Solid Waste and Emergency Response (OSWER) publication 9200.3-56

Available at:

<http://epa.gov/superfund/health/contaminants/dioxin/dioxinsoil.html>

## FIGURES

Figure 1 – NWES Facility (source Figure 1-1 of the NWES draft Final CMS)

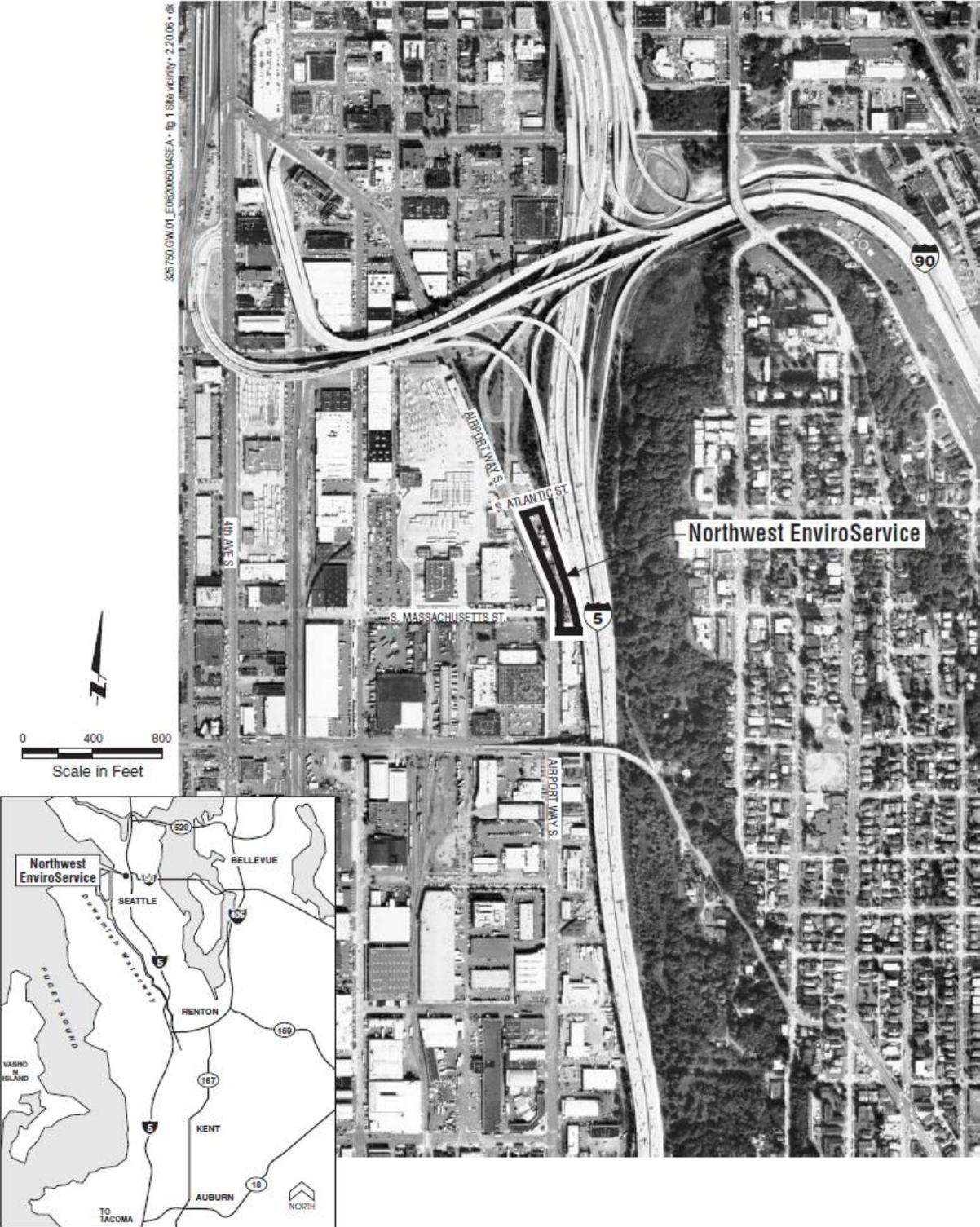
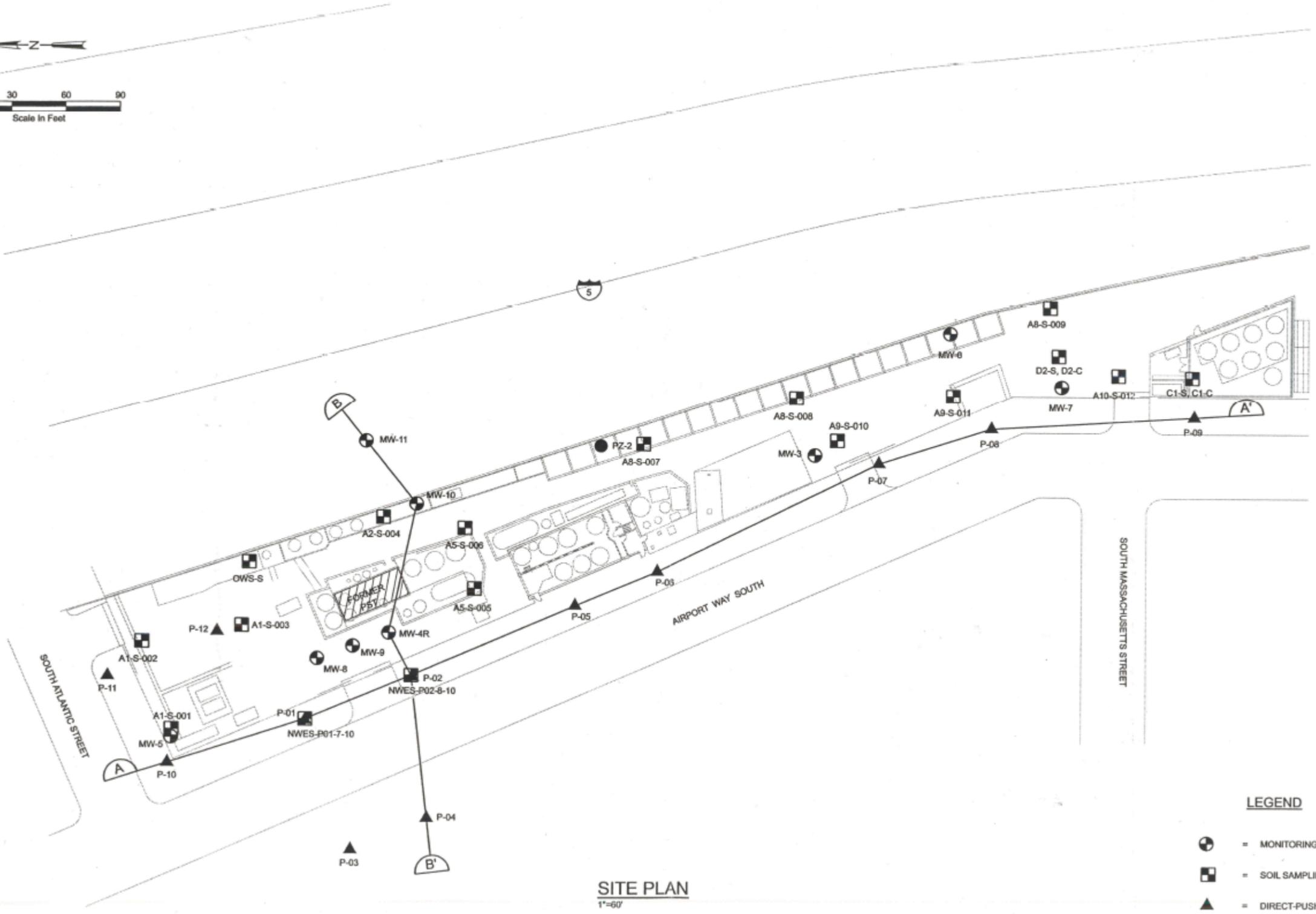
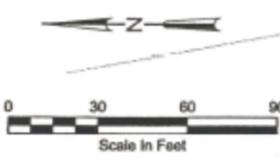


Figure 2 Locations of wells/pushprobes used for hydrogeologic cross sections (source Figure 4-1 of the NWES RFI)



**SITE PLAN**  
1"=60'

**LEGEND**

-  = MONITORING WELLS
-  = SOIL SAMPLING LOCATIONS
-  = DIRECT-PUSH PROBE LOCATIONS

Figure 3 North-South hydrogeologic cross section (source Figure 4-2 of the NWES RFI)

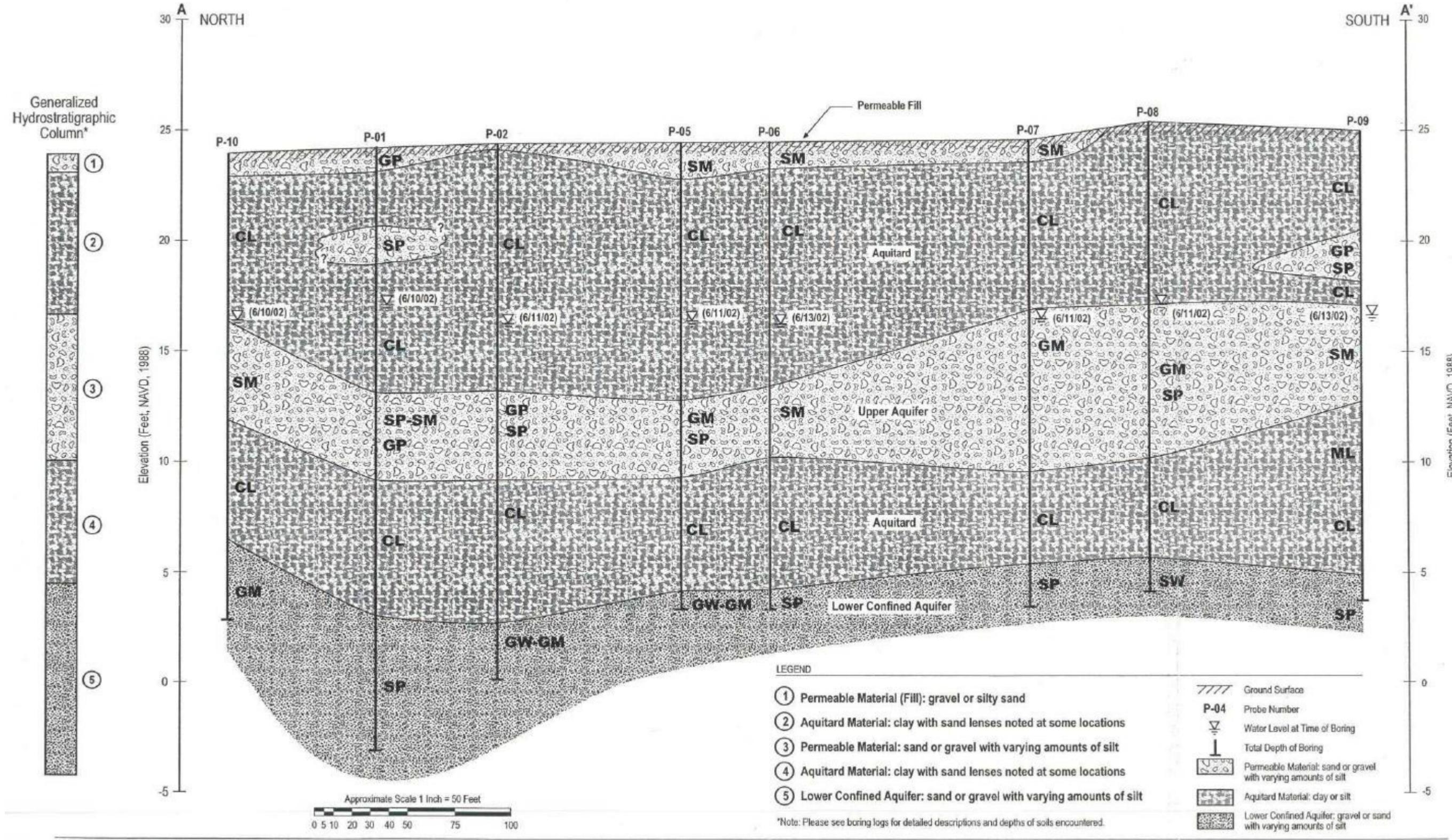


Figure 4 East-West hydrogeologic cross section (source Figure 4-3 of the NWES RFI)

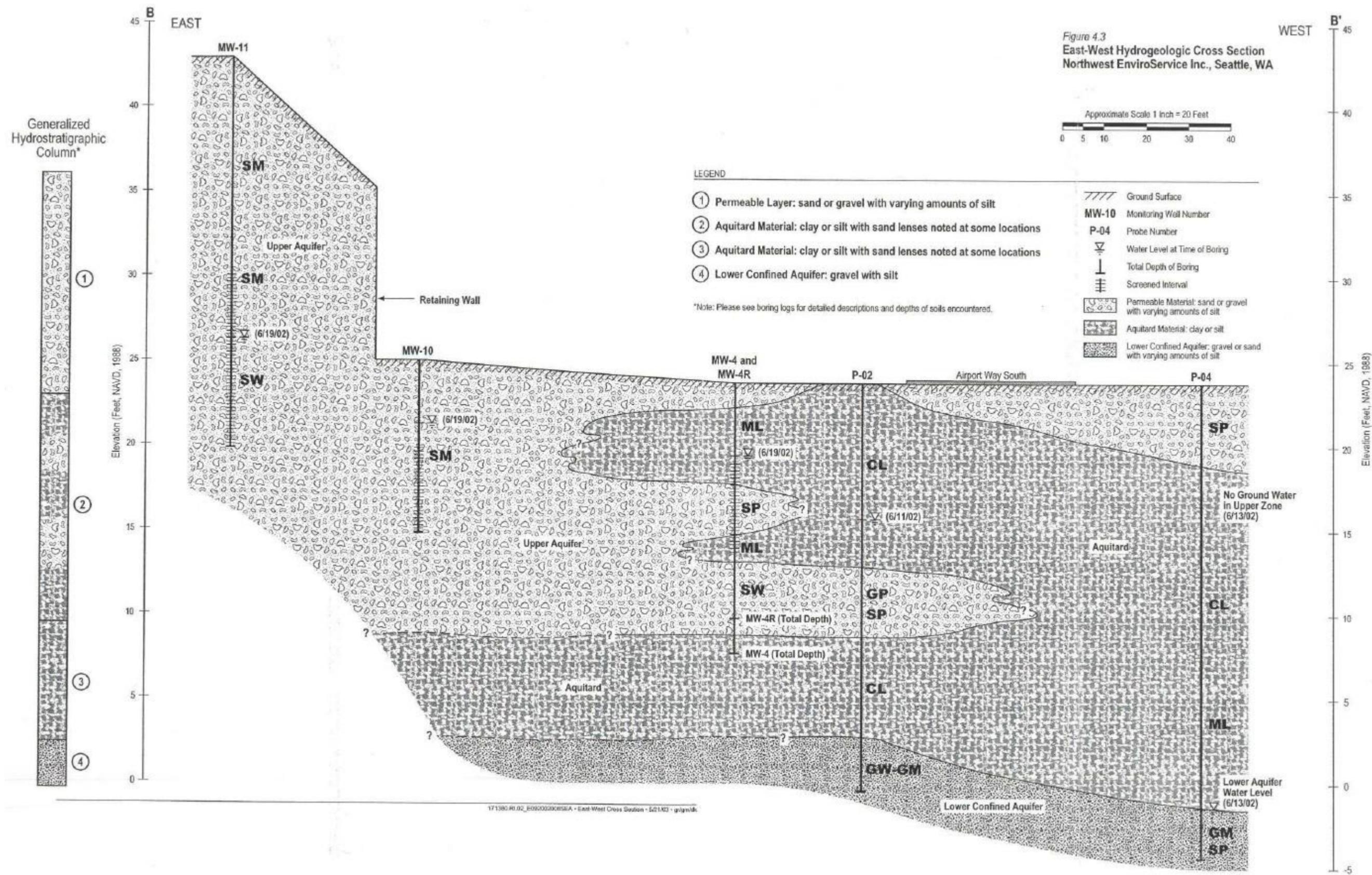


Figure 5: Soil Contamination exceeding proposed industrial use cleanup standards (source: Figure 3-2 of the NWES draft Final CMS)

Contaminant of Concern	Industrial Soil Target Cleanup Standard (mg/kg)
Benzo(a)anthracene	21
Benzo(a)pyrene	2.1
Benzo(b)fluoranthene	21
Benzo(k)fluoranthene	180
Indeno(1,2,3-cd)pyrene	21
Total cPAH	18
Antimony	410
Arsenic	88
Chromium, hexavalent	56
Vanadium	72

**Legend**

- Soil sampling locations
- Soil sample name
- Chromium, Total 63.1: Soil concentration greater than Industrial Target Cleanup Standard
- Vanadium 1,050: Soil concentration greater than 2X Industrial Target Cleanup Standard

All units in mg/kg

Note: Data from Tables 4.6 and 4.7 of RFI (CH2M HILL, 2004)

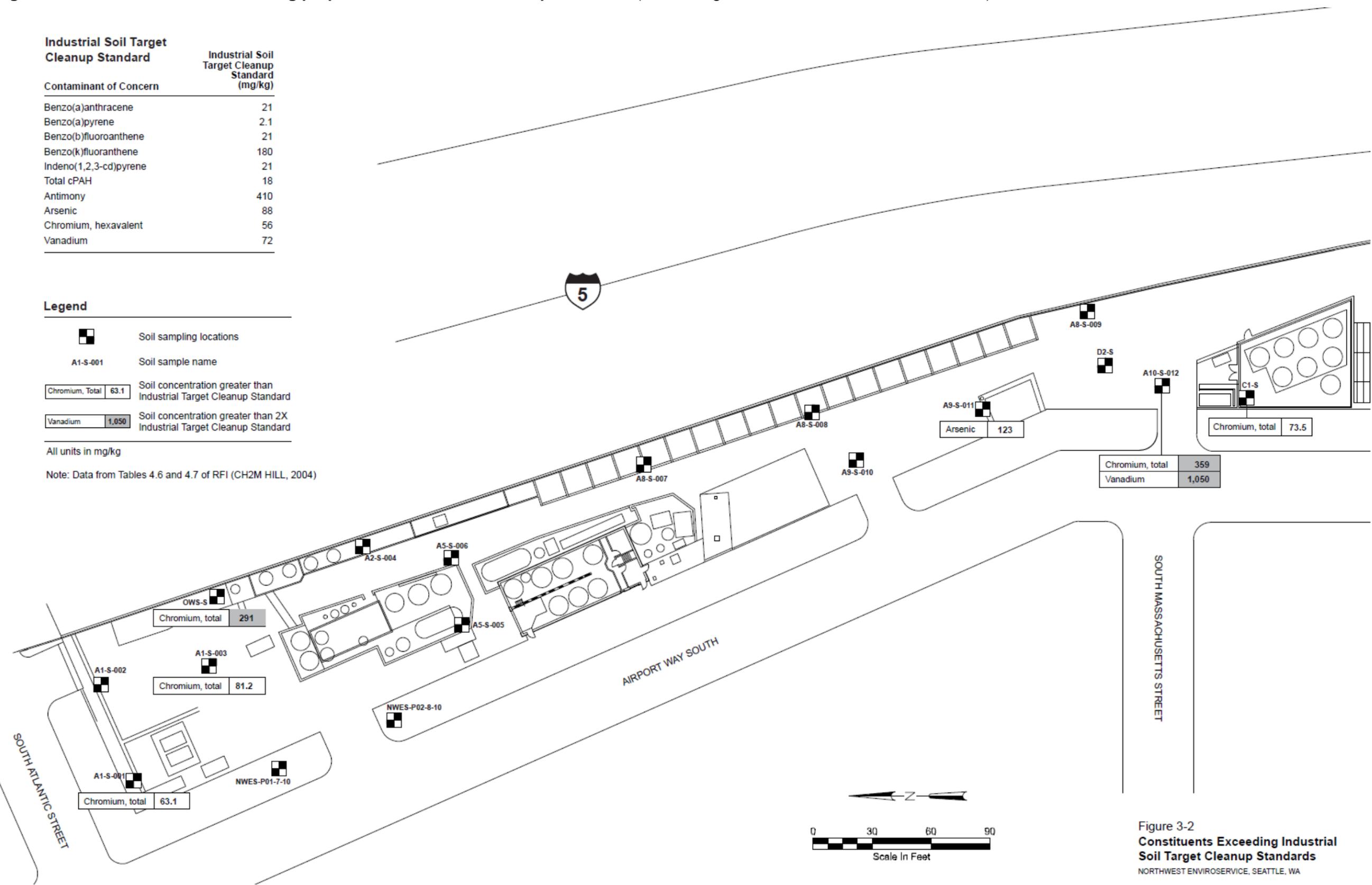


Figure 3-2  
**Constituents Exceeding Industrial Soil Target Cleanup Standards**  
 NORTHWEST ENVIROSERVICE, SEATTLE, WA

Figure 6: Soil Contamination exceeding unrestricted use screening criteria (source: Figure 3-1 of the NWES draft Final CMS)

Unrestricted Use Soil Cleanup Standard	Unrestricted Use Soil Cleanup Standard (mg/kg)
Contaminant of Concern <sup>a</sup>	
Total cPAH	0.14
Antimony	31
Arsenic	0.39
Chromium, hexavalent	0.29
Vanadium	5.5

<sup>a</sup>Includes additional PAHs not listed.

**Legend**

- Soil sampling locations
- A1-S-001 Soil sample name
- Total cPAH 0.093 Soil concentration less than Unrestricted Land Use Cleanup Standard
- Vanadium 1.050 Soil concentration greater than Unrestricted Land Use Cleanup Standard

All units in mg/kg  
 U = Below detection limit  
 Note: Data from Tables 4.6 and 4.7 of RFI (CH2M HILL, 2004)

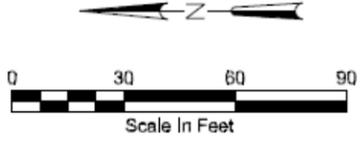
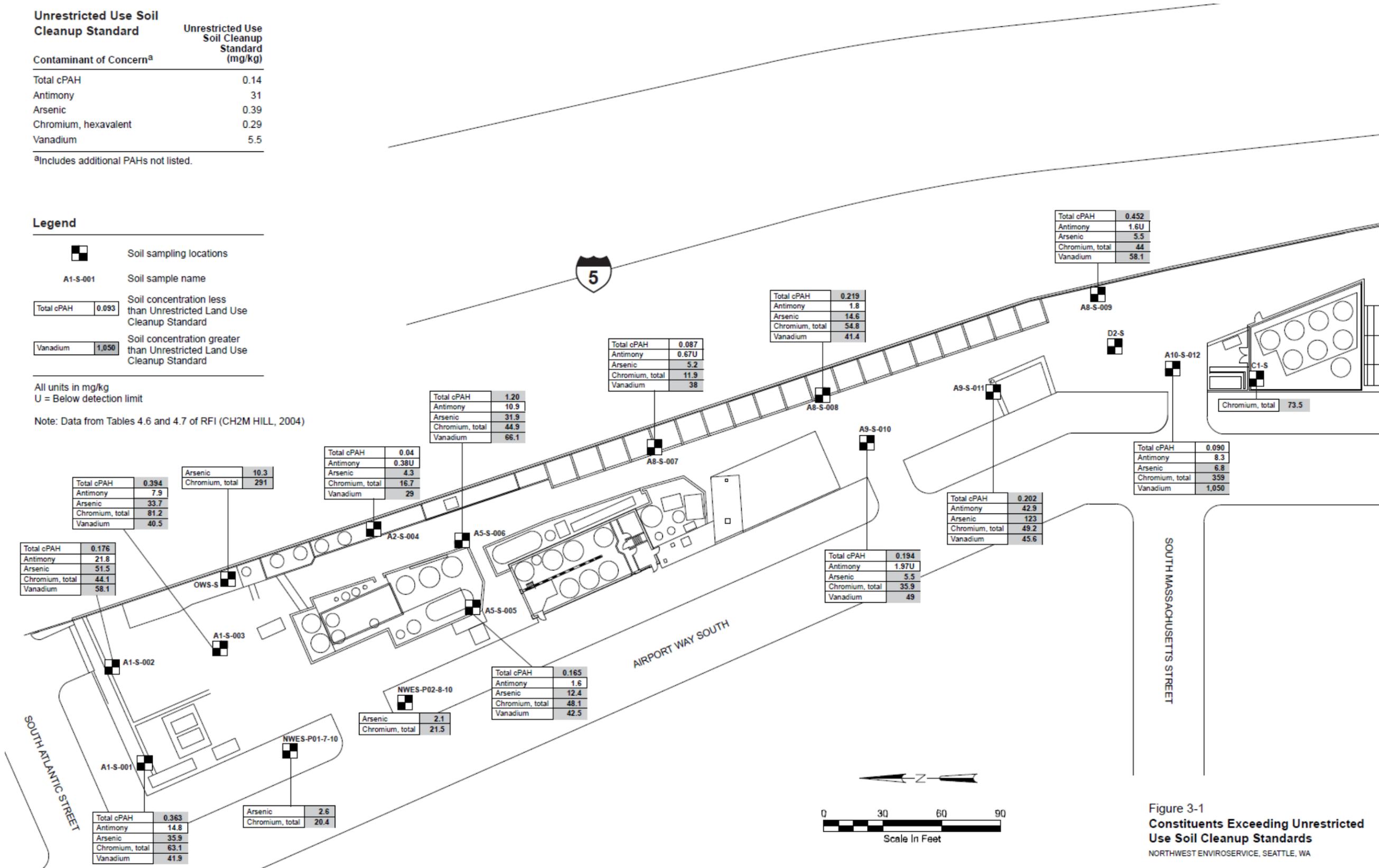


Figure 3-1  
 Constituents Exceeding Unrestricted Use Soil Cleanup Standards  
 NORTHWEST ENVIROSERVICE, SEATTLE, WA

## TABLES

<b>Table 1 COCs in Soil and Proposed Industrial Use Cleanup Standards</b>			
Contaminant of Concern in soil	Maximum Concentration (mg/Kg)	Proposed Industrial Use Soil Cleanup Standard (mg/Kg)	Target Unrestricted Use Cleanup Standard (mg/Kg)
Benzo[a]anthracene	1.2	21	0.137
Benzo[a]pyrene	0.94	2.1	0.015
Benzo[b]fluoranthene	0.91	21	0.137
Benzo[k]fluoranthene	0.32	180	0.137
Indeno[1,2,3-cd]pyrene	0.29	21	0.137
Total Carcinogenic PAHs (cPAHs)	NA	18	0.137
Antimony (total)	42.9	410	31
Arsenic (total)	123	88	0.39
Chromium (hexavalent)	359	56	0.29
Vanadium	1050	72	5.5

In addition to meeting the target cleanup standards for individual constituents the NWES Facility must meet the Total cPAH concentration. Total cPAH is calculated by multiplying individual constituent concentrations for seven cPAHs by the corresponding Toxicity Equivalency Factor (TEF) to adjust for relative toxicity and summing the results. See *Evaluating the Toxicity and Assessing the Carcinogenic Risk of Environmental Mixtures Using Toxicity Equivalency Factors*, Washington State Department of Ecology, available at: <https://fortress.wa.gov/ecy/clarc/FocusSheets/tef.pdf>

**Table 2 Summary of RFI and recent PST groundwater monitoring**

Groundwater Potential Contaminant of Concern	RFI groundwater sampling		PST well sampling		Various screening or regulatory criteria			
	Push Probes Max. Conc. (ug/L)	Wells Max. Conc. (ug/L)	2009 max	2010 max	Vapor Intrusion* (ug/L)	MCL (ug/L)	MTCA (ug/L)	EPA RSL (ug/L)
Benzo[a]anthracene	0.7J	ND <sup>1</sup>	**	**	NA	NA	0.12	0.029
Benzo[b]fluoranthene	0.64J	ND <sup>1</sup>	**	**	NA	NA	0.12	0.029
2-methynaphthalene	89	94	**	**	NA	NA	32	150
Acrylonitrile	2.8Y <sup>2</sup>	ND <sup>1</sup>	**	**	12	NA	0.081	0.045
Benzene	55 <sup>3</sup>	22	0.6	1.2	5	5	0.8	0.41
Chloroethane	120	6.2	3.5	4	40000	NA	15	21000
Lead (total)	48	3.3	104	210	NA	15	15	15

\* Lowest groundwater screening value from Table 3c of *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* November 2002, EPA530-D-02-004

\*\* No analysis. PST monitoring is for lead and selected VOCs.

ND Not Detected

NA Not Applicable

<sup>1</sup> Reporting limit(s) above screening values.

<sup>2</sup> This analyte was only reported for the November 2002 additional sampling at push probe location NWES-P09 and from the three monitoring wells analyzed for the Appendix IX constituent list. The Y qualifier is not explained at the end of the table nor in the summary data validation. This analyte was non-detect at 0.3 ug/L in the three monitoring wells.

<sup>3</sup> Second round sampling at NWES-PO9 had a result of 24 ug/L which was above the instrument linear range. The dilution analysis of 55 ug/L was qualified as rejected but noted to be considered an estimate in the RFI Report (dilution analysis was outside the sample holding time). The highest sample result not qualified due to quality control issues was 13 ug/L.

**Table 3 Alternative 1 Cost Estimate** (source Table 7-1 of the NWES draft Final CMS)

Corrective Measures Cost Estimate for Alternative 1 Containment

Item	Description	Unit	Unit Price	Quantity	Total	Implementation Status
1	Asphalt and Concrete Pavement				\$ -	Already implemented
3	Security Measures				\$ -	Currently implemented as part of standard business operation.
3	Restrictive Covenants	Hour	\$ 300	24	\$7,200	Will be implemented following approval of the corrective measures.
4	Maintenance Inspection and Repairs				\$ -	Currently implemented as part of standard business operation.
5	Implementation of Environmental Management System				\$ -	Currently implemented as part of standard business operation.
<b>SUBTOTAL</b>						
	Subtotal					\$ 7,200
	Plus 10% Contingencies					\$ 720
<b>TOTAL</b>						<b>\$ 7,920</b>

**Table 4 Alternative 2 Cost Estimate** (source Table 7-2 of the NWES draft Final CMS)

Corrective Measures Cost Estimate for Alternative 2 Excavation and Offsite Disposal					
Item	Description	Unit	Unit Price	Quantity	Total
1	CMI Workplan Development	LS	\$10,000	1	\$10,000
2	Pre-Excavation Characterization Sample Collection and Analysis	LS	\$3,000	1	\$3,000
3	Construction Oversight	LS	\$3,000	1	\$3,000
4	Utility Coordination and Pre-Construction Meetings	LS	\$2,000	1	\$2,000
5	Mobilization and General Conditions	LS	\$5,000	1	\$5,000
6	Concrete Pavement Removal	SF	\$4.66	25	\$117
7	Excavation and Stockpiling of Contaminated Soil	BCY	\$17.82	2	\$36
8	Concrete Recycling	TON	\$75.00	3	\$225
9	Soil Loadout and Disposal	TON	\$180 <sup>1</sup>	3.2	\$576
10	Backfill Excavation	CY	\$47.62	2	\$95
11	Site Restoration	SF	\$24.01	25	\$600
12	Demobilization	LS	\$3,000	1	\$3,000
13	Confirmation Sampling and Analysis	LS	\$500	1	\$500
14	Waste Characterization Sampling	EA	\$140	3	\$420
<b>SUBTOTAL</b>					
	Subtotal Items 1 through 14				\$28,569
	Plus 15% Contingencies				\$4,285
15	Restrictive Covenants	HR	\$300	24	\$7,200
	Plus 10% Contingencies				\$720
<b>TOTAL</b>					<b>\$40,774</b>

<sup>1</sup>The cost covers transportation and disposal at a Subtitle C Landfill in the event waste characterization analysis shows the removed soil fails one or more TCLP criteria for metals. While vanadium does not have a TCLP criterion, other metals present in the soil at this location do have TCLP criteria which could be exceeded. If the soil does not fail any TCLP criteria, it may be disposed of in a Subtitle D Landfill.