Final Report

Corrective Measures Study

Prepared for

Northwest EnviroService, Inc.
Airport Way South Facility

USEPA Administrative Order on Consent No. 1093-02-09-3008(h)

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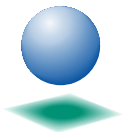

CH2MHILL

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1. Introduction

The U.S. Environmental Protection Agency Region 10 (EPA) and Northwest EnviroService (NWES) entered into an Administrative Order on Consent (Consent Order) for RCRA corrective action activities at their facility located at 1500 Airport Way South, Seattle, WA. The Consent Order, No. 1093-02-09-3008(h), became effective on February 8, 1994 and requires NWES to complete a Corrective Measures Study (CMS) following the approval of the RCRA Facility Investigation Report (RFI) (CH2M HILL, 2004c) and notification by EPA of the proposed facility specific objectives for the corrective action. The final RFI Report was submitted by NWES to EPA on June 16, 2004.

In March of 2003, EPA determined that the NWES facility has met the two established RCRA Corrective Action Environmental Indicators (EIs). These indicators measure progress of corrective action activities at a facility in environmental terms instead of administrative steps such as the Consent Order. Both EIs have been met by the NWES facility and are identified as:

- CA725 – Current Human Exposures Under Control
- CA750 – Migration of Contaminated Groundwater Under Control

In a letter dated January 14, 2009, EPA defined media-specific target cleanup standards and directed NWES to proceed with preparation of the CMS. The draft CMS report was submitted in April 2009 pursuant to the EPA letter and Section 7.15 of the Consent Order. A revised draft CMS report was submitted in January 2011 in accordance with EPA's November 30, 2010 letter which provided comments on the Draft CMS Report and requested the submittal of a Revised CMS report. This Final CMS report is being submitted in accordance with EPA's March 2, 2011 letter which requested modifications to the Revised CMS Report. The EPA letter are included in Appendix 1.

NWES operated the Airport Way South Facility (the Facility) as a hazardous waste management facility between 1979 and 1995. The Facility has completed all closure activities identified in the RCRA Interim Status Closure Plan (Closure Plan) (CH2M HILL, 2004a). While the Closure Plan was not formally approved by the Washington State Department of Ecology (Ecology) and EPA, it has been developed in consultation with Ecology and EPA at various times between 1994 and 2004 when the RCRA Interim Status Closure Report (Closure Report) (CH2M HILL, 2004b) was submitted. Since 1995, the facility has been operated by Emerald Recycling, a subsidiary of Emerald Services Inc., as a used oil processing and industrial wastewater treatment facility.

1.1 Corrective Measures Study Purpose and Objectives

The purpose of this CMS is to identify and evaluate potential corrective action alternatives that address affected media at the facility and to identify a final corrective measures alternative that, once implemented, would achieve target cleanup standards and performance standards for soil and groundwater set forth in EPA's January 14, 2009 letter (Appendix 1). In EPA's November 30, 2010 comments on the Draft Corrective Measures

Study Report (CH2M HILL, 2009), EPA made corrections to the industrial target cleanup standards for polynuclear aromatic hydrocarbons (PAHs) and directed the use of the updated Regional Screening Levels (RSLs) for establishing cleanup levels for hexavalent chromium and vanadium.

EPA has determined that in order to ensure that human health exposures remain under control, corrective measures at the NWES facility may be required. Since the entire NWES facility is paved with either concrete or asphalt, EPA has further determined that there are no ecological exposure routes at the facility under the current and potential future use scenarios.

1.2 Corrective Measures Study Organization

The CMS is presented in the following sections and addresses the content requirements of the January 14, 2009 EPA letter, the November 30, 2010 EPA letter and Section 7.15 of the Consent Order:

- Section 2 describes the history of activities conducted at the facility and summarizes the results of previous investigations
- Section 3 presents the established media cleanup objectives
- Section 4 identifies and describes the corrective action alternatives considered for the facility
- Section 5 presents the evaluation of the corrective action alternatives
- Section 6 presents the conclusions of this CMS and recommends a final corrective measure alternative
- Section 7 presents the cost estimates and schedule
- Section 8 presents the references used in this CMS.

Figures follow Section 8.

2. Site History and Setting

2.1 Site History

The NWES facility occupies about 1 acre within the City of Seattle. It is bordered by South Atlantic Street to the north, South Holgate Street to the south, Interstate 5 (I-5) to the east, and Airport Way South to the west. Land use for the facility and the adjacent parcels west of I-5 is industrial. The NWES facility subject to this CMS consists of the following parcels and parcel owners:

TABLE 2-1
NWES Parcel Information

Parcel Number	Parcel Owner
3770300160	Western Tank Properties
3770300182	Samis Land Company
3881900050	Puget Properties LLC
7666202861	Emerald Recycling

NWES operated the Airport Way South Facility (the Facility) as a hazardous waste management facility between 1979 and 1995. In December 1994, NWES notified the Washington State Department of Ecology (Ecology) and EPA of its intent to begin RCRA interim status closure at the Facility. An interim status closure plan was submitted to EPA and Ecology at that time. On February 15, 1995, the last shipment of hazardous waste was received by the Facility. The last volume of NWES waste was processed by October 1995. Between 1996 and 1999, the facility was operated by Northwest Tank Service as a used oil processing facility. From 1999 to the present, the facility has been operated by Emerald Recycling, a subsidiary of Emerald Services Inc., as a used oil processing and industrial wastewater treatment facility.

Closure activities were conducted in general accordance with the Facility's *RCRA Interim Status Closure Plan* (CH2M HILL, 2004). Closure activities included waste inventory removal, decontamination of concrete secondary containment structures, tanks, roadways, and sumps, and closure standard verification. NWES elected to clean close the hazardous waste management units at the facility. Clean closure required that there will be no hazardous waste remaining in and about the units at completion. To achieve this, closure activities conducted included the removal or decontamination of all dangerous waste, waste residues and equipment, bases, liners and other material containing or contaminated with dangerous waste or waste residue. Verification sample analytical results showed that closure performance standards were met.

The closure activities were documented in the *Closure Report* which was submitted to Ecology and EPA in November 2004.

2.2 Previous Investigations

Since operations of hazardous waste management activities ceased, investigations have been completed to evaluate potential environmental impacts to soil and groundwater. The investigations have followed the RCRA process from an initial *RCRA Facility Assessment* (RFA) (Ecology and Environment, 1988) through the RCRA Facility Investigation (RFI) which was completed in 2004. In addition, a groundwater assessment monitoring program has been in place at the Facility since 1998 under 40 CFR 265 Subpart F requirements. The results of these investigations are presented below.

2.2.1 Groundwater Investigations from 1987 through 2000

Groundwater investigation activities conducted between 1987 through 2000 at the NWES facility were summarized in Section 2.4.1 of the *RFI Work Plan* (CH2M HILL, 2001) approved by EPA in a letter dated March 21, 2002. In summary, groundwater monitoring wells were installed and sampled during various groundwater monitoring events between 1987 through 2000. A map showing groundwater monitoring well locations is presented as Figure 2-1. The results of these investigations were used to develop groundwater investigation approach during the RFI.

2.2.2 RCRA Facility Investigation

NWES completed the RFI in accordance with the Consent Order and the EPA-approved *RFI Work Plan* (CH2M HILL, 2001). The general objectives of the RFI were to:

- Characterize the environmental setting and potential pathways of contaminant migration at the Facility.
- Characterize sources and nature of constituents released to soil, groundwater, surface water and air at the Facility.
- Characterize concentration, rate, and extent of contamination released at and from the Facility.
- Gather data to assist with stabilization decisions, development of alternatives for corrective measures and identification of additional Sold Waste Management Units (SWMUs) and Areas of Concern (AOCs).

The overall objectives of the RFI were fulfilled through two rounds of extensive and comprehensive field investigation and associated sampling, laboratory analysis, and data evaluation. The major findings of the RFI are as follows:

- The RFI results for hydrogeology confirmed the presence, thickness, and continuity of the clay aquitard layer beneath the Facility. This aquitard layer is present beneath the NWES site and also is present beneath nearby properties. The aquitard separating the shallow aquifer from the lower confined aquifer at the site is continuous beneath the Facility and ranges in thickness from 3.5 feet to 19.5 feet. Testing on the aquitard material confirms that is has very low permeability.
- For groundwater, consistent with previous sampling efforts, there are low level exceedances of benzene, vinyl chloride, total lead, and total arsenic in the groundwater

beneath the facility above the Model Toxics Control Act (MTCA) Method B groundwater cleanup levels (Figure 2-2). The NWES site is located in an industrial area of Seattle with a well documented history of site being developed by filling with many heterogeneous materials as presented in the *RFI Workplan* for the NWES site. This material undoubtedly impacts the groundwater quality at the site exclusive of any NWES potential historical operations related impacts. The surrounding facilities are built on similar fill material and have similar TPH detection in the subsurface.

- The RFI results indicate that the Facility soils have levels of arsenic and benzo(a)pyrene that exceed the MTCA Method B soil cleanup level. With the exception of one out of a total of 12 soil sample, the arsenic concentrations were well below the MTCA Method C industrial facility soil cleanup level of 88 mg/kg. The only soil sample that exceeded the arsenic cleanup level was detected at 123 mg/kg which is less than 2 times the cleanup level. Benzo(a)pyrene results were all below the industrial soil target cleanup level of 2.1 mg/kg. The limited number of compounds exceeding soils cleanup levels is consistent with the practices of the Facility to place synthetic liners and paved areas of the facility prior to beginning operations. In addition, NWES has had an effective spill control and crack sealing program throughout their 15-year operational history.
- The RFI results indicate that surface water is not a pathway for contaminant transport from historical NWES operations. Information was reviewed from the former facility operations along with data collected during the RFI (groundwater, soil and sump samples).
- The RFI results also indicate that NWES operations have not caused continuing releases of volatiles to the air. Similar to the surface water pathway investigation, information from NWES operations was reviewed in concert with the data collected during the RFI (groundwater and soil samples).

2.2.3 PST Groundwater Monitoring Program

In addition to the previous Facility groundwater monitoring and the data collected during the RFI, the Facility also conducts a groundwater assessment monitoring program specifically designed to monitor groundwater in the area near the former primary sedimentation tank (PST) at the north end of the NWES facility. This program was implemented according to the plan titled *Groundwater Monitoring Workplan Assessment Monitoring Program for the Primary Sedimentation Tank*. This plan was submitted to EPA in November of 1999 in accordance with the requirements of 40 CFR 265.93(d)(4) (Subpart F). Under that plan, NWES was required to collect quarterly groundwater samples for analysis and measure groundwater elevations. The assessment monitoring program for the PST was initially implemented in January 2000 which included the installation of several new groundwater monitoring wells upgradient and downgradient of the PST. In agreement with EPA and Ecology, Subpart F sampling program frequency was reduced from quarterly to annually for 2003. This event was conducted in April 2003. On July 14, 2004, NWES met with Ecology and EPA. During the meeting, it was agreed that two groundwater sampling events should be conducted annually until the completion of the RCRA Corrective Measure Study (CMS) and one groundwater program is defined for the site. Since that time, groundwater sampling events have been conducted during April and October of each year.

Nearly eleven years of the groundwater monitoring have produced the following results:

- Based on groundwater flow directions, the PST monitoring well network is appropriately located for monitoring groundwater upgradient and downgradient of the PST.
- The westward direction of groundwater flow has been consistently observed throughout the monitoring period and does not vary significantly throughout the year.
- The calculated average groundwater gradient and velocity ranged from 0.01 to 0.038 and 0.86 feet/day to 3.39 feet per day in the vicinity of the PST.
- Lead and benzene were the primary water quality indicators for groundwater monitoring associated with the PST Assessment Monitoring Program. The occurrence and concentration of lead and benzene show a generally decreasing trend between 2000 and 2008 in all down gradient wells. Benzene, in particular, has been detected at concentrations below the Maximum Concentration Levels (MCLs) since October 2007. Details of the lead and benzene data from this monitoring program are presented in Appendix 2.

2.3 Hydrogeological Setting

Hydrogeological conditions at the facility were evaluated during the RFI and previous groundwater sampling events. Results are presented below.

2.3.1 Geology/Hydrostratigraphy

During this RFI, the continuity, thickness, and permeability of the aquitard separating the shallow aquifer from the deeper aquifer beneath the NWES facility was evaluated. Direct-push probes performed at 12 locations within the NWES facility showed that a clay aquitard is present and is continuous beneath the NWES facility. Geologic logs from locations on the west side of Airport Way South indicate that the aquitard is considerably thicker toward the west and that the shallow aquifer does not even exist at the two locations probed on the west side of Airport Way South. Logs from the 12 probe locations indicate that the clay aquitard ranges in thickness from 3.5 feet to 19.5 feet and is generally approximately 5 to 7 feet thick beneath most of the site. In addition, vertical hydraulic conductivity tests performed on three samples of aquitard material yielded low hydraulic conductivity results ranging from 1.6×10^{-7} to 3.5×10^{-8} cm/sec.

The results of the RFI indicate that clay aquitard is present and continuous across the site and, coupled with the groundwater sampling results from the lower aquifer beneath the site, has been an effective barrier to migration of contaminants into the lower confined aquifer.

2.3.2 Groundwater Hydrology

A summary of groundwater hydrology information for the site is presented below:

- Groundwater elevations, flow patterns and gradients do not exhibit significant seasonal variation.

- The predominant flow direction in the upper aquifer is from the east (off the steep hillside) to the west.
- The upper aquifer beneath the Facility is not tidally influenced.
- The facility groundwater is not used as either a drinking water or industrial water source.
- Hydraulic conductivity of the upper aquifer has previously been completed at the site by performing single well hydraulic tests (slug tests).
- The groundwater gradient across the Facility has previously been calculated (presented in the RFI Workplan (CH2M HILL, 2002)) as 0.05. The gradients are relatively consistent over time.
- The groundwater velocity has also been calculated for the site (presented in the RFI Workplan (CH2M HILL, 2001) as 4.7 feet/day.

3. Establishment of Media Cleanup Objectives

Media-specific target cleanup standards and performance standards for the NWES facility have been established in a letter from EPA received on January 14, 2009 and in subsequent comment letter from EPA received on November 30, 2010. In the January 14, 2009 letter EPA stated the following:

> "Monitoring and investigations completed to date at the NWES facility have documented the presence of hazardous constituents in both soil and groundwater at the facility. EPA has determined that in order to ensure that human health exposures remain under control, corrective measures at the Facility may be required. Since the entire NWES facility is paved with either concrete or asphalt, EPA has further determined that there are no ecological exposure routes at the facility under the current and potential future use scenarios."

Soil target cleanup standards and soil and groundwater performance standards have been established by EPA for the Facility and are presented below.

Groundwater target cleanup standards were determined by EPA to not be necessary for the NWES facility.

3.1 Soil Target Cleanup Standard

For soil at NWES, EPA proposed MTCA Method C cleanup levels for direct exposure and the EPA Regional Screening Levels (RSLs) for industrial land use (which replaced Industrial Soil Preliminary Remediation Goals) as the appropriate target cleanup standards for contaminants.

Contaminants of concern with soil target cleanup standards included selected polynuclear aromatic hydrocarbons (PAHs), antimony, arsenic, hexavalent chromium, and vanadium. In the November 30 comment letter to the Draft CMS Report, EPA made corrections to the industrial target cleanup standards for selected polynuclear aromatic hydrocarbons (PAHs), added total carcinogenic PAHs (cPAHs), and directed the use of the updated RSLs for hexavalent chromium and vanadium.

The maximum concentration detected on site, unrestricted use soil cleanup standards, and the industrial use soil target cleanup standards are presented in Table 3-1. The RFI soil data compared to the unrestricted and industrial use cleanup standards are presented in Tables 3-2 and 3-3.

TABLE 3-1
Soil Target Cleanup Standards

Contaminant of Concern (COC)	Maximum Concentration (mg/kg)	Unrestricted Use Cleanup Standard (mg/kg)[1]	Basis[2]	Industrial Soil Target Cleanup Standard (mg/kg)[1]	Basis[3]
Benzo(a)anthracene	1.2	0.137	MTCA	21	EPA
Benzo(a)pyrene	0.94	0.015	EPA	2.1	EPA
Benzo(b)fluoranthene	0.91	0.137	MTCA	21	EPA
Benzo(k)fluoranthene	0.32	0.137	MTCA	180	MTCA
Indeno(1,2,3-cd)pyrene	0.29	0.137	MTCA	21	EPA
Total Carcinogenic PAHs (cPAHs)	1.43	0.14	MTCA	18	MTCA
Antimony (total)	42.9	31	EPA	410	EPA
Arsenic (total)	**123**	0.39	EPA	88	MTCA
Chromium (hexavalent)	**359**[4]	0.29	EPA	56[5]	EPA
Vanadium	**1,050**	5.5[6]	EPA	72[6]	EPA

[1] In addition to achieving the concentrations listed for individual constituents, the cumulative risk from all constituents and all pathways cannot exceed 10^{-5} for carcinogens or a hazard index of 1 for non-carcinogens.

[2] The basis for the soil unrestricted use cleanup standard is either the EPA Preliminary Remediation Goal for Residential Soil or the MTCA Method B formula value.

[3] The basis for the target cleanup standard is either the EPA Preliminary Remediation Goal for Industrial Soil (1 x 10-5) or the MTCA Method C formula value.

[4]Sample concentrations measured as total chromium.

[5]EPA Regional Screening Levels (RSL) for hexavalent chromium adjusted to a 1x10-5 risk level. RSL Tables last updated November 2010, http://www.epa.gov/region9/superfund/prg/.

[6]RSLs for metallic vanadium. RSL Tables last updated November 2010, http://www.epa.gov/region9/superfund/prg/.

EPA further stated that when soil target cleanup standards are established based on industrial exposure instead of residential exposure assumptions, MTCA (WAC 173-340-745(1)(a)(ii)) requires that at a minimum, a restrictive covenant be placed on the property to ensure that the use of the property remains industrial. A restrictive covenant that meets the requirements of WAC 173-340-440(9) must be executed by the property owner(s) if industrial cleanup standards will be used. Alternatively, the MTCA B levels or the EPA Residential Soil Preliminary Remediation Goal (PRGs) (now replaced by RSLs), whichever is more stringent, allow for unrestricted use. These values are also included in Table 3-1. Achieving the MTCA B levels or the unrestricted use cleanup levels for individual constituents and a cumulative risk from all constituents and all pathways that does not

exceed one per hundred thousand (10^{-5}) for carcinogens or a hazard index of 1 for non-carcinogens would allow the NWES facility to close without a covenant.

As shown on Figure 3-1, unrestricted use cleanup standards have been exceeded at all sampled locations. Analytes that exceeded unrestricted use cleanup standards include selected PAHs, antimony, arsenic, chromium, and vanadium.

NWES has elected to meet soil target cleanup standards for industrial exposure scenario. As such, the only COCs that exceed the soil target cleanup standard are arsenic, chromium, and vanadium (see Table 3-2). These exceedances are summarized as follows:

- Arsenic (soil target cleanup standard of 88 mg/kg)
  - 123 mg/kg at A9-S-010

- Chromium analyzed as total chromium (soil target cleanup standard of 56 mg/kg for hexavalent chromium)
  - 63 mg/kg at A1-S-001
  - 81.2 mg/kg at A1-S-003
  - 359 mg/kg at A10-S-012
  - 73.5 mg/kg at C1-S
  - 291 mg/kg at OWS-S

- Vanadium (soil target cleanup standard of 72 mg/kg)
  - 1,050 mg/kg at A10-S-012

Under MTCA, soil cleanup level is considered as met if (1) no single sample concentration is greater than two times the soil cleanup level, and (2) less than ten percent of the sample concentrations exceed the soil cleanup level (WAC 173-340-740(7)(e)). Based on this, soil target cleanup standard is considered as met for arsenic.

At A10-S-012, chromium (359 mg/kg) and vanadium (1,050 mg/kg) exceeded two times the soil target cleanup standards. In addition, at OWS-S, chromium exceeded two times the soil target cleanup level at 291 mg/kg. Figure 3-2 shows the locations and COCs that exceeded soil target cleanup standards.

As noted in EPA's November 30, 2010 comment letter, although site soils were analyzed for total chromium and not the hexavalent chromium form, NWES does not have to re-evaluate the site for chromium soil removal. However, if EPA selects hot-spot removal as the corrective measure, confirmation sampling to show that hexavalent chromium is less than 56 mg/kg will be required. Chromium removal is not necessary at the northern portion of the property (locations A1-S-001 and A1-S-003) because it is unlikely that the actual hexavalent chromium standard is exceeded in this area since some if not all of the chromium is likely to be present in trivalent form which has a much higher cleanup standard. This is supported by the fact that chromium was not detected in groundwater during the RFI. If chromium VI is present in the soil, it is likely to be observed in the groundwater as well.

Based on these factors, the only location where soil target cleanup standards have not been met is at location A10-S-012.

A Restrictive Covenant, as revised by EPA and Ecology and provided to NWES as an enclosure to the November 30, 2010 comment letter, has been included in this report as Appendix 3. In addition to arsenic, vanadium, and benzo(a)pyrene, the revised Restrictive Covenant lists polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDDs/PCDFs) as residual contaminants.

Using the draft interim PRG, EPA evaluates 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 TEFs developed by the World Health Organization (WHO – 2005 World Health Organization Re-evaulation of Human and Mammalian Toxic Equivalency Factors for Dioxin and Dioxin-like Compounds (Van den Berg et al, 2006) were used.

Table 3-3 presents the dioxin data collected during the RFI and compares them to the draft interim residential PRG of 72 nanogram/kilogram (ng/kg) and draft interim industrial PRG of 950 ng/kg. The residential PRG was exceeded at two sample locations: A1-S-001 at 88.2 ng/kg and A8-S-008 at 79.6 ng/kg. No sample exceeded the industrial PRG of 950 ng/kg.

3.2 Groundwater Target Cleanup Standard

EPA has determined that media-specific target cleanup standards for groundwater beneath the NWES facility are not required. This determination is made by EPA based on the following:

- Groundwater at and downgradient from the NWES facility is not potable for the following reasons; 1) the groundwater does not currently serve as a drinking water source and, 2) the groundwater is not a potential source of drinking water because it is present in insufficient quantity.
- EPA agrees that the unit beneath the facility does not produce sufficient quantities of water to enable it to be used as a drinking water source as the thickness of the perched aquifer is inadequate to install a potable well that meets the requirements set forth in WAC 173-160.
- Based on data presented in the RFI, EPA has concluded that the shallow groundwater beneath the NWES facility consists of a thin saturated perched unit that has been impacted by facility operations. This saturated unit is bound below and to the west by a low permeability clay unit. Therefore, cleanup standards based on the protection of surface water would not be applicable to the NWES facility, since the contaminated shallow groundwater should never reach a surface water body.
- MTCA Method B levels were not exceeded for any constituent measured from the lower aquifer.

Given that there is insufficient groundwater beneath the facility to be used as a drinking water source, and that the contaminated shallow groundwater should not impact surface water, EPA has determined that media-specific target cleanup standards for groundwater beneath the NWES facility are not required. However, the CMS must evaluate options such

as long-term monitoring and institutional controls to ensure that that the groundwater beneath the facility is not further degraded (EPA, 2009).

3.3 Performance Standards – Soil and Groundwater

Performance standards are designed to ensure that continuous progress is made during the implementation of the corrective measures. The performances standards as specified by EPA in the January 14, 2009 letter are as follows:

- Achieving the target cleanup standards for soil
- Ensuring that the groundwater will not be further degraded and groundwater contamination will remain contained with the perched aquifer.

TABLE 3-2
RFI Soil Results Compared to Target Cleanup Standards

Chemical Group	Parameter	Units	TEF	Unrestricted Use Cleanup Standard mg/kg)	Industrial Target Cleanup Standards (mg/kg)	A1-S-001	A1-S-002	A1-S-003	A10-S-012	A2-S-004	A5-S-005	A5-S-006	A8-S-007	A8-S-008	A8-S-009	A9-S-010	A9-S-011	NWESP 01-7-10	NWESP 2-8-10	C1-S	OWS-S
SVOC	Benzo(a)anthracene	mg/kg	0.1	0.137	21	0.020 J	0.012 J	0.039 JD	0.007 J	0.004 J	0.016 JD	0.120 JD	0.010 J	0.010 J	0.015 J	0.009 J	0.009 J				
SVOC	Benzo(a)pyrene	mg/kg	1	0.015	2.1	**0.260 J**	**0.120 J**	**0.300 JD**	**0.069 J**	**0.031 J**	**0.130 JD**	**0.940 JD**	**0.065 J**	**0.150 J**	**0.350 J**	**0.140 J**	**0.150 J**				
SVOC	Benzo(b)fluoroanthene	mg/kg	0.1	0.137	21	0.046 **J**	0.020 **J**	0.036 **JD**	0.010 J	0.004 J	0.016 JD	0.091 JD	0.006 J	0.025 **J**	0.039	0.020 **J**	0.019 **J**				
SVOC	Benzo(k)fluoranthene	mg/kg	0.1	0.137	180	0.0000 U	0.005 J	0.012 JD	0.003 J	0.000 U	0.000 U	0.032 JD	0.000 U	0.007 J	0.010 J	0.007 J	0.006 J				
SVOC	Chrysene	mg/kg	0.01		--	0.004 J	0.002 J	0.007 JD	0.001 J	0.001 J	0.003 JD	0.016 JD	0.001 J	0.001 J	0.002 J	0.001 J	0.001 J				
SVOC	Dibenzo(a,h)anthracene	mg/kg	0.1		--	0.007 J	0.004 J	0.000 U	0.000 U	0.000 U	0.000 U	0.000 U	0.000 U	0.004 J	0.007 J	0.004 J	0.003 J				
SVOC	Indeno(1,2,3-cd)pyrene	mg/kg	0.1	0.137	21	0.027 **J**	0.013 J	0.000 **U**	0.000 U	0.000 U	0.000 **U**	0.000 **U**	0.005 J	0.022 **J**	0.029 **J**	0.013 J	0.013 J				
CALC	Total cPAH	mg/kg		0.14	18	**0.363**	**0.176**	**0.394**	**0.090**	**0.040**	**0.165**	**1.199**	**0.087**	**0.219**	**0.452**	**0.194**	**0.202**				
METAL	Antimony	mg/kg		31	410	14.8	21.8	7.9	8.3	0.4 U	1.6	10.9	0.7 U	1.8	1.7 U	2.0 U	**42.9**				
METAL	Arsenic	mg/kg		0.39	88	**35.9**	**51.5**	**33.7**	**6.8**	**4.3**	**12.4**	**31.9**	**5.2**	**14.6**	**5.5**	**5.5**	**123**	**2.6**	**2.1**	**1.2**	**10.3**
METAL	Chromium, total	mg/kg		0.29 [1]	56 [1]	**63.1**	**44.1**	**81.2**	**359**	**16.7**	**48.1**	**44.9**	**11.9**	**54.8**	**44.0**	**35.9**	**49.2**	**20.4**	**21.5**	**73.5**	**291**
METAL	Vanadium	mg/kg		5.5	72	**41.9**	**58.1**	**40.5**	**1050**	**29.0**	**42.5**	**66.1**	**38.0**	**41.4**	**58.1**	**49.0**	**45.6**				

Notes:

[1] Hexavalent Chromium criteria was used instead of Total Chromium values.

BOLD = Exceed unrestricated landuse cleanup standard

= Exceed Soil Target Cleanup Standard for Industrial Exposure Scenario

= Exceed 2x Soil Target Cleanup Standard for Industrial Exposure Scenario.

Chemical Groups

SVOC semi volatile organic compounds
METAL metals
CALC calculated

Organic Qualifiers

U - Indicates the compound was analyzed for but not detected.

J - Indicates an estimated value. It is used when the data indicates the presence of a target compound below the reporting limit or the presence of a Tentatively Identified Compound (TIC).

D - This qualifier is used for all the compounds identified in an analysis at a secondary dilution factor.

Inorganic Qualifiers

U - Indicates the compound was analyzed for but not detected.

TABLE 3-3
RFI Soil Results for PCDD/F Compared to Target Cleanup Standards

Chemical Group	Parameter	Units	TEF[1]	Unrestricted Use Cleanup Standard (ng/kg)	Industrial Target Cleanup Standards (ng/kg)	A1-S-001	A1-S-002	A1-S-003	A10-S-012	A2-S-004	A5-S-005	A5-S-006	A8-S-007	A8-S-008	A8-S-009	A9-S-010	A9-S-011
DIOX/FURAN	1,2,3,4,6,7,8,9-OCDD	ng/kg	0.0003			6692	744	3580	739	204	1405	6608	580	18549	3929	1612	2648
DIOX/FURAN	1,2,3,4,6,7,8-HpCDD	ng/kg	0.01			1761	97	260	63.3	24.4	93	508	64	1974	358	225	191
DIOX/FURAN	1,2,3,4,6,7,8-HpCDF	ng/kg	0.01			808	23.2 U	63.4	12.1	6.73	15.9	48.3	14.9	313	67.2	26.5	33.2
DIOX/FURAN	1,2,3,4,7,8,9-HpCDF	ng/kg	0.01			26.5	2.5 U	2.88	2.5 U	2.5 U	2.5 U	4.01	2.5 U	12.2	2.5 U	2.5 U	2.5 U
DIOX/FURAN	1,2,3,4,7,8-HxCDD	ng/kg	0.1			9.9	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	18.9	3.87	2.5 U	2.5 U
DIOX/FURAN	1,2,3,4,7,8-HxCDF	ng/kg	0.1			33.4	2.5 U	5.22	4.43	2.5 U	2.88	4.05	2.81	57.6	8.59	16.2	13.7
DIOX/FURAN	1,2,3,6,7,8-HxCDD	ng/kg	0.1			319	6.94	14.3	2.9	2.5 U	3.52	16.7	2.5 U	113	18.2	19.1	9.07
DIOX/FURAN	1,2,3,6,7,8-HxCDF	ng/kg	0.1			20.5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	11.4	2.86	2.54	3.31
DIOX/FURAN	1,2,3,7,8,9-HxCDD	ng/kg	0.1			26.3	3.26	8.9	2.5 U	2.5 U	2.5 U	7.72	2.5 U	57.7	9.4	7.02	8.5
DIOX/FURAN	1,2,3,7,8,9-HxCDF	ng/kg	0.1			2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.67	2.5 U
DIOX/FURAN	1,2,3,7,8-PeCDD	ng/kg	1			5.73	1 U	3.41	1 U	1 U	1 U	2.11	1 U	17.7	2.86	3.38	1.79
DIOX/FURAN	1,2,3,7,8-PeCDF	ng/kg	0.03			2.66	1 U	1 U	1 U	1 U	1 U	1.52	1 U	1.29	1 U	1 U	1.09
DIOX/FURAN	2,3,4,6,7,8-HxCDF	ng/kg	0.1			101	2.5 U	3.9	2.5 U	2.5 U	2.5 U	5.01	2.5 U	18.8	3.95	5.75	7.9
DIOX/FURAN	2,3,4,7,8-PeCDF	ng/kg	0.3			7.6	1 U	1.01	1.27	1 U	1 U	2.23	1 U	6.18	2.21	9.41	4.66
DIOX/FURAN	2,3,7,8-TCDD	ng/kg	1			1 U	1 U	1.65	1 U	1.09	1 U	1.65	1 U	2.78	1 U	1 U	1 U
DIOX/FURAN	2,3,7,8-TCDF	ng/kg	0.1			2.79	1 U	1.66	2.53	1 U	1.77	2.23	1 U	5.78	3.03	3.08	10.6
DIOX/FURAN	Heptachlorodibenzo-p-dioxins (HpCDD), To	ng/kg				3139	206	529	213	46.6	181	1061	175	9077	1292	870	433
DIOX/FURAN	Heptachlorodibenzofurans (HpCDF), Total	ng/kg				2031	61.2	180	24.9	25.1	46	152	51.5	1155	209	90.7	85
DIOX/FURAN	Hexachlorodibenzo-p-dioxins (HxCDD), Tot	ng/kg				888	40.1	98	31.8	6.69	12.1	99	18.6	1217	172	181	90.8
DIOX/FURAN	Hexachlorodibenzofurans (HxCDF), Total	ng/kg				1775	51.6	103	49.7	11.9	40	106	29.5	814	156	152	122
DIOX/FURAN	OCDF	ng/kg	0.0003			670	33.6	141	25.1	21.6	42.9	88	48.4	604	106	55.6	72
DIOX/FURAN	Pentachlorodibenzo-p-dioxin (PeCDD), Tot	ng/kg				36.8	3.36	5.06	4.68	1 U	2.83	8.02	1 U	61.9	14.6	37.5	22.6
DIOX/FURAN	Pentachlorodibenzofurans (PeCDF), Total	ng/kg				185	16.8	48.2	42.3	5.58	18.3	45.8	14.1	305	65	193	134
DIOX/FURAN	Tetrachlorodibenzo-p-dioxins (TCDD), Tot	ng/kg				6.6	1.52	6.09	6.63	2.04	3.23	9.6	1.89	20.3	9.07	10.8	36.3
DIOX/FURAN	Tetrachlorodibenzofurans (TCDF), Total	ng/kg				35.1	7.25	94.8	25.9	1.82	15.4	26.9	4.73	66	34.2	63.8	85.3
DIOX/FURAN	Total TEQ*	ng/kg		72 [2]	950 [2]	**88.2**	4.2	13.5	4.0	3.1	4.1	16.0	3.2	**79.6**	14.6	15.5	12.3

Notes:

* Non-detected values were assumed to be one half of the detection limit shown for the specific congener

[1] World Health Organization Human and Mammalian TEFs, from van den Berg et al (2006)

[2] USEPA Draft Recommended Interim PRG (OSWER 9200.3-56)

BOLD = Exceed Unrestricated Use Cleanup Standard

Chemical Groups
DIOX/FURAN Dioxin/Furan

Qualifiers

U - Indicates the compound was analyzed for but not detected.

4. Screening of Corrective Measure Alternatives

In an advanced notice of proposed rulemaking (ANPR) regarding corrective action at RCRA facilities, EPA recognizes that at facilities with relatively straightforward remedial solutions, extensive evaluation of a range of corrective measure alternatives may not be necessary (EPA, 1996). The CMS can be tailored to focus on a limited set of plausible remedies only. Given the limited number of COCs present at the NWES facility, the small size of the facility and that the site has already met the EPA-established corrective action environmental indicators (Current Human Exposures Under Control and Migration of Contaminated Groundwater Under Control), a limited set of alternatives has been evaluated in this CMS. Soil and groundwater measure alternatives are screened in the following sections.

4.1 Soil Corrective Measure Alternatives

The soil corrective action alternatives considered for the NWES facility to address vanadium include the following:

- Alternative 1. Containment through Engineering and Institutional controls;
- Alternative 2. Soil Excavation (hot spot removal) and Off-Site Disposal; and
- Alternative 3. In-situ Soil Flushing

As stated in Attachment C of the Consent Order, facility characteristics, contaminant characteristics, and technology limitations will be used to screen corrective measure technologies. Each of the alternatives is screened against these three characteristics. A brief description of these alternatives and the results of this screening are discussed below and summarized in Table 4-1.

Alternative 1 is containment of hazardous substances through engineering and institutional controls.

Alternative 2 would use excavation to remove soils exceeding the target cleanup levels for industrial land use. Soils exceeding cleanup levels would be removed from underneath the Facility at one location, i.e. "hot spot" excavation. Figure 3-2 shows that soil target cleanup levels for industrial exposure scenario were exceeded at A10-S-012 located near the center of the property. As discussed under Section 3.1, cleanup level is considered as met for arsenic since less than 10% of the sample exceed cleanup standard and the exceedance is not greater than 2 times the cleanup level. Chromium removal is not necessary at the northern portion of the property because it is unlikely that the actual hexavalent chromium standard is exceeded. This is supported by the fact that chromium was not detected in groundwater during the RFI suggesting that most of the chromium in soil is likely to be present as chromium III.

Alternative 3 would use in-situ treatment methods to treat affected soils. In situ soil flushing involves extracting inorganic contaminants from soil by using a chemical solution, without excavating the contaminated material itself. The solution is injected into or sprayed onto the area of contamination, causing the contaminants to become mobilized by dissolution or emulsification. After passing through the contamination zone, the contaminant-bearing flushing solution is collected by downgradient wells or trenches and pumped to the surface for removal, treatment, discharge, or reinjection in water, or an organic extractant, without excavating the contaminated material itself.

As stated Attachment C of the Consent Order, facility characteristics, contaminant characteristics, and technology limitations will be used to screen corrective measure technologies. Each of the alternatives is screened against these three characteristics. The results of this screening are presented below in Table 4-1.

Based on the results of this preliminary screening, Alternative 3 is not feasible because of the facility, contaminant and technology characteristics. Therefore, Alternative 1 Engineering and Institutional Controls and Alternative 2 Excavation and Off-Site Disposal are retained for further development and evaluation in Section 5.

4.2 Groundwater Corrective Measure Alternatives

EPA has determined that media-specific target cleanup standards for groundwater beneath the NWES facility are not required. EPA further indicated that the CMS should include an evaluation of Institutional Controls (Alternative 1) and Long-term Groundwater Monitoring (Alternative 2) to meet the performance standard of ensuring that the groundwater beneath the facility is not further degraded. In the November 30, 2010 comment letter to the Draft CMS report, EPA noted that long-term groundwater monitoring is not needed. However, both of these alternatives are retained for further development and evaluation in Section 5 in this revised CMS report for completeness.

TABLE 4-1
Screening of Corrective Measure Alternatives for Soil

Alternative	Facility Characteristics	Contaminant Characteristics	Technology Limitations	Retain for Further Evaluation?
Alternative 1 Containment through Engineering and institutional Controls	The entire site is paved; therefore exposure route for human and ecological receptors is not available. Containment limits infiltration through the surface soils.	Vanadium is relatively immobile.	None	Yes
Alternative 2 Excavation and Off-Site Disposal	The entire site is paved. Subsurface utilities are present throughout the facility. Facility is an active operating facility situated with many potential obstructions which would create short term hazards. However, the area requiring excavation is relatively small.	Since vanadium is relatively immobile, it is likely located near the surface where excavation can be conducted effectively.	If excavation is required beyond expected boundaries, the following may be required: 1) special excavation equipment to excavate in areas with limited access and turning radius; 2) shoring of existing equipment, tanks and buildings. In addition, excavation may be limited by presence of subsurface utilities.	Yes
Alternative 3 In-situ Soil Flushing	The entire site is paved; Containment currently limits infiltration through the surface soils. Facility is a very active operating facility situated in a relatively small area (less than 1 acre). In-situ treatment of the site soils would require that facility be partially shut down.	Vanadium is present at concentration above target cleanup level in a limited area. Treatment efficiency will likely to be low.	Effectiveness of In-situ Soil Flushing of vanadium has not been proven. Creates waste streams that require further treatment.	No. Technology has not been proven effective. Only a limited area requires treatment. Groundwater at the site is shallow (5-8 ft below ground surface) and the soil treatment technology would potentially flush contaminants through the shallow soil layer into the groundwater.

5. Evaluation of Corrective Measure Alternatives

Soil and groundwater corrective measure alternatives are described and evaluated against evaluation criteria in the following sections.

5.1 Soil Corrective Measure Alternatives

As discussed in Section 4, Alternative 1, Containment through Engineering and Institutional Controls passed screening and Alternative 2 Excavation and Off-Site Disposal were retained for development and detailed evaluation.

5.1.1 Description of Corrective Measure Alternative 1

Alternative 1 consists of containment through Engineering and Institutional Controls. They are described below.

Engineering Controls

Engineered controls are containment or treatment systems designed to prevent or limit movement of, or exposure to, hazardous substances (Ecology 2007). The engineering controls selected for Alternative 1 are described below.

Asphalt and Concrete Pavement

The placement of an asphalt and concrete pavement over contaminated soils limits contact with the contamination. Not only does it limit contact between people and contamination, it also prevents stormwater from infiltrating into the ground and contacting the contamination. This prevents contaminant migration through the soil column and potential groundwater contamination. The Facility is currently completely paved with either asphalt or concrete with curbing at the perimeter to contain stormwater for onsite treatment.

Institutional Controls

Institutional controls are "measures undertaken to limit or prohibit activities that may interfere with the integrity of an interim action or cleanup action or that may results in exposure to hazardous substances at a site (Ecology 2007). They are non-engineered instruments like physical measures, land use restrictions, maintenance requirements on engineered controls, educational programs, or financial assurances.

Security Measures

Physical measures such as fencing, gates, and lighting provide security for the facility and limit access and exposure to hazardous substances. The Facility is completely fenced. Gates are monitored at all times when the facility is open and are locked when the facility is not in operation. Ample lighting is provided throughout the facility to allow for the safe nighttime operation of the facility, spill detection, and the prevention and discovery of vandalism.

Restrictive Covenant

Restrictive covenants are legal controls that reduce the potential for exposure by limiting land use. NWES has elected to meet soil target cleanup standards for industrial exposure which requires a restrictive covenant as an institutional control. The restrictive covenant ensures that the property use remains industrial. As identified in the EPA January 14, 2009 letter, a restrictive covenant that meets the requirements of WAC 173-340-440(9) must be executed by the property owner if industrial cleanup standards will be used. Since NWES has elected to use industrial cleanup standards, a Restrictive Covenant as edited by Ecology and EPA in November, 2010 has been included in this report as Appendix 3.

Asphalt and Concrete Pavement Maintenance Requirements

Maintenance requirements are used to protect an engineering control. A typical maintenance requirement would be routine inspection and repair of the asphalt and concrete pavement or treatment system. The asphalt and concrete pavement and stormwater management system at the Facility are routinely inspected and appropriate repairs made as necessary to prevent exposure to hazardous substances. NWES's inspection and maintenance program, which is implemented by Emerald Recycling (current site operator) as part of its standard business practice, is as follows:

- Concrete containment and load/off area will be inspected on a monthly basis. The areas will be inspected for the presence of cracks, gaps, chips and overall deterioration.
- Repairs for smaller cracks, gaps and chips (less than 0.01 inches wide) will be completed during suitable weather or planned equipment shutdowns.
- Repairs for larger cracks, gaps, and chips will be scheduled immediately and performed as soon as allowed by weather.
- Frequent repairs of larger cracks, or excessive deterioration in concrete containment or load/off-load areas indicate that full replacement of the affected area may be required. Full replacement of the containment area, if needed, will be scheduled for the following dry season if possible.

Implementation of Environmental Management System

An Environmental Management System (EMS) is a set of processes and practices that enable an organization to reduce its environmental impacts and increase its operating efficiency. The Emerald Recycling Facility has prepared, implemented and reviews an EMS for their operations.

5.1.2 Description of Corrective Measure Alternative 2

Alternative 2 consists of the excavation and removal of soil with concentrations of vanadium above the soil target cleanup level for industrial exposure. Soil underneath the concrete near the center of the property will be excavated to approximately 2 feet. The proposed excavation area will be approximately 5 feet by 5 feet. Because a stormwater/sewer line is located less than 5 feet south of the original hot spot (Sample A10-S-012), the proposed excavation would cover an area 5 feet to the north and 2.5 feet to the east and west from A10-S-012. A pre-excavation sampling event will be conducted at the edge of the planned excavation footprint. Samples will be collected and analyzed for vanadium and hexavalent chromium. The sample results will be used to evaluate the need

to expand the excavation area. If the sample results are below target soil cleanup standards, they will be used as to demonstrate attainment of target soil cleanup standards.

Excavated soil will be characterized prior to disposal. If characterization sampling shows exceedance of one or more TCLP regulatory criterion, excavated soil shall be disposed of in a Subtitle C Landfill. If TCLP regulatory criteria are not exceeded, excavated soil may be disposed of in a Subtitle D Landfill. Confirmation samples will be collected and analyzed for vanadium and hexvalent chromium from the bottom and side walls of the excavation to demonstrate attainment of target soil cleanup standard. Additional excavation and removal will be conducted as necessary to achieve cleanup objective. The excavated area will be backfilled with clean material prior to placement of a concrete slab.

5.1.3 Evaluation Criteria and Evaluation Results

The alternatives are evaluated against the criteria set forth in Attachment C of the Scope of Work for Corrective Measures Study (EPA, 1994). Summaries of the criteria and alternative evaluation are presented in Table 5-1.

The alternatives are also evaluated by considering the point of compliance. The May 1996 Advanced Notice of Proposed Rulemaking (ANPR) on RCRA corrective action (61 FR 19432) described a number of important considerations in selecting potential remedies including the identification of points of compliance.

The point of compliance is the point or points where the soil cleanup levels should be obtained. At the Facility, the soil cleanup levels were based on human exposure via direct contact, therefore, the point of compliance is the soils throughout the site from the ground surface to fifteen feet below the ground surface.

The Point of Compliance criteria set forth in WAC 173-340-740(6)(f) is listed in Table 5-2. This criterion is specific to cleanup actions involving containment of hazardous substances where soil cleanup levels do not meet the points of compliance specified in (b) through (e). In these cases, the cleanup action may be determined to comply with cleanup standards, provided the criteria indicated in Table 5-2 are met.

TABLE 5-1
Soil Corrective Measure Evaluation Criteria and Results

Criteria	Evaluation Criteria Description	Evaluation Results – Alternative 1 Containment	Evaluation Results – Alternative 2 Excavation and Offsite Disposal
Technical Criteria – Performance			
Effectiveness	Capability for the alternative to perform the intended functions, such as containment, diversion, removal, or constituent destruction. This criterion must be evaluated through design specification or performance evaluation. Site-specific characteristics that affect the effectiveness of the alternative must be considered.	The only COC that exceed the soil target cleanup standard for the industrial exposure scenario and requiring removal is vanadium which is relatively immobile. This alternative effectively contains this COC.	This alternative would effectively remove soil exceeding the target cleanup standard from the affected area.
Useful Life	Useful life is the length of time that the alternative can achieve its effectiveness. Specific components of an alternative may require replacement at the end of its useful life in order to continue to achieve the desired objective. The availability of resources in the future as well as the appropriateness of the technology must be considered to assess the useful life.	The asphalt and concrete pavement put in place for this alternative as an engineered control provides long term containment for the COC. The asphalt and concrete pavement would be routinely inspected, repaired, and replaced as needed. .	This alternative would permanently remove soil exceeding the target cleanup standard from the affected area.
Toxicity, Mobility, and Volume Reduction	Reduction in toxicity, mobility, and volume assesses the capability of the alternative to address COCs to remove the constituents from interaction with the environment through treatment. The reductions can be achieved by treatment to destroy COCs, treatment to immobilize the COCs, or treatment to reduce the volume of affected media.	The mobility of the COC is limited through the use of asphalt and concrete pavement that reduces their exposure to water and restricts human access to the contaminants.	Under this alternative, soil exceeding target cleanup standard would be removed from the site and placed within an engineered, secure landfill. This would remove hazardous constituents from the site and limits their mobility over the long term.
Technical Criteria – Reliability			
Long-Term Operation & Maintenance Requirements	The frequency and complexity of operations and maintenance procedures and availability of qualified labor. Alternatives requiring frequent or complex procedures would be less reliable than those requiring	This alternative utilizes long-term institutional controls. The operating and maintenance requirements for the asphalt and concrete pavement would be routine inspections and	No long-term operation and maintenance is required with this alternative after the completion of excavation activities.

TABLE 5-1
Soil Corrective Measure Evaluation Criteria and Results

Criteria	Evaluation Criteria Description	Evaluation Results – Alternative 1 Containment	Evaluation Results – Alternative 2 Excavation and Offsite Disposal
	less frequent or simpler procedures.	repairs as needed.	
Demonstrated and Expected Reliability	This is an assessment of the risk and effects due to failure of the alternative. Factors to assess include success of the technology in previous similar applications, demonstrated compatibility of multiple technologies, effects of failure of one component on other components, and the flexibility of the alternative to deal with uncontrollable changes.	This alternative has been demonstrated to reliably contain COCs and the effects due to failure in the asphalt and concrete pavement are minimal.	This alternative has been demonstrated to be reliable. The engineered controls utilized for off-site management of the excavated soils also have proven reliability.
Technical Criteria – Implementability			
Constructability	Constructability is the relative ease of implementation for the alternative, considering factors specific to the site and external factors. Site factors could include heterogeneity, utilities or buildings, adjacent properties, natural conditions, etc. External factors could include availability of qualified contractors, permitting requirements, etc.	This alternative would be implemented with ease at the Facility.	Excavation may need to be constructed in phases in order to maintain facility operation and truck access. Excavation is expected to be shallow and will not require shoring or permitting to complete. Full implementation of this alternative could be limited if affected soil extends beneath the stormwater/sewer line located south of the hotspot. Qualified contractor and landfill space are readily available.
Implementation Time	Implementation time is the time needed to implement the alternative. Alternatives that can be implemented in a short time would be preferred over those that require longer implementation times.	The components of this alternative have already been implemented at the Facility to a large extent.	This alternative could be completed in less than a year.
Beneficial Results Timeframe	Some corrective measures may require more time to achieve their full effectiveness than others. Alternatives that achieve beneficial results in a shorter time would be preferred over alternatives requiring more time.	The benefits of this alternative would be achieved immediately upon implementation.	The benefits of this alternative would be achieved immediately upon implementation.

TABLE 5-1
Soil Corrective Measure Evaluation Criteria and Results

Criteria	Evaluation Criteria Description	Evaluation Results – Alternative 1 Containment	Evaluation Results – Alternative 2 Excavation and Offsite Disposal
Technical Criteria – Safety			
Risk of Fire, Explosion, or Exposure to Hazardous Substances	Safety includes risks posed to workers implementing the corrective measure as well as to nearby businesses and communities. Factors to be assessed for safety include fire, explosion, traffic accidents, potential for exposure to site constituents, and injuries associated with implementation.	This alternative has minimal safety risks for workers and the public with regard to fire, explosion, traffic accidents, injuries during implementation, or exposure to contaminants.	Compared with Alternative 1, this alternative has moderate risk to safety due to potential worker exposure issues associated with the generation of dust during excavation and handling of impacted soils. There is also an increased risk of traffic accidents associated with the transport of soil to an off-site disposal facility.
Human Health			
Minimization of Short- and Long- Tern Exposure	The extent to which the alternative mitigates both short-term and long-term exposure to site constituents, including protection of workers and the public during implementation of the alternative. Potential exposure routes, the nature and location of site constituents, and the locations of potentially exposed populations are assessed.	This alternative minimizes short and long term exposure for workers and the public to contaminants.	Soils with COC concentration above target cleanup standard would be permanently removed from the site under this alternative. However, there are short-term exposure risks to construction workers during the excavation and loading of impacted soil. Because of the offsetting effects of short- and long-term exposure risk, this alternative would have moderate ranking relative to Alternative 1.
Environmental			
Short- and Long-Term Beneficial Versus Adverse Effects	The short- and long-term beneficial and adverse effects associated with the alternative owing to site conditions and pathways, including measures taken to mitigate these effects. In addition, the beneficial or adverse effects on environmentally sensitive areas that could be affected by the corrective measure alternative are considered.	This alternative minimizes short and long term adverse effects on environmentally sensitive areas.	This alternative minimizes short and long term adverse effects on environmentally sensitive areas.

TABLE 5-1
Soil Corrective Measure Evaluation Criteria and Results

Criteria	Evaluation Criteria Description	Evaluation Results – Alternative 1 Containment	Evaluation Results – Alternative 2 Excavation and Offsite Disposal
Institutional			
Relative Ease of Addressing Institutional Issues	Compliance with applicable federal, state, and local environmental, safety, or public health standards, guidance, or regulations on the design, operation, or implementation time for the alternative. Community issues that may affect the design, operation, or implementation time of the alternative.	This alternative requires a restrictive covenant that will limit land use which will require interaction with appropriate government entities to implement.	This alternative requires a restrictive covenant that will limit land use which will require interaction with appropriate government entities to implement.
Cost			
Relative Cost	The estimated costs for construction and for operation and maintenance of the alternative, including associated monitoring and inspection costs. Total costs in current dollars will be estimated for a project life up to 30 years.	The costs for implementation of this alternative are minimal as the actions are already a part of the Facility's operating procedures and budget.	The capital costs for construction is relatively high compared to Alternative 1. This alternative has no operation or maintenance cost.

TABLE 5-2
Point of Compliance Criteria (WAC 173-340-740(6)(f))

	Criteria	Alternative 1 Evaluation	Alternative 2 Evaluation
(i)	The selected remedy is permanent to the maximum extent practicable using the procedures in WAC 173-340-360;	No. While Engineering and Institutional control will continue for the foreseeable future, they do not reduce the toxicity, mobility or volume of hazardous substances and therefore is not permanent.	Yes. Soil exceeding target cleanup level is permanently removed from the site.
(ii)	The cleanup action is protective of human health. The department may require a site-specific human health risk assessment conforming to the requirements of this chapter to demonstrate that the cleanup action is protective of human health;	Yes. There is no human exposure pathway via direct contact because the Facility is capped.	Yes. The cleanup action is protective of human health. Soil exceeding target cleanup level is removed from the site.
(iii)	The cleanup action is demonstrated to be protective of terrestrial ecological receptors under WAC 173-340-7490 through 173-340-7494;	Yes. There are no terrestrial ecological receptors.	Yes. There are no terrestrial ecological receptors.
(iv)	Institutional controls are put in place under WAC 173-340-440 that prohibit or limit activities that could interfere with the long-term integrity of the containment system;	Yes. Institutional controls are put in place under WAC 173-340-440.	Yes. Institutional controls are put in place under WAC 173-340-440.
(v)	Compliance monitoring under WAC 173-340-410 and periodic reviews under WAC 173-340-430 are designed to ensure the long-term integrity of the containment system; and	Yes. Maintenance program including inspection and repairs will be conducted.	Not applicable since affected soil would have been permanently removed from the site.
(vi)	The types, levels and amount of hazardous substances remaining on-site and the measures that will be used to prevent migration and contact with those substances are specified in the draft cleanup action plan.	Yes. This CMS documents the measures that will be used to prevent migration and contact of hazardous substance.	Yes. If hazardous substances remain on-site due to accessibility issues, this CMS documents the measures that will be used to prevent migration and contact of hazardous substance.

5.2 Groundwater Corrective Measure Alternatives

The groundwater corrective measure alternatives include engineering controls measures and long-term groundwater monitoring. Engineering and institutional controls being considered for the NWES facility have been described and evaluated in Section 5.1. The same set of engineering and institutional controls are also applicable to corrective measures for groundwater. Therefore, only Alternative 2 Long-Term Groundwater Monitoring is described and evaluated below.

5.2.1 Description of Corrective Measure

Long-term groundwater monitoring could consist of groundwater sampling at existing groundwater wells located in the vicinity of the PST on a stated frequency (e.g., every 5 years).

5.2.2 Evaluation Criteria and Evaluation Results

As indicated in EPA's January 14, 2009 letter, there is insufficient groundwater beneath the facility to be used as a drinking water source and the contaminated shallow groundwater should not impact surface water. Therefore no target cleanup standards have been established for groundwater.

The purpose of the long-term monitoring is to ensure that the groundwater beneath the facility is not further degraded. This is the performance standard proposed by EPA for the groundwater.

NWES believes that long-term groundwater monitoring is not necessary for the following reasons:

- RFI results indicate there are low level exceedances of benzene, vinyl chloride, total lead, and total arsenic in the shallow aquifer groundwater beneath the facility above the MTCA Method B groundwater cleanup levels (risk based levels defined assuming groundwater is used for drinking water). The shallow aquifer is not a drinking water source so this comparison provides an extremely conservative evaluation of the facility shallow aquifer groundwater. Of these four constituents, arsenic is not believed to be associated with NWES's activities but is from the subsurface soil fill material on the property.
- Analytical results from RFI indicate that the lower aquifer beneath the NWES facility has not been impacted. The layer of clay aquitard was confirmed to be present across the site and is an effective barrier to migration of contaminants into the lower confined aquifer. This is not expected to change.
- Groundwater monitoring has been conducted since January 2000 or a total of 24 events from 2000 through 2010 at monitoring wells located in the PST area. Constituents monitored during the groundwater water monitoring include lead and volatile organic compounds. Benzene and lead were the primary water quality indicators. The occurrence and concentration of lead and benzene show a generally decreasing trend between 2000 and 2010 in all down gradient wells. Benzene, in particular, has been detected at concentrations below the Maximum Concentration Levels (MCLs) since October 2007. Continued groundwater monitoring is not expected to yield significantly different results since the potential source of the benzene, the PST, is no longer in use.
- NWES is no longer in operation since 1995 when closure activities began. The PST, a potential past source of groundwater contamination, has been taken out of operation, emptied, cleaned and completed final closure according to the approved PST Interim Measures Workplan (CH2M HILL, 2001). The completed closure activities were documented in a letter to EPA dated January 24, 2002 and included as Appendix E in the RFI Report (CH2M HILL 2004).

- Engineering and institutional controls currently in place at the NWES facility such as asphalt and concrete pavement, maintenance activities, and implementation of environmental management system are believe to be effective in preventing contaminant from infiltration into groundwater. This is demonstrated in part by the fact that groundwater monitoring conducted from 2000 through the present showed that there is a general decreasing trend in contaminants of concern.

Based on the above, NWES believes that the performance standard of ensuring groundwater beneath the facility is not further degraded has already been demonstrated. Compliance with the engineering and institutional controls required for the soil corrective measures will be sufficient to ensure that groundwater is not further degraded going forward. Therefore, long-term groundwater monitoring at this site will not be needed.

6. Recommendation of Corrective Measures

The purpose of this CMS is to identify and evaluate potential corrective action alternatives that address affected media at the NWES facility and to identify a final corrective measure alternative that, once implemented, would achieve soil target cleanup standards and soil and groundwater performance standards set forth in EPA's January 14, 2009 and November 30, 2010 letters (Appendix 1). EPA has determined that media-specific target cleanup standards for groundwater beneath the NWES facility are not required. EPA has further determined that there are no ecological exposure routes at the facility under the current and potential future use scenarios.

In order to evaluate the potential corrective action alternatives, the following facility specific information was used:

- The performance standards as specified by EPA in the January 14, 2009 letter are:

  1) Achieving the target cleanup standards for soil, and
  2) Ensuring that the groundwater will not be further degraded and groundwater contamination will remain contained with the perched aquifer.

- NWES is no longer in operation having received the last shipment of hazardous waste for processing in February 1995. Closure activities including removal of inventory, cleaning of tanks and decontamination of secondary containment structures have been completed.

- The entire NWES facility is paved. NWES has a concrete and asphalt inspection, maintenance and repair program in place to ensure that the asphalt and concrete remain in good condition.

- NWES has conducted groundwater investigation and monitoring activities since 1987 and continues to routinely monitor the groundwater beneath the facility.

- In March 2003, EPA documented that the NWES facility met the two established RCRA Corrective Action Environmental Indicators (EIs):

  CA725 – Current Human Exposures Under Control
  CA750 – Migration of Contaminated Groundwater Under Control

On the basis of the two sets of soil target cleanup standards defined by EPA in the January 14, 2009 letter, NWES has elected to meet soil target cleanup standards for industrial exposure scenario. As such, the only COCs that exceed the soil target cleanup standards are chromium, and vanadium. However, as discussed under Section 3.1, the industrial cleanup standard is considered as met for arsenic since less than 10% of the samples exceed this cleanup standard and the exceedance is not greater than two times the cleanup standard. In addition, EPA has indicated that NWES doesn't have to re-evaluate chromium for soil removal. However, if hot spot removal is selected as the corrective measure, confirmation sampling to show that hexavalent chromium is less than the target cleanup standard will be

required. As such, vanadium is the only COC that exceed soil target cleanup standard and require remedial action.

Initial screening of corrective measures alternatives indicate that two of the three alternatives can be successfully implemented based on facility, contaminant, and technology limitations. Implementation of one or both of these corrective measures will allow NWES to meet the established performance standard for soil.

The two retained corrective measure alternatives were evaluated in detail using the evaluation criteria listed in Tables 5-1 and 5-2. The results of the screening evaluation indicated that Alternative 2 Excavation and Offsite Disposal at a portion of the property would be effective in achieving industrial use soil target cleanup standards and is therefore identified as the preferred soil corrective measure alternatives for the NWES facility. In addition, because soil with constituents exceeding unrestricted land use cleanup standards remain on site, Alternative 1, Containment through a combination of engineering and institutional controls would also need to be implemented. This is consistent with EPA's expectation that engineering and institutional controls can be used in situations where contaminated media can be reliably contained, pose relatively low long-term threats, or for which treatment is impracticable (EPA, 2000). None of the COCs pose threat to protection of human health and the environment because there are no direct human contact pathways (the entire site is paved) and there are no ecological receptors.

For groundwater, NWES believes that the recommendation of engineering and institutional controls (Alternative 1) proposed for the soil corrective measure have been and will continue to be effective in achieving the performance standard for groundwater of ensuring that groundwater underneath the NWES facility is not further degraded. Long term groundwater monitoring is not proposed as part of the corrective measures. Furthermore, in the November 30, 2010 comment letter, EPA stated that based on analysis of the data in the RFI and groundwater data collected under the PST groundwater monitoring program, EPA will be proposing termination of long-term monitoring of groundwater for contaminants of concern.

7. Cost Estimates and Schedule

The cost estimate for implementing Alternative 1 Containment through Engineering and Institutional Controls is presented in Table 7-1. All but one component of the Alternative 1 has already been implemented as part of the standard business operating practices by the current facility operator Emerald Recycling. The only remaining component of the correct measure is the Restrictive Covenants. A copy of the draft Restrictive Covenant as edited by Ecology and EPA is included in Appendix 3.

TABLE 7-1

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.
SUBTOTAL						
	Subtotal					$ 7,200
	Plus 10% Contingencies					$ 720
TOTAL						**$ 7,920**

The cost estimate for implementing Alternative 2 Excavation and Offsite Disposal is presented in Table 7-2.

Per Section 7.20 of the Consent Order, within 60 calendar days after EPA's written acceptance of the Corrective Measures Study Report and selection of the corrective measures, NWES will submit a draft Corrective Measures Implementation (CMI) Workplan for EPA review and approval. The CMI Workplan will be designed to implement the design, construction, operation, maintenance, and monitoring of corrective measures at the Facility, and will be prepared in accordance with the CMI Workplan Scope of Work contained in Attachment D of the Consent Order.

TABLE 7-2

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[1]	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
SUBTOTAL					
	Subtotal Items 1 through 14				$28,569
	Plus 15% Contingencies				$4,285
15	Restrictive Covenants	HR	$300	24	$7,200
	Plus 10% Contingencies				$720
TOTAL					**$40,774**

[1]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.

8. References

CH2M HILL, 1994. *RCRA Treatment and Storage Permit Application for Airport Way South Facility, Northwest EnviroService Inc., Volume 1.* April 1994..

CH2M HILL, 1999. *Groundwater Monitoring Workplan Assessment Monitoring Program for the Primary Sedimentation Tank, Northwest EnviroService Inc.* November 1999.

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CH2M HILL, 2001. *Interim Measures Workplan, PST Interim Measures Project*. May 2001.

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CH2M HILL, 2004b. *RCRA Interim Status Closure Report, 1500 Airport Way South Facility*. Prepared for Northwest EnviroService, Inc., Seattle, Washington. November 2004.

CH2M HILL, 2004c. *Revised Final RCRA Facility Investigation Report,* Northwest EnviroService, Inc., Airport Way South Facility, Seattle, Washington. April 2004.

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EPA, 1994. Administrative Order on Consent, US EPA Docket No. 1093-02-09-3008(h). January 19, 1994.

EPA, 1996. Advanced Notice of Proposed Rule, 61 FR 19432. May, 1996.

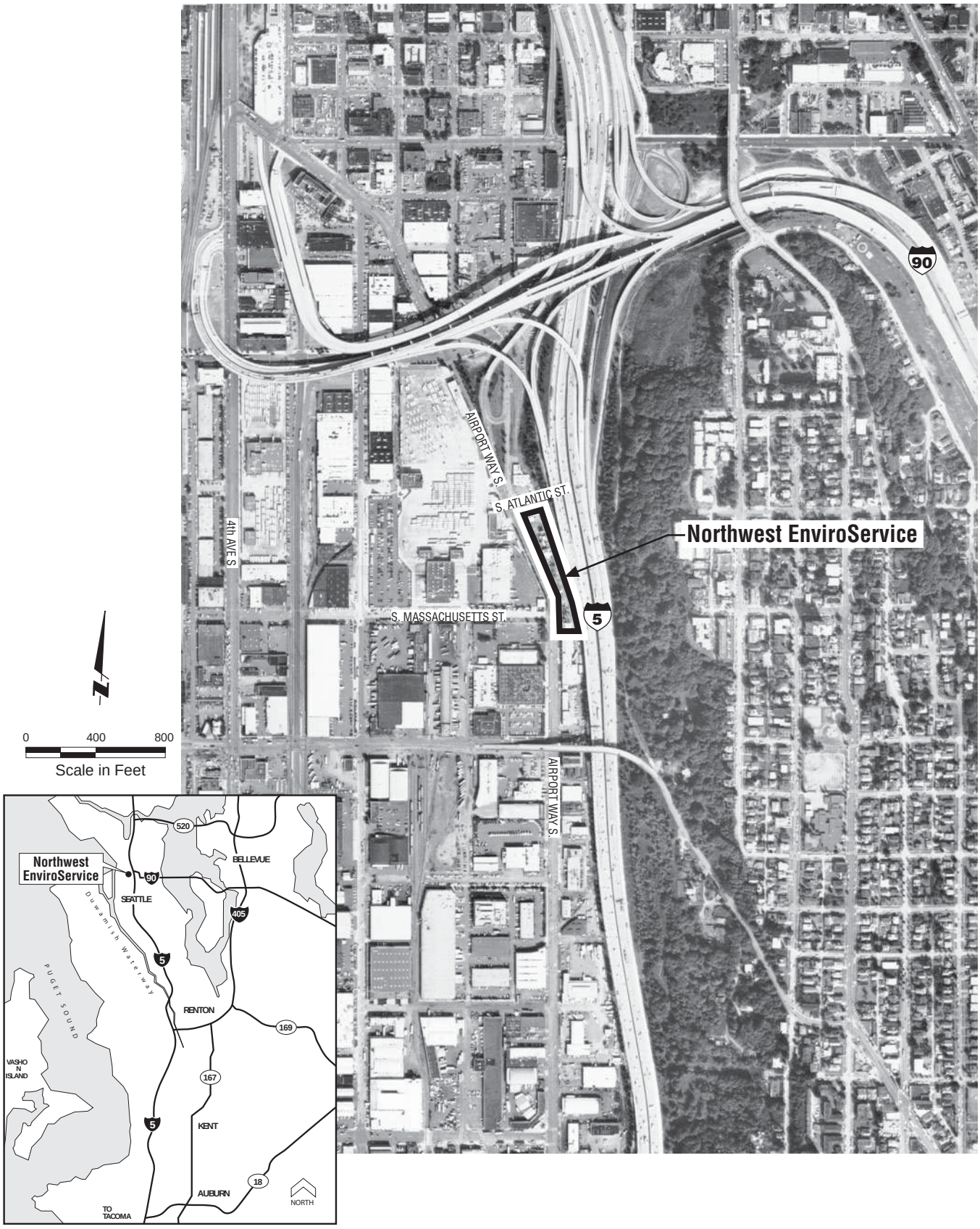
EPA, 2000. *Institutional Controls: A Site Manager's Guide to Identifying, Evaluating, and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups*. EPA 540-F-00-005. September 2000.

EPA, 2002. Fact Sheet #2 Expectations for Final Remedies at RCRA Corrective Action Facilities. March 2000.

EPA, 2003. Documentation of Environmental Indicator Determination, RCRA Corrective Action. March 2003.

Van den Berg, e al. 2006. The 2005 World Health Organization Re-evaluation of Human Health and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds. Toxicological Science, 93(2), 223-241. 2006.

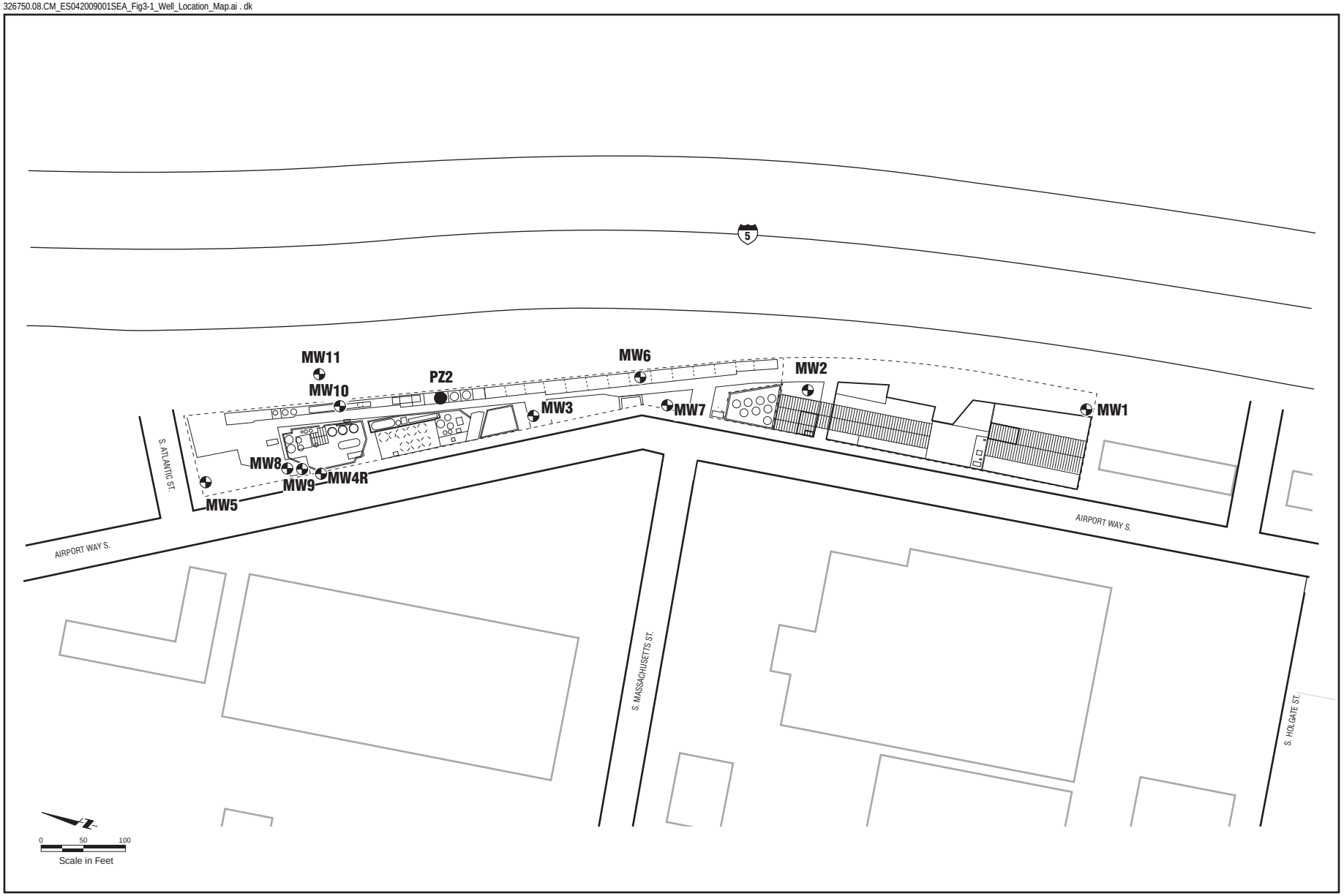
Figures



326750.08.CM_ES042009001SEA_Fig1-1_Site_Vicinity_Map.ai . dk

Figure 1-1
Site Vicinity Map
NORTHWEST ENVIROSERVICE, SEATTLE, WA

326750.08.CM_ES042009001SEA_Fig3-1_Well_Location_Map.ai . dk



LEGEND

- Piezometer
- Monitoring Well

Figure 2-1
Well Location Map
NORTHWEST ENVIROSERVICE, SEATTLE, WA

Legend

- Monitoring Well Locations
- Direct-Push Probe Locations

All unit in micrograms/liter (ug/L)
U = Below detection limit

Notes: Data from Tables 4.1 through 4.5 of RFI (CH2M HILL, 2004)
Regulatory criteria are MTCA Method B cleanup levels for groundwater. MTCA Method A cleanup level used for lead.

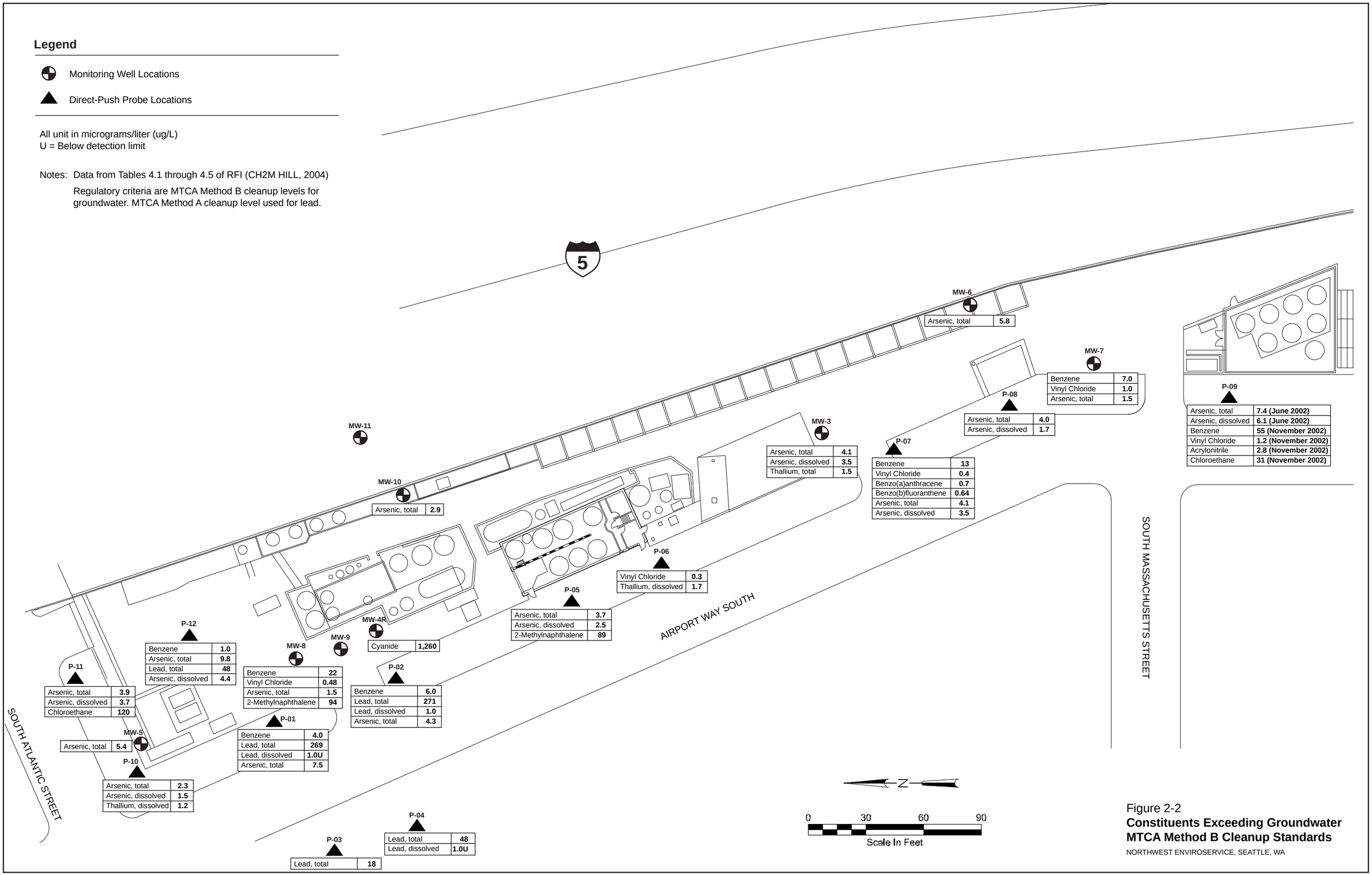


Figure 2-2
Constituents Exceeding Groundwater MTCA Method B Cleanup Standards
NORTHWEST ENVIROSERVICE, SEATTLE, WA

Unrestricted Use Soil Cleanup Standard

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

[a]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)

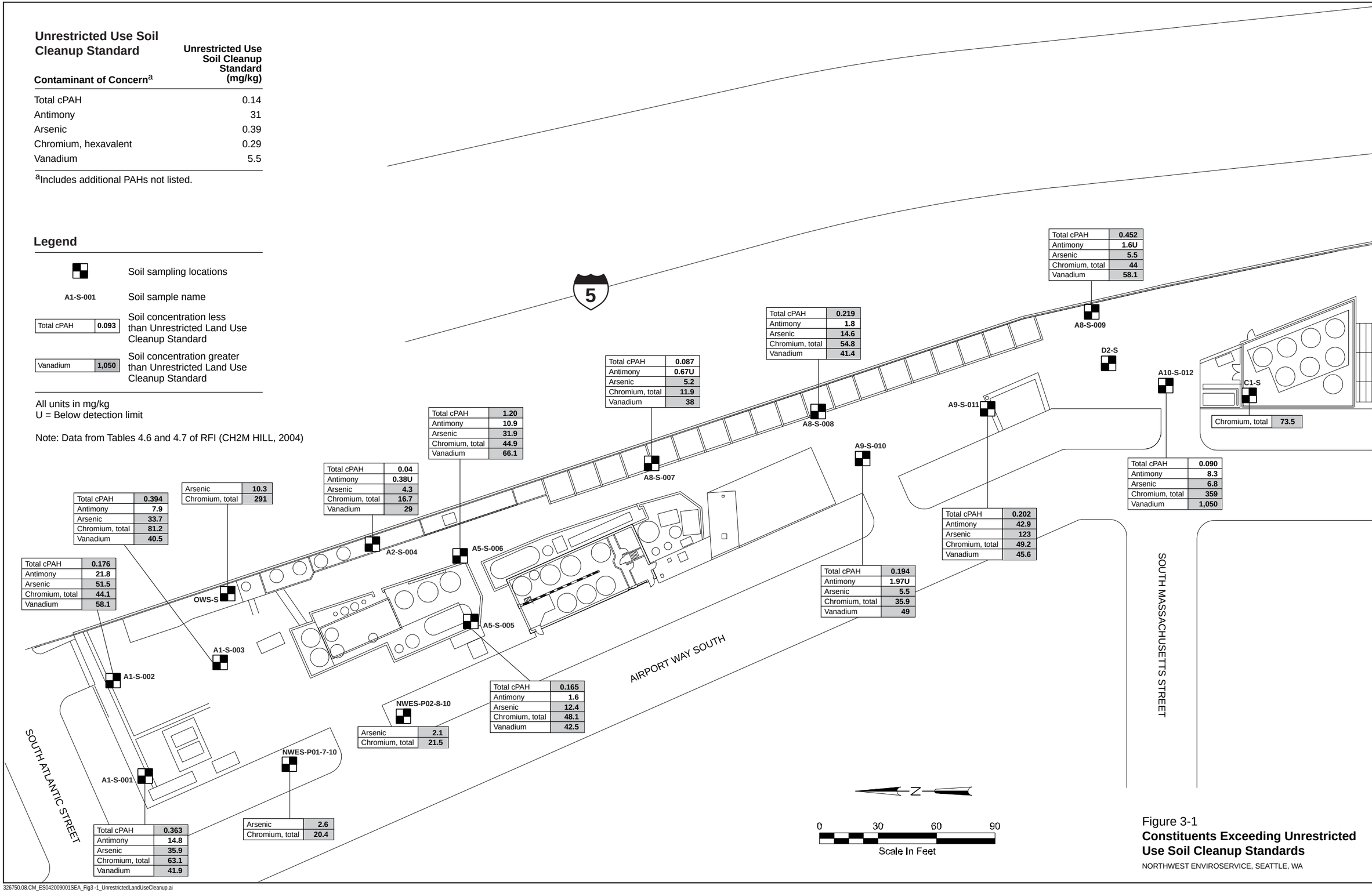


Figure 3-1
Constituents Exceeding Unrestricted Use Soil Cleanup Standards
NORTHWEST ENVIROSERVICE, SEATTLE, WA

326750.08.CM_ES042009001SEA_Fig3 -1_UnrestrictedLandUseCleanup.ai

Industrial Soil Target Cleanup Standard

Contaminant of Concern	Industrial Soil Target Cleanup Standard (mg/kg)
Benzo(a)anthracene	21
Benzo(a)pyrene	2.1
Benzo(b)fluoroanthene	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

A1-S-001 — 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)

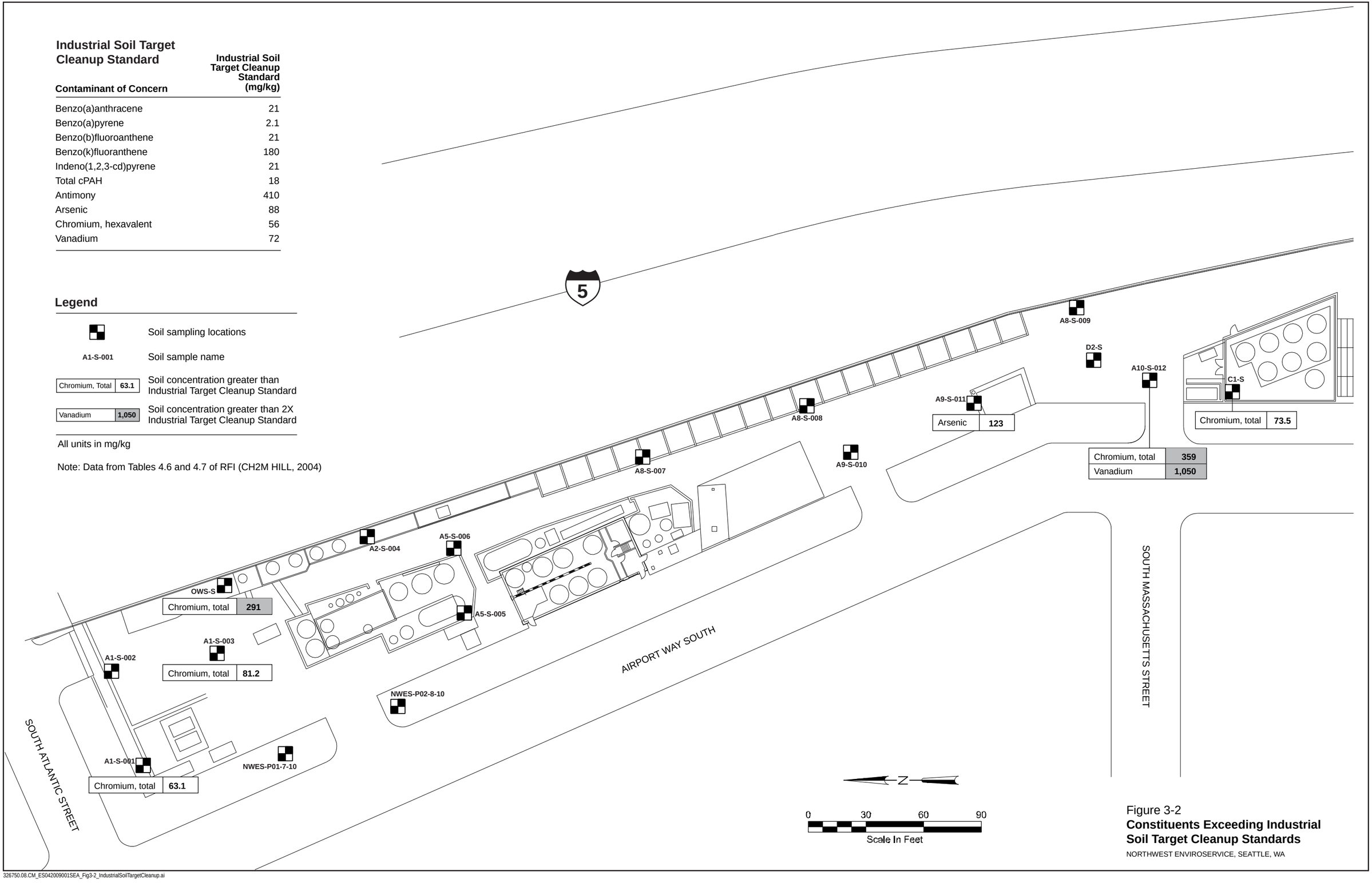


Figure 3-2
Constituents Exceeding Industrial Soil Target Cleanup Standards
NORTHWEST ENVIROSERVICE, SEATTLE, WA

326750.08.CM_ES042009001SEA_Fig3-2_IndustrialSoilTargetCleanup.ai

APPENDIX 1

EPA January 14, 2009 Target Cleanup Standards Letter and Comment Letters

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

January 14, 2009

Reply To: AWT-121

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

Jerry Bartlett
Vice President
Emerald Services
7343 E. Marginal Way South
Seattle, Washington 98018

Re: Establishment of Media-Specific Target Cleanup Standards and Performance Standards, and Request for Corrective Measures Study
Northwest EnviroService Inc. Airport Way Facility
Administrative Order on Consent under the Resource Conservation and Recovery Act (RCRA)
U.S. EPA Docket No. 1093-02-09-3008(h)
WAD 05836 7152

Dear Mr. Bartlett:

Pursuant to Paragraph 7.14 of the above-referenced Order, the U S Environmental Protection Agency, Region 10 (EPA) hereby establishes the media-specific target cleanup standards for contaminated media at the former Northwest EnviroService Inc. (NWES) facility, located at 1500 Airport Way South in Seattle, Washington. This letter also sets forth the performance standards for assessing the corrective measures and establishes a due date for submittal of a draft Corrective Measures Study (CMS).

Monitoring and investigations completed to date at the NWES facility have documented the presence of hazardous constituents in both soil and ground water at the facility. EPA has determined that in order to ensure that human health exposures remain under control, corrective measures at the Facility may be required. Since the entire NWES facility is paved with either concrete or asphalt, EPA has further determined that there are no ecological exposure routes at the facility under the current and potential future use scenarios.

The specific bases for soil target cleanup standards are discussed in this letter. The rationale for not establishing ground-water target cleanup standards is also presented. Table 1 sets forth maximum concentrations of individual hazardous constituents measured at the NWES facility and media-specific target cleanup standards for those

hazardous constituents. The table also includes soil cleanup standards for unrestricted use for individual constituents. For these constituents, further cleanup would be necessary if NWES chooses to clean up to unrestricted use.

Ground Water

The NWES RCRA Facility Investigation Report (RFI) concluded that ground water at and downgradient from the NWES facility is not potable for the following reasons; 1) the ground water does not currently serve as a drinking water source and, 2) the ground water is not a potential source of drinking water because it is present in insufficient quantity. EPA agrees that the unit beneath the facility does not produce sufficient quantities of water to enable it to be used as a drinking water source as the thickness of the perched aquifer is inadequate to install a potable well that meets the requirements set forth in WAC 173-160. In addition, based on data presented in the RFI, EPA has concluded that the shallow ground water beneath the NWES facility consists of a thin saturated perched unit that has been impacted by facility operations. This saturated unit is bound below and to the west by a low permeability clay unit. Therefore, cleanup standards based on the protection of surface water would not be applicable to the NWES facility, since the contaminated shallow ground water should never reach a surface water body.

The RFI also concluded that Washington State Model Toxic Control Act (MTCA) Method B levels were not exceeded for any constituent measured from the lower aquifer.

Given that there is insufficient ground water beneath the facility to be used as a drinking water source, and that the contaminated shallow ground water should not impact surface water; EPA is proposing that media-specific target cleanup standards for ground-water beneath the NWES facility are not required. However, the CMS must evaluate options such as long-term monitoring and institutional controls to ensure that that the ground water beneath the facility is not further degraded.

Soil

For soil at NWES, EPA is proposing MTCA Method C levels for direct exposure and the EPA Industrial Soil Preliminary Remediation Goals (PRGs) as the appropriate target cleanup standards for contaminants. These target cleanup standards are set out in the table below.

When soil target cleanup standards are established based on industrial exposure instead of residential exposure assumptions the MTCA (WAC 173-340-745(1)(A)(ii)) requires that at a minimum, a restrictive covenant be placed on the property to ensure that the use of the property remains industrial. A restrictive covenant that meets the requirements of WAC 173-340-440(9) must be executed by the property owner(s) if industrial cleanup standards will be used. Alternatively, the MTCA B levels or the EPA Residential Soil Preliminary Remediation Goal (PRGs), whichever is more stringent, allow for unrestricted use. These values are also included in the table below. Achieving

the MTCA B levels or the PRGs for individual constituents and a cumulative risk from all constituents and all pathways that does not exceed one per hundred thousand (10^{-5}) for carcinogens or a hazard index of 1 for non-carcinogens would allow the NWES facility to close without a covenant.

NWES Soil Target Cleanup Standard					
Contaminant of Concern	Maximum Concentration (mg/kg)	Unrestricted Use Cleanup Standard (mg/kg)[1]	Basis[2]	Soil Target Cleanup Standard (mg/kg)[1]	Basis[3]
Benzo(a)anthracene	1.2	0.137	MTCA	2.1	EPA
Benzo(a)pyrene	0.94	0.015	EPA	0.18	MTCA
Benzo(b)fluoranthene	0.91	0.137	MTCA	2.1	EPA
Benzo(k)fluoranthene	0.32	0.137	MTCA	17.979	MTCA
Indeno(1,2,3-cd)pyrene	0.29	0.137	MTCA	2.1	EPA
Antimony (total)	42.9	31	EPA	410	EPA
Arsenic (total)	123	0.39	EPA	88	MTCA
Chromium (hexavalent)	359	230	EPA	1,400	EPA
Vanadium	1,050	550	EPA	7,200	EPA

[1] In addition to achieving the concentrations listed for individual constituents, the cumulative risk from all constituents and all pathways cannot exceed 10^{-5} for carcinogens or a hazard index of 1 for non-carcinogens.
[2]The basis for the soil unrestricted use cleanup standard is either the EPA Preliminary Remediation Goal for Residential Soil or the MTCA Method B formula value.
[3]The basis for the target cleanup standard is either the EPA Preliminary Remediation Goal for Industrial Soil or the MTCA Method C formula value.

Performance Standards

As specified in Paragraph 7.14 of the Order, EPA is proposing performance standards for the operation of the corrective measure. Performance standards are designed to ensure that continuous progress is made during the implementation of the corrective measure. In this case, the performance standards consist of achieving the target cleanup standards and ensuring that the ground water will not be further degraded and ground-water contamination will remain contained within the perched aquifer.

Due Date for CMS

Pursuant to Paragraph 7.15 of the Order, a CMS Report must be submitted to EPA within 90 days of receipt of this letter. The CMS must be developed in accordance with Attachment C of the Order.

If you have any questions, please contact me by phone at (206)553-2851 or by email at orlean.howard@epa.gov or have your attorney contact Elizabeth McKenna at (206)553-0016 or mckenna.elizabeth@epa.gov.

Sincerely,

(signed by H. Orlean)

Howard Orlean
RCRA Project Manager

cc: Byung Maeng, Ecology NWRO
Rachel Chang, CH2M Hill

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

NOV 30 2010

OFFICE OF
AIR, WASTE AND TOXICS

Jerry Bartlett
Vice President
Emerald Services
7343 E. Marginal Way South
Seattle, Washington 98018

Re: Draft Corrective Measures Study
Northwest EnviroService Inc. Airport Way Facility
Administrative Order on Consent (AOC) under the Resource Conservation and Recovery Act (RCRA)
U.S. EPA Docket No. 1093-02-09-3008(h)
WAD 05836 7152

Dear Mr. Bartlett:

The U.S. Environmental Protection Agency, Region 10 (EPA) has reviewed the Draft Corrective Measures Study (CMS) for the Northwest EnviroSevice, Inc. (NWES), Facility located on Airport Way South in Seattle, Washington. The draft CMS document was submitted by NWES to EPA on April 15, 2009.

NWES currently conducts groundwater monitoring downgradient of the Primary Sedimentation Tank (PST) as required by the above-referenced AOC and Washington Administrative Code (WAC) 173-303-400. Based on further analysis of the data in the RCRA Facility Investigation (RFI) and the *Groundwater Assessment Monitoring Program Annual Report – 2009 PST Monitoring Network*, EPA will be proposing termination of long-term monitoring of groundwater for contaminants of concern pursuant to the AOC. This proposal is subject to public notice for remedy selection. If no changes to EPA's proposal are warranted as a result of public comments, termination of groundwater monitoring at the facility will be part of EPA's final selected remedy. Until a final remedy has been selected by EPA, Respondents must continue groundwater monitoring required by the AOC. It is important to note that Washington Department of Ecology may require continued and/or additional groundwater monitoring under its WAC authority.

In accordance with Paragraph 8.3 of the AOC, NWES must revise and resubmit the Draft CMS in accordance with the enclosed comments within thirty (30) days of receipt of this letter.

If you have any questions, please contact me by phone at (206)553-4323 or by email at castrilli.laura@epa.gov or have your attorney contact Elizabeth McKenna at (206)553-0016 or mckenna.elizabeth@epa.gov.

Sincerely,

Laura Castrilli
RCRA Corrective Action and Permits Team
Office of Air, Waste and Toxics

Enclosures

cc: Byung Maeng, Ecology NWRO
Rachel Chang, CH2M Hill

General Comment

There are errors in the EPA letter establishing industrial target cleanup standards for polynuclear aromatic hydrocarbons (PAHs). The corrected industrial target cleanup standards are below:

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 Carcinogenic PAHs (cPAHs)	18

While most of the corrected industrial soil target cleanup standards are based on EPA industrial screening levels adjusted to a 1x10-5 risk level, the EPA screening level for benzo(k)fluoranthene was lowered to equal MTCA Method C. In addition to meeting the target cleanup standards for individual constituents the 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 to adjust for relative toxicity and summing the results.

See also specific comment 6 regarding the vanadium target cleanup standard and a discussion regarding chromium.

The draft Corrective Measures Study (CMS) screens out soil removal corrective measure alternatives. Revise the CMS figure that shows soil sample results that exceed the industrial target cleanup standards. Add a new figure that shows soil sample results where 1) the result is more than two times the cleanup level and/or 2) ten percent or more of the sample results exceed the cleanup level. The CMS must be revised to evaluate hot spot soil removal as a corrective measure alternative. The corrective measure alternatives evaluation must be based on the revised target cleanup standards. See Washington Administrative Code (WAC) 173-340-740 (7) (e) criteria for determining compliance with soil cleanup levels.

Specific Comments

1. Page 1-1, Section 1, Last Paragraph –

The CMS must state that NWES performed work to close the RCRA interim status units without a closure plan approved by Washington State Department of Ecology (Ecology).

2. Page 2-1, Last Paragraph, Section 2.1 –

This paragraph states that "closure activities conducted included the removal or decontamination of all dangerous waste, waste residues and equipment, bases, liners **soils/subsoils** and..." EPA has no documentation that NWES removed or decontaminated any soils during the closure activities. If soil was removed and/or treated, NWES must submit the documentation along with results of verification sampling. If closure work did not include removal or decontamination of soils and/or subsoils, delete this phrase from this sentence.

3. Page 2-2, Section 2.1, Last Paragraph, Last Two Sentences –

Delete these sentences. Ecology has not approved the Closure Report. RCRA corrective action is not the regulatory mechanism used to close the subsurface portions of the facility. Closure of the NWES facility must be accomplished in accordance with WAC 173-303-400.

4. Page 2-3, Second Bullet –

This paragraph states that "RFI results indicate that the Facility soils have levels of arsenic and benzo(a)pyrene that exceed the MTCA B soil cleanup level but which are far below the MTCA Method C industrial facility soil cleanup level." This statement is not correct. According to Table 3-1 of the draft CMS and Table 4.6b of the RCRA Facility Investigation (RFI), arsenic concentrations are as high as 123 mg/kg which exceeds the MTCA Method C soil cleanup level of 88 mg/kg. Revise this section to state that arsenic has been detected in facility soils at levels exceeding the MTCA Method C industrial soil cleanup level.

5. Page 2-3, Second Bullet, Last Sentence –

Delete this sentence. It has not been shown that Benzo(a)pyrene is not related to past site activities. In addition, the source(s) of arsenic is still uncertain.

6. Pages 3-1 and Page 3-2, Table 3-1 –

Benzo(a)anthracene and benzo(a)pyrene were duplicated in the table on pages 3-1 and 3-2. Revise the CMS report to eliminate this duplication.

Place a footnote on 'Chromium (hexavalent)' that refers to the current EPA Regional Screening Levels (RSLs) for hexavalent chromium. See comment 8 for further information.

For vanadium: replace the unrestricted use cleanup standard with 5.5 mg/Kg and the soil target cleanup standard with 72 mg/Kg. These are the current residential and industrial EPA RSLs for vanadium which represent a hazard quotient of 1. Note that vanadium was added to the list of residual contaminants in the draft restrictive covenant.

7. Page 3-2, third line in the first paragraph –

Replace the upper case 'A' with a lower case 'a' in the WAC 173-340-745(1)(a)(ii) citation.

8. Section 3.2, Soil Target Cleanup Standard –

The soil target cleanup standard and unrestricted use cleanup standard for chromium were established using older EPA RSL information for hexavalent chromium. The current RSLs are 5.6 mg/Kg for industrial exposure and 0.29 mg/Kg for residential exposure. A target cleanup standard based on the EPA industrial screening level adjusted to a 1x10-5 risk level would be 56 mg/Kg.

Site soils were analyzed for total chromium, not the hexavalent form. One soil sample showed high concentrations of total chromium (359 mg/Kg) This soil sample is co-located with a soil sample that shows high concentrations of vanadium. NWES does not have to re-evaluate the site for chromium soil removal. If EPA selects hot-spot removal as the corrective measure, confirmation sampling to show that hexavalent chromium is less than 56 mg/Kg will be required.

9. Page 4-1, Section 4.1 and Page 5-1, Section 5-1, Soil Corrective Measure Alternatives –

The draft CMS initially proposes three soil corrective measure alternatives and then screens out two alternatives, saying that they are not feasible. For example, the draft CMS screens out excavation of soils (Alternative 2) stating that a large portion of the facility would need to be excavated without the assurance that target cleanup standards would be met. Data collected during the RFI show that there are several discrete areas of higher levels of contaminants in soil. "Hot spot" removals have been successfully conducted at many other treatment, storage, and disposal facilities. The CMS must be revised to include a detailed analysis of removal of soil that exceeds an industrial risk of 10-5 for carcinogens or an industrial hazard quotient of 1 for non-carcinogens. See the general comment for further details.

10. Page 4-1, Bottom of Page and Page 4-2, Top of Page –

Delete this paragraph regarding the 2003 Area-Wide Soil Contamination Task Force Report. Ecology has never made any decision on whether "low-to-moderate" levels can be used as soil cleanup levels or whether no further action is appropriate when arsenic concentrations are less than 200 mg/kg.

11. Page 5-1, Section 5.1.1, Asphalt and Concrete Pavement –

The asphalt and concrete pavement at the facility is integral to prevent exposure of industrial workers to elevated concentrations of contaminants. Text must be added to this section of the CMS that describes NWES' proposed inspection and maintenance procedures that would ensure that the asphalt and concrete remain in good condition. Remove all discussion of stormwater. See comment 12 for further details.

12. Page 5-1, Section 5.1.1, Stormwater Management, and Table 5-1 –

The CMS must be revised to clearly articulate the alternatives being evaluated and how those alternatives prevent exposure. As the soil-to-groundwater pathway is presently not of concern at this site, the intent of the pavement is only to prevent exposure to contaminated soils. As long as pavement inspections are conducted and any gross deterioration that leaves exposed soil is remedied, stormwater management is not a necessary component of this alternative. The CMS should include only those remedial alternatives which are necessary based on site information.

13. Page 5-3, Table 5-1 –

The asphalt and concrete pavement will only be effective if they are adequately maintained. The useful life of the pavement is limited and maintenance is required to ensure long term effectiveness. The results of the alternative evaluation section in the table must be modified to discuss long term maintenance.

14. Page 5-6, Table 5-2, Criteria (i) –

Permanence is defined at WAC 173-340-360(3)(f)(ii) as "The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances..." Neither engineering controls nor institutional controls reduce the toxicity, mobility or volume of hazardous substances. Therefore these controls are not permanent. Revise the CMS to state that Alternative 1 does not meet the criterion of permanence.

15. Page 5-6, Last Paragraph at Bottom of Page –

Delete this paragraph. Whether or not the corrective measure alternative meets the evaluation criteria does not equate to whether or not the target cleanup standard is met.

16. Page 5-8, First Bullet, First Sentence –

Delete this sentence. Known on-site contaminant sources have not been eliminated from the NWES facility.

17. Page 7-1, Table 7-1 –

The text states that the current owner of the property will complete the inspection and repairs for the concrete and asphalt pavement. The contaminants that may pose an unacceptable risk do not degrade (arsenic, vanadium). Because the length of time that the current business will operate at the site is not known, the cost estimate must include the costs for long-term inspection and repair of the asphalt and concrete pavement.

18. Figures –

Add a figure showing the site wide existing groundwater monitoring wells.

Add a figure showing the soil sampling data exceeding the Unrestricted Use Soil Cleanup Standards in Table 3-1.

Add a figure showing the site wide groundwater quality data which exceed MTCA Method B cleanup levels. Where sampling data is from Geoprobe samples, dissolved metals data may be displayed in addition to total metals data.

19. Appendix 3, Draft Restrictive Covenant –

EPA and Ecology have edited and attached a redlined/strikeout version of the draft restrictive covenant.

Note that polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDDs/PCDFs) have been added to the list of residual contaminants in the restrictive covenant. NWES does not have to include figures for PCDDs/PCDFs in the CMS nor does it have to consider removal alternatives for PCDDs/PCDFs. However, to be transparent, a discussion of PCDDs/PCDFs must be included in the revised CMS. Below is EPA's explanation and background on why PCDDs/PCDFs have been added to the list of contaminants in the restrictive covenant:

EPA is revising the draft interim preliminary remediation goals (PRGs) for dioxin in soil (http://epa.gov/superfund/policy/remedy/sfremedy/remedies/dioxinsoil.html). Under the draft interim PRG, EPA evaluates 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. EPA recommends the use of the TEFs developed by the World Health Organization (WHO - *2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds* [Van den Berg et al. 2006]). The draft interim residential PRG is 72 ng/Kg and the draft interim industrial PRG is 950 ng/Kg.

The RFI includes PCDD/PCDF data but only compared the data to older MTCA B standards for 1,2,3,7,8,9-HxCDD and 2,3,7,8-TCDD. A row containing a dioxin/furan total TEQ result for each soil sample is also in the RFI. Given the 2004 date of the RFI, the current 2005 TEFs were not used to calculate these TEQs. The RFI shows that two of the twelve samples are above the draft interim residential PRG, but all samples are below the draft interim industrial PRG.

EPA re-calculated the two 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).

Environmental Restrictive Covenant

After Recording Return to:

Department of Ecology
3190 160th Ave SE
Bellevue, WA 98008-5452

Deleted: Mr. Howard Orlean¶
RCRA Project Manager¶
USEPA Region 10¶
1200 Sixth Avenue, Suite 900¶
Seattle, Washington 98101-3140

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Environmental Covenant

Grantor: Western Tank Properties
Grantee: State of Washington, Department of Ecology
Legal: See Exhibit A
Tax Parcel Nos.: 7666202860

Grantor, Western Tank Properties, hereby binds Grantor, its successors and assigns to the land use restrictions identified herein and grants such other rights under this environmental covenant (hereafter "Covenant") made this___ day of 201__ in favor of the State of Washington Department of Ecology, its successors and assigns (hereafter "Ecology"). Ecology shall have full right of enforcement of the rights conveyed under this Covenant pursuant to the Model Toxics Control Act, RCW 70.105D.030(1)(g), and the Uniform Environmental Covenants Act, 2007 Wash. Laws ch. 104, sec. 12.

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This Declaration of Covenant is made pursuant to RCW 70.105D.030(1)(f) and (g) and WAC 173-340-440 by Western Tank Properties, its successors and assigns, and Ecology.

Deleted: the State of
Deleted: Washington Department of
Deleted: , its successors and assigns (hereafter "Ecology")

A remedial action (hereafter "Remedial Action") occurred at the property that is the subject of this Covenant. The Remedial Action conducted at the property is described in the following document:

- *Insert name of the report containing the remedial action, Northwest EnviroService Inc. Airport Way Facility, insert Month Year of the report.*

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This document is on file at Ecology's Northwest Regional Office.

Deleted: *Corrective Measures Study Report, Northwest EnviroService Inc. Airport Way Facility, Month 2009*

This Covenant is required because the Remedial Action resulted in residual concentrations of polychlorinated dibenzodioxins and polychlorinated dibenzofurans (PCDDs/PCDFs), total arsenic, total vanadium and benzo(a)pyrene in soil and benzene, vinyl chloride, total lead and total arsenic in groundwater which exceed the Model Toxics Control Act Method B Cleanup Levels established under WAC 173-340-705.

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The undersigned, Western Tank Properties, is the fee owner of real property (hereafter "Property") in the County of King, State of Washington, that is subject to this Covenant. The Property is legally described in Exhibit A of this covenant and made a part hereof by reference.

Western Tank Properties makes the following declaration as to limitations, restrictions, and uses to which the Property may be put and specifies that such declarations shall constitute covenants to run with the land, as provided by law and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property (hereafter "Owner").

Section 1.

1. The property shall be used only for traditional industrial uses, as described in RCW 70.105D.020(23) and defined in and allowed under the [City – or COUNTY] of ['s] zoning regulations codified in the [OFFICIAL NAME OF ZONING REGULATION] as of the date of this Restrictive Covenant.

2. No groundwater may be taken for domestic, agricultural or any other use from the property.

3. a. The Property contains total arsenic and benzo(a)pyrene contaminated soil across the majority of property. The Owner shall not alter, modify, or remove the existing structures in any manner that may result in the release or exposure to the environment of that contaminated soil or create a new exposure pathway without prior written approval from Ecology.

b. Any activity on the Property that may result in the release or exposure to the environment of the contaminated soil that was contained as part of the Remedial Action, or create a new exposure pathway, is prohibited. Some examples of activities that are prohibited in the capped areas include: drilling, digging, placement of any objects or use of any equipment which deforms or stresses the surface beyond its load bearing capability, piercing the surface with a rod, spike or similar item, bulldozing or earthwork.

Section 2. Any activity on the Property that may interfere with the integrity of the Remedial Action and continued protection of human health and the environment is prohibited.

Section 3. Any activity on the Property that may result in the release or exposure to the environment of a hazardous substance that remains on the Property as part of the Remedial Action, or create a new exposure pathway, is prohibited without prior written approval from Ecology.

Section 4. The Owner of the property must give thirty (30) day advance written notice to Ecology of the Owner's intent to convey any interest in the Property. No conveyance of title, easement, lease, or other interest in the Property shall be consummated by the Owner without adequate and complete provision for continued monitoring, operation, and maintenance of the Remedial Action.

Section 5. The Owner must restrict leases to uses and activities consistent with the Covenant and notify all lessees of the restrictions on the use of the Property.

Section 6. The Owner must notify and obtain approval from Ecology prior to any use of the Property that is inconsistent with the terms of this Covenant. Ecology may approve any inconsistent use only after public notice and comment.

Section 7. The Owner shall allow authorized representatives of Ecology the right to enter the Property at reasonable times for the purpose of evaluating the Remedial Action; to take samples, to inspect remedial actions conducted at the property, to determine compliance with this Covenant, and to inspect records that are related to the Remedial Action.

Section 8. The Owner of the Property reserves the right under WAC 173-340-440 to record an instrument that provides that this Covenant shall no longer limit use of the Property or be of any further force or effect. However, such an instrument may be recorded only if Ecology, after public notice and opportunity for comment, concurs.

Western Tank Properties,

_____

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[Name of Signatory]
[Title]
Dated:

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

_____
[Name of Person Acknowledging Receipt]
[Title]
Dated:

[CORPORATE ACKNOWLEDGMENT]

STATE OF _____
COUNTY OF _____

On this day of , 20__, I certify that personally appeared before me, acknowledged that **he/she** is the of the corporation that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that **he/she** was authorized to execute said instrument for said corporation.

_____
Notary Public in and for the State of Washington, residing at
_____.
My appointment expires_____.

Exhibit A
Legal Description

Deleted: [INDIVIDUAL ACKNOWLEDGMENT]¶
STATE OF _____¶
COUNTY OF _____¶
¶
On this day of , 20__, I certify that personally appeared before me, and acknowledged that **he/she** is the individual described herein and who executed the within and foregoing instrument and signed the same at **his/her**free and voluntary act and deed for the uses and purposes therein mentioned.¶
¶
_____
_¶
Notary Public in and for the State of¶
Washington, residing at _____.¶
My appointment expires_____.¶
¶

Deleted: [REPRESENTATIVE ACKNOWLEDGEMENT]¶
STATE OF_____¶
COUNTY OF_____¶
¶
On this day of , 20__, I certify that personally appeared before me, acknowledged that **he/she** signed this instrument, on oath stated that **he/she** was authorized to execute this instrument, and acknowledged it as the _____ [type of authority] of _____ [name of party being represented] to be the free and voluntary act and deed of such party for the uses and purposes mentioned in the instrument.¶
_____
_¶
Notary Public in and for the State of¶
Washington, residing at _____.¶
My appointment expires _____.¶
¶
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

OFFICE OF
AIR, WASTE AND TOXICS

MAR 0 2 2011

Jerry Bartlett
Vice President
Emerald Services
7343 E. Marginal Way South
Seattle, Washington 98018

Re: Modifications to the Revised Corrective Measures Study Report
Northwest EnviroService Inc. Airport Way Facility
Administrative Order on Consent (AOC) under the Resource Conservation and Recovery Act (RCRA)
U.S. EPA Docket No. 1093-02-09-3008(h)
WAD 05836 7152

Dear Mr. Bartlett:

The U.S. Environmental Protection Agency, Region 10 (EPA) has reviewed the Revised Corrective Measures Study (CMS) Report for the Northwest EnviroService, Inc. (NWES), Facility located on Airport Way South in Seattle, Washington. The revised CMS Report was submitted by NWES to EPA on January 14, 2011.

In accordance with Paragraph 8.3 of the AOC, the CMS Report must be modified as specified in the enclosure. NWES must revise and resubmit the Revised CMS Report in accordance with the enclosed modifications within thirty (30) days of receipt of this letter. NWES may choose to only resubmit the pages requiring modification. No other modifications may be made without prior EPA approval.

Some of the modifications enclosed require adding groundwater contaminants exceeding MTCA B criteria to Figure 2-2. Not all groundwater contaminants exceeding MTCA B criteria are listed in the draft restrictive covenant. At this time, EPA is not requiring modification to the list of contaminants in the restrictive covenant. Depending upon Ecology and/or public comments received on the forthcoming Statement of Basis, EPA may require further changes to the list of contaminants in the covenant prior to finalization.

EPA is drafting the Statement of Basis. In accordance with Paragraph 7.17 of the Order, EPA will provide the public with an opportunity to comment on EPA's proposed remedy. Prior to issuing the public notice, NWES will have two weeks to provide EPA with any factual corrections on the Statement of Basis.

If you have any questions, please contact me by phone at (206)553-4323 or by email at castrilli.laura@epa.gov or have your attorney contact Elizabeth McKenna at (206)553-0016 or mckenna.elizabeth@epa.gov.

Sincerely,

Laura Castrilli
RCRA Corrective Action and Permits Team
Office of Air, Waste and Toxics

Enclosure

cc: Byung Maeng, Ecology NWRO
Rachel Chang, CH2M Hill

1. **Page 2-1, Section 2.1, Last Paragraph, Last Sentence** – Delete this sentence. EPA and Ecology have not approved the Closure Report. Therefore, it cannot be stated that the Closure Report addressed EPA's and Ecology's requirements to close the above-ground portion of the facility.

2. **Page 3-2, Table 3-1**

   a. Change the basis for the industrial cleanup standard for total cPAHs from EPA to MTCA. EPA does not have regional screening levels for total cPAHs. The 18 mg/Kg standard is a MTCA C standard.

   b. When this table was revised, the old definition for footnote 4 was removed and not replaced while additional footnotes numbering 5-7 were added. The result is that footnotes placed in the body of the table either have no definition below or refer to the incorrect footnote definition:

      i. Renumber footnote definitions so that footnote 5 is now 4, 6 is now 5 and 7 is now 6.
      ii. Remove footnote 5 on the 0.29 mg/Kg unrestricted use cleanup standard for chromium (hexavalent). The definition for footnote 5 states that the risk was adjusted to 1x10-5. The unrestricted use standard represents a 1x10-6 risk concentration. EPA only adjusted the industrial cleanup standard to a 1x10-5 risk concentration.
      iii. Change the footnotes in the table body, so that number "7" footnotes are "6"s.

3. **Page 3-2, last sentence on this page** – Replace the words "established target" with "unrestricted use". Achieving target cleanup standards, which are based on industrial use, does not allow NWES to close without a covenant. Closing without a covenant is only possible if unrestricted use cleanup standards are achieved.

4. **Table 3-3** – This new table has the footnote "1" on the unrestricted use cleanup standard of 72 ng/Kg. Footnote "2" is a reference to the draft recommended interim preliminary remediation goals for dioxins and furans. Replace footnote 1 on 72 ng/Kg with a footnote 2.

5. **Page 5-2, Section 5.1.2** – Remove the sentence that discusses disposal of excavated soil in a Subtitle D Landfill. Modify the end of this paragraph to read as follows:

   "Excavated soils will be characterized prior to disposal. If characterization sampling shows exceedance of one or more TCLP criterion, excavated soil shall be disposed of in a Subtitle C Landfill. If TCLP regulatory criteria are not exceeded, excavated soil may be disposed of in a Subtitle D Landfill."

6. **Table 5-1, Soil Corrective Measure Evaluation Criteria and Results** – The Alternative 2 Evaluation is only for removing soil contaminated above the target industrial cleanup level. Institutional controls in the form of restrictive covenants will still be required even after satisfactory completion of Alternative 2. Modify Alternative 2 results for the "Institutional" criteria listed on page 5-7 by adding the following to the existing discussion:

   "This alternative requires a restrictive covenant that will limit land use which will require interaction with appropriate government entities to implement."

7. **Table 5-2, Point of Compliance Criteria (WAC 173-340-740(6)(f))** – The Alternative 2 Evaluation is only for removing soil contaminated above the target industrial cleanup level. Institutional controls in the form of restrictive covenants will still be required even after satisfactory completion of Alternative 2. Page 5-8, criteria iv, institutional controls, column for Alternative 2: remove the entry in this cell that begins with "Not applicable" and replace it with the following language:

   "Yes. Institutional controls are put in place under WAC 173-340-440."

8. **Page 6-1, last paragraph** – Second sentence: add arsenic to the list of contaminants of concern that exceed the soil target cleanup standard. Insert the following sentence after the second sentence:

   "However, as discussed under Section 3.1, the industrial cleanup standard is considered as met for arsenic since less than 10% of the samples exceed this cleanup standard and the exceedance is not greater than two times the cleanup standard."

9. **Table 7-1** – When this table was edited to remove the stormwater management that was included as item 2 in the previous draft CMS cost estimate, the remaining items were not renumbered. Renumber items 3 through 6 to 2 through 5.

10. **Table 7-2** –

    a. Item 7: change the unit price to $180 and the total for this line item to $4347. Revise this page to include the following footnote:

       "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 Toxicity Characteristic Leaching Procedure (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."

    b. Change the second item 8 to 9, the 9 to 10, the 10 to 11 and the 11 to 12.

c. The cost estimate does not include waste characterization. Modify the estimate to add an item 13, Waste Characterization Sampling, with a unit of EA, a unit price of $140, a quantity of 3 and a total of $420.

d. Change the 15% contingency total to $5025.

e. Between the contingency line and the Total, add a line for total institutional control costs from Table 7-1, at a cost of $7920. Change the total for Alternative 2 to $46,450. Since Alternative 2 leaves contamination above unrestricted cleanup standards, institutional controls are still required. The cost cannot be added as a line item to this table as the contingency percentage for the ICs is 10% versus the 15% for the excavation and disposal measure.

11. Figure 2-2 –

a. Add the chloroethane result of 120 ug/L to the list of constituents exceeding MTCA B cleanup standards in groundwater at location NWES-P11. Chloroethane, also known as ethyl chloride, has a MTCA B cleanup standard of 15 ug/L.

b. Add the 2-methylnaphthalene result of 89 ug/L is to the list of constituents exceeding MTCA B cleanup standards in groundwater at location NWES-P05. The MTCA B cleanup standard for this compound is 32 ug/L.

c. Add the 2-methylnaphthalene result of 94 ug/L to the list of constituents exceeding MTCA B cleanup standards in groundwater at MW-8. The MTCA B cleanup standard for this compound is 32 ug/L.

d. For location NWES-P09:

   i. Add the "Y" qualified result for acrylonitrile. There is no explanation of the reason for this qualifier in the RFI report, however, the result is above the MTCA B cleanup standard of 0.081 ug/L.
   ii. Add the estimated results for benzene and chloroethane of 55 ug/L and 31 ug/L, respectively.

12. Figure 3-2 – Add the arsenic result of 123 mg/Kg for location A9-S-011. This figure depicts soil results that exceed industrial soil target cleanup standards and this result for arsenic exceeds the 88 mg/Kg industrial soil target cleanup standard.

APPENDIX 2

PST Groundwater Monitoring Results for Lead and Benzene

Appendix 2 PST Groundwater Monitoring Results for Lead and Benzene

NWES conducts a groundwater assessment monitoring program specifically designed to monitor groundwater in the area near the former primary sedimentation tank (PST) at the north end of the NWES facility. This program was implemented according to the plan titled *Groundwater Monitoring Workplan Assessment Monitoring Program for the Primary Sedimentation Tank* (CH2M HILL, 1999). Under that workplan, NWES was required to collect quarterly groundwater samples for analysis and measure groundwater elevations. The assessment monitoring program for the PST was initially implemented in January 2000 which included the installation of several new groundwater monitoring wells upgradient and downgradient of the PST. Since 2003, groundwater sampling events have been conducted during April and October of each year.

The following section presents a summary of the lead and benzene sampling results from January 2000 through 2008.

Lead

Lead was detected above the maximum contaminant level (MCL) of 0.015 mg/L in two downgradient PST monitoring wells (MW-4R and MW-8) during the first PST sampling event in January 2000. Since then, it was commonly detected above its MCL in all three downgradient wells (MW-4R, MW-8 and MW-9) and less frequently in one upgradient well (MW-10). Sampling results for lead is presented in Table 1. A time series plot from 2000 through 2008 is shown in Figure 1. In general, lead showed a decreasing trend in all of the down gradient wells (MW-4R, MW-8 and MW-9).

Benzene

Benzene was detected above its MCL of 5.0 µg/L in three downgradient wells (MW-4R, MW-8 and MW-9). Benzene was not detected at the upgradient wells of MW-10 and MW-11 since January 2001. Sampling results for benzene is presented in Table 1. A time series plot from 2000 through 2008 is shown in Figure 1.

Benzene showed a pronounced decreasing trend in all of the downgradient wells. Benzene has not been detected above its MCL at MW-4R and MW-9 since April 2001 and October 2001 respectively. Benzene has not been detected above its MCL at MW-8 since April 2007.

Table 1 Lead Sampling Results

Sampled	MW-4R	MW-8	MW-9	MW-10	MW-11	Units
January-00	0.098	0.007	0.32	U	0.003	mg/L
April-00	0.148	0.2	0.191	0.091	0.015	mg/L
July-00	0.06	0.12	0.22	0.12	0.007	mg/L
October-00	0.078	0.048	0.052	0.135	0.004	mg/L
January-01	0.035	0.074	0.1	0.072	0.003	mg/L
April-01	0.05	0.08	0.16	0.09	0.02	mg/L
July-01	0.05	0.052	0.094	0.048	0.006	mg/L
October-01	0.16	0.21	0.029	0.064	0.006	mg/L
January-02	0.007	0.31	0.27	0.02	0.002	mg/L
April-02	0.02	0.16	0.094	0.011	0.01	mg/L
April-03	0.007	0.6	0.21	0.023	0.001	mg/L
April-04	0.011	0.052	0.16	0.027	0.005	mg/L
October-04	0.005	0.06	0.086	0.058	0.005	mg/L
April-05	0.004	0.072	0.006	0.041	0.002	mg/L
October-05	0.006	0.12	0.06	0.058	0.002	mg/L
April-06	0.008	0.032	0.046	0.012	0.002	mg/L
October-06	0.018	0.047	0.029	0.016	0.008	mg/L
April-07	0.009	0.007	0.051	0.004	0.035	mg/L
October-07	0.025	0.12	0.049	0.005	0.017	mg/L
April-08	0.004	0.04	0.041	0.014	0.002	mg/L
October-08	0.01	0.004	0.031	0.01	0.002	mg/L

Table 2 Benzene Sampling Results

Sampled	MW-4R	MW-8	MW-9	MW-10	MW-11	Units
January-00	13.5	5.3	22	U	0.2	µg/L
April-00	11	5.3	17	0.4	0.4	µg/L
July-00	9.2	8.4	16	1	1	µg/L
October-00	6.3	5.8	16	1	1	µg/L
January-01	8	5	18	0.2	0.2	µg/L
April-01	5.8	4.6	11	0.2	0.2	µg/L
July-01	1.9	7.2	11	0.2	0.2	µg/L
October-01	2.3	5.4	12	0.2	0.2	µg/L
January-02	0.7	29	0.3	0.2	0.2	µg/L
April-02	0.4	29	0.2	0.2	0.2	µg/L
April-03	0.2	20	0.2	0.2	0.2	µg/L
April-04	0.2	20.7	0.2	0.2	0.2	µg/L
October-04	0.2	23	0.2	0.2	0.2	µg/L
April-05	0.2	21	0.2	0.2	0.2	µg/L
October-05	0.2	20	0.2	0.2	0.2	µg/L
April-06	0.3	12	0.2	0.2	0.2	µg/L
October-06	0.2	5.2	0.2	0.2	0.2	µg/L
April-07	0.2	8.6	0.2	0.2	0.2	µg/L
October-07	0.2	1	0.2	0.2	0.2	µg/L
April-08	0.2	3.5	0.2	0.2	0.2	µg/L
October-08	0.2	0.5	0.2	0.2	0.2	µg/L

Shade = Above MCL

Figure 1 Lead Sampling Results

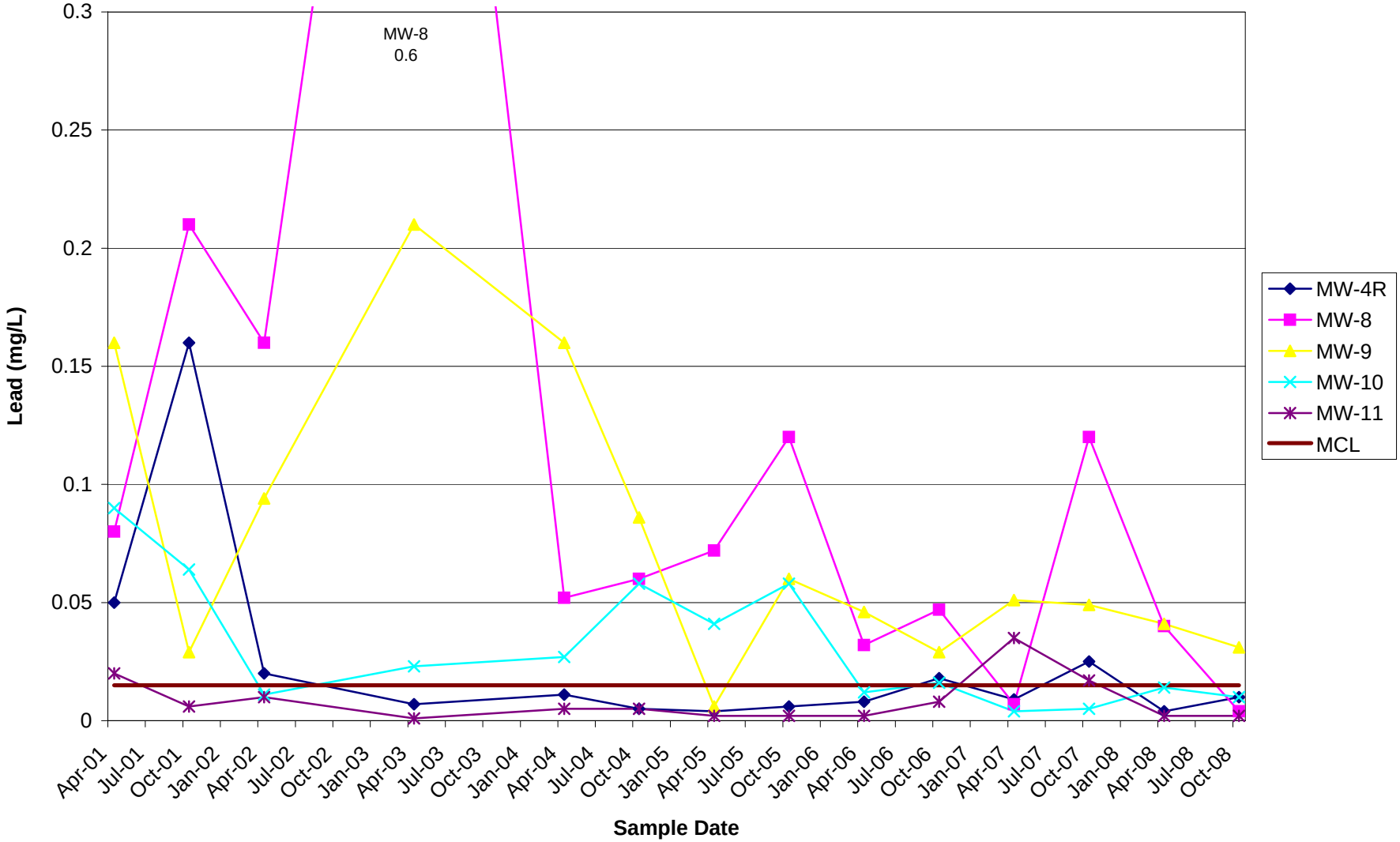
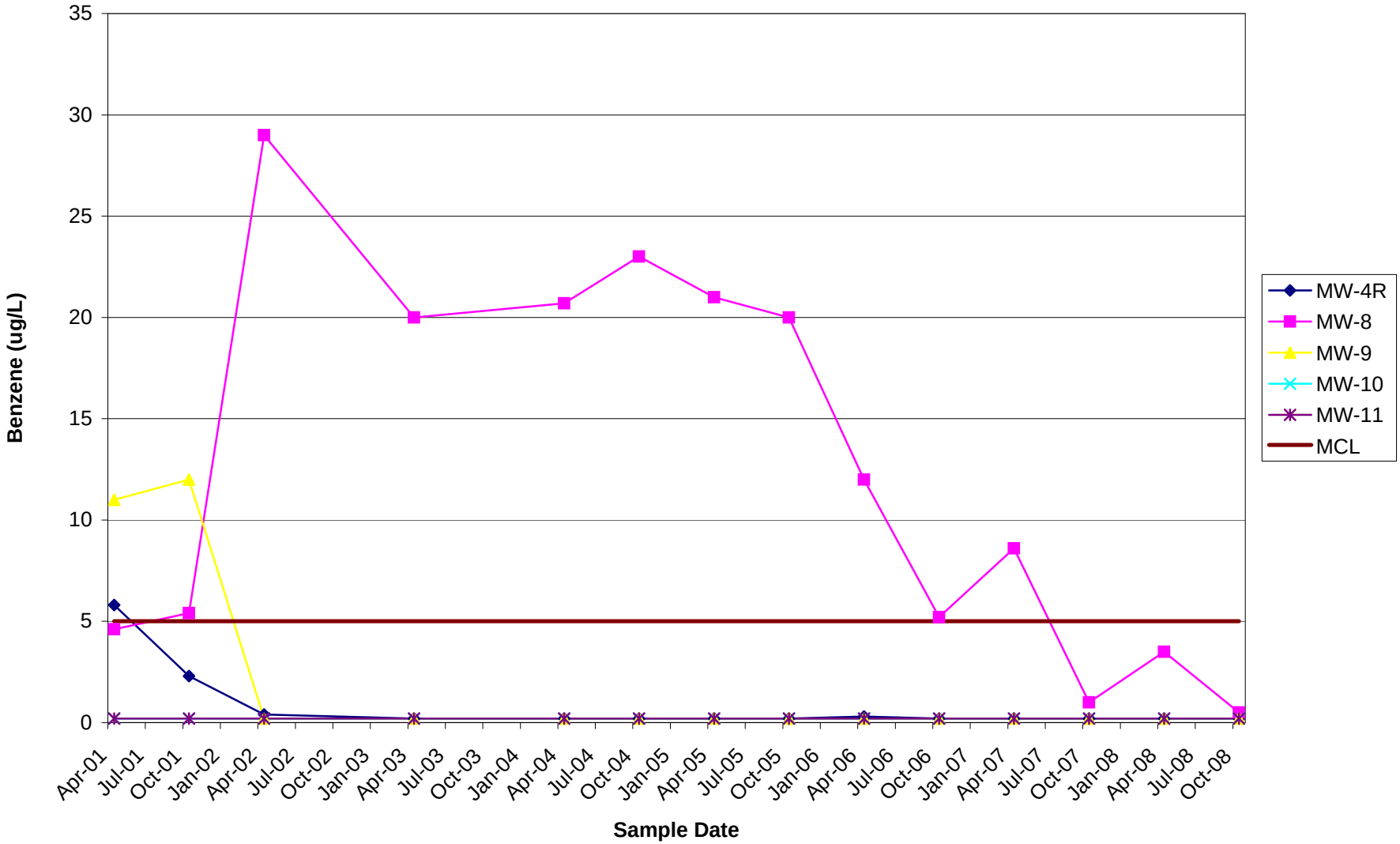


Figure 2 Benzene Sampling Results



APPENDIX 3

Draft Restrictive Covenant

Environmental Restrictive Covenant

After Recording Return to:

Department of Ecology
3190 160 Avenue SE
Bellevue, Washington 98008-5452

Environmental Covenant

Grantor: Western Tank Properties
Grantee: State of Washington, Department of Ecology
Legal: See Exhibit A
Tax Parcel Nos.: 3770300160

Grantor, Western Tank Properties, hereby binds Grantor, its successors and assigns to the land use restrictions identified herein and grants such other rights under this environmental covenant (hereafter "Covenant") made this _ day of _____, 201_ in favor of the State of Washington Department of Ecology (Ecology), its successors and assigns (hereafter "Ecology"). Ecology shall have full right of enforcement of the rights conveyed under this Covenant pursuant to the Model Toxics Control Act, RCW 70.105D.030(1)(g), and the Uniform Environmental Covenants Act, 2007 Wash. Laws ch. 104, sec. 12.

This Declaration of Covenant is made pursuant to RCW 70.105D.030(1)(f) and (g) and WAC 173-340-440 by Western Tank Properties, its successors and assigns, and Ecology.

A remedial action (hereafter "Remedial Action") occurred at the property that is the subject of this Covenant. The Remedial Action conducted at the property is described in the following document:

- Insert name of the report containing the remedial action, Northwest EnviroService Inc. Airport Way Facility, Month 201_.

This document is on file at Ecology's Northwest Regional Office.

This Covenant is required because the Remedial Action resulted in residual concentrations of total arsenic, total vanadium, benzo(a)pyrene, and polychlorinated

dibenzodioxins and polychlorinated dibenzofurans (PCDDs/PCDFs) in soil and benzene, vinyl chloride, total lead and total arsenic in groundwater which exceed the Model Toxics Control Act Method B Cleanup Level established under WAC 173-340-705.

The undersigned, Western Tank Properties, is the fee owner of real property (hereafter "Property") in the County of King, State of Washington, that is subject to this Covenant. The Property is legally described in Exhibit A of this covenant and made a part hereof by reference.

Western Tank Properties makes the following declaration as to limitations, restrictions, and uses to which the Property may be put and specifies that such declarations shall constitute covenants to run with the land, as provided by law and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property (hereafter "Owner").

Section 1.

1. The property shall be used only for traditional industrial use, as described in RCW 70.105D.020(23) and defined in and allowed under the [City – or COUNTY] of [_____'s] zoning regulations codified in the [Official Name of Zoning Regulations] as of the date of this Restrictive Covenant.
2. No groundwater may be taken for domestic, agricultural or any other use from the property.
3. a. The Property contains total arsenic, total vanadium, and benzo(a)pyrene contaminated soil across the majority of property. The Owner shall not alter, modify, or remove the existing structures in any manner that may result in the release or exposure to the environment of that contaminated soil or create a new exposure pathway without prior written approval from Ecology.

   b. Any activity on the Property that may result in the release or exposure to the environment of the contaminated soil that was contained as part of the Remedial Action, or create a new exposure pathway, is prohibited. Some examples of activities that are prohibited in the capped areas include: drilling, digging, placement of any objects or use of any equipment which deforms or stresses the surface beyond its load bearing capability, piercing the surface with a rod, spike or similar item, bulldozing or earthwork.

Section 2. Any activity on the Property that may interfere with the integrity of the Remedial Action and continued protection of human health and the environment is prohibited.

Section 3. Any activity on the Property that may result in the release or exposure to the environment of a hazardous substance that remains on the Property as part of the Remedial Action, or create a new exposure pathway, is prohibited without prior written approval from Ecology.

Section 4. The Owner of the property must give thirty (30) day advance written notice to Ecology of the Owner's intent to convey any interest in the Property. No conveyance of title, easement, lease, or other interest in the Property shall be consummated by the Owner without adequate and complete provision for continued monitoring, operation, and maintenance of the Remedial Action.

Section 5. The Owner must restrict leases to uses and activities consistent with the Covenant and notify all lessees of the restrictions on the use of the Property.

Section 6. The Owner must notify and obtain approval from Ecology prior to any use of the Property that is inconsistent with the terms of this Covenant. Ecology may approve any inconsistent use only after public notice and comment.

Section 7. The Owner shall allow authorized representatives of Ecology the right to enter the Property at reasonable times for the purpose of evaluating the Remedial Action; to take samples, to inspect remedial actions conducted at the property, to determine compliance with this Covenant, and to inspect records that are related to the Remedial Action.

Section 8. The Owner of the Property reserves the right under WAC 173-340-440 to record an instrument that provides that this Covenant shall no longer limit use of the Property or be of any further force or effect. However, such an instrument may be recorded only if Ecology, after public notice and opportunity for comment, concurs.

Western Tank Properties,

_____

[Name of Signatory]
[Title]

Dated: _____

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

_____

[Name of Person Acknowledging Receipt]
[Title]

Dated: _____

[CORPORATE ACKNOWLEDGMENT]

STATE OF _____
COUNTY OF _____

On this _____ day of _____, 20__, I certify that _____ personally appeared before me, acknowledged that **he/she** is the _____ of the corporation that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that **he/she** was authorized to execute said instrument for said corporation.

_____
Notary Public in and for the State of Washington, residing at _____.
My appointment expires_____.

Exhibit A
Legal Description

SEATTLE TIDE LDS LESS RY R/W & 5 & 6 BLK 222 & VAC GRAND ST ADJ & POR VAC ST ADJ SD ADD TGW POR LOT 1 BLK 5 & LOTS 3 & 4 BLK 6 W OF R R R/W & POR VAC ST ADJ IN MCNAUGHTS 3RD ADD