Independent Remedial Action Report for the Former Atomic Energy Commission Bus Lot Property

Prepared for

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List of Acronyms

AEC	Atomic Energy Commission
CAP	Cleanup Action Plan
DDT	Dichlorodiphenyltrichloroethane
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
FS	Feasibility Study
MTCA	Model Toxics Control Act
PNWD	Pacific Northwest Division (of Battelle)
RI	Remedial Investigation Report
TEE	Terrestrial Ecological Evaluation
TPH	Total Petroleum Hydrocarbons
WAC	Washington Administrative Code

List of Units

°C	degrees Celsius
cm	centimeter
ft	feet
ft^3	cubic feet
in.	inches
km/hr	kilometers per hour
m	meter
m^3	cubic meter
mi^2	square miles
mg/kg	milligrams per kilogram
ppm	parts per million
µg/L	micrograms per liter

Glossary

Battelle	Battelle Memorial Institute
Battelle Campus Tract	275 Acre Battelle-owned tract of land located in the northern part of Richland, Washington; site of the Battelle Pacific Northwest Division (PNWD) Richland campus.
Bus Lot	10 acre southern portion of the Transit Center parcel. Contains all sites that require remediation under the present MTCA cleanup action. The Bus Lot is generally rectangular in shape, bounded by Stevens Drive on the west, Einstein Avenue on the east, 5th Street on the south, and the westerly extension of 6th Street on the north
Ecology	Washington State Department of Ecology
Transit Center Parcel	Parcel located in the SW portion of the Battelle Campus Tract; previous location of 1948-1954 AEC transit center operations, the southern portion consists of the Bus Lot, the subject of the present MTCA cleanup action, the northern portion containing tennis courts, a softball field, and vacant land on which an electric substation and bus loading lanes were formerly located.

INDEPENDENT REMEDIAL ACTION REPORT
FORMER AEC BUS LOT PROPERTY

1.0 INTRODUCTION

A Remedial Action Report summarizes the studies and activities undertaken to clean up and remediate a contaminated area under the State of Washington Department of Ecology's (Ecology) Voluntary Cleanup Program. This report describes the cleanup actions performed for the former Atomic Energy Commission (AEC) Bus Lot Property (Bus Lot) in Richland, Washington. The report fulfills the requirements of the Model Toxics Control Act (MTCA) and MTCA regulations set forth in Washington Administrative Code (WAC) Chapter 173-340. The report is submitted by Battelle Memorial Institute (Battelle)'s Pacific Northwest Division (PNWD) in accordance with Ecology's September 24, 2007, letter approving the Bus Lot's entry into the Voluntary Cleanup Program. Figure 1 shows the Bus Lot after remediation.

In 1965, Battelle purchased a 275 acre tract of former government land, known as the Battelle Campus Tract, located in the northern part of Richland, Washington. This tract includes a smaller parcel on which, between 1948 and 1954, the AEC operated a transit center. For purposes of this report, the land on which the transit center operated is termed the "Transit Center Parcel".

The Bus Lot comprises the southern portion of the Transit Center Parcel. Major transit facilities, in particular a bus maintenance facility and fueling station, were located on the western half of the Bus Lot during the time the transit center was operating. It is this western portion of the Bus Lot on which actionable contamination levels were found and remediation was completed.

Figure 1 presents a ground-level view of the Bus Lot after remediation was complete. Figure 2 shows the Bus Lot vicinity within the State of Washington. Figure 3 locates the Bus Lot study area within the vicinity shown in Figure 2.

Figure 1 - Bus Lot, Post Remediation

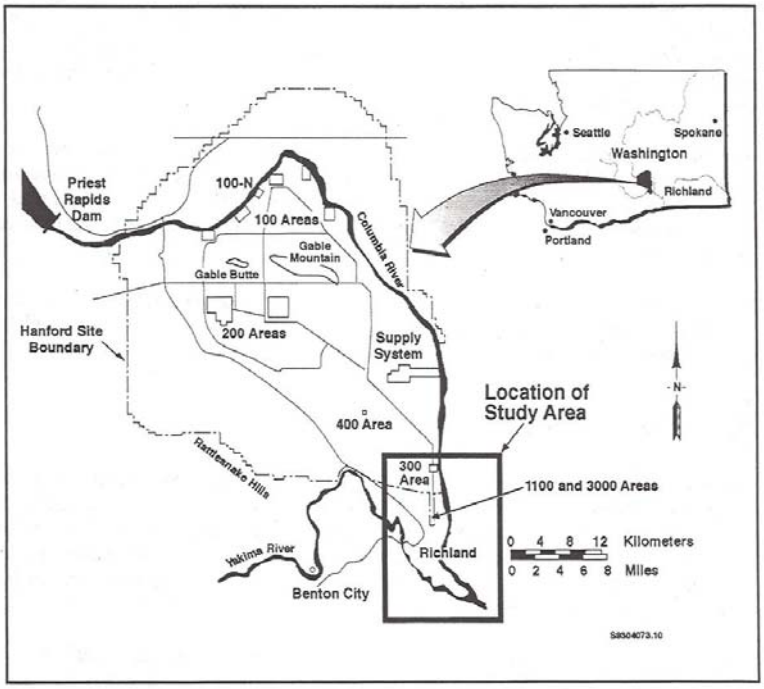

Figure 2 - Vicinity Map

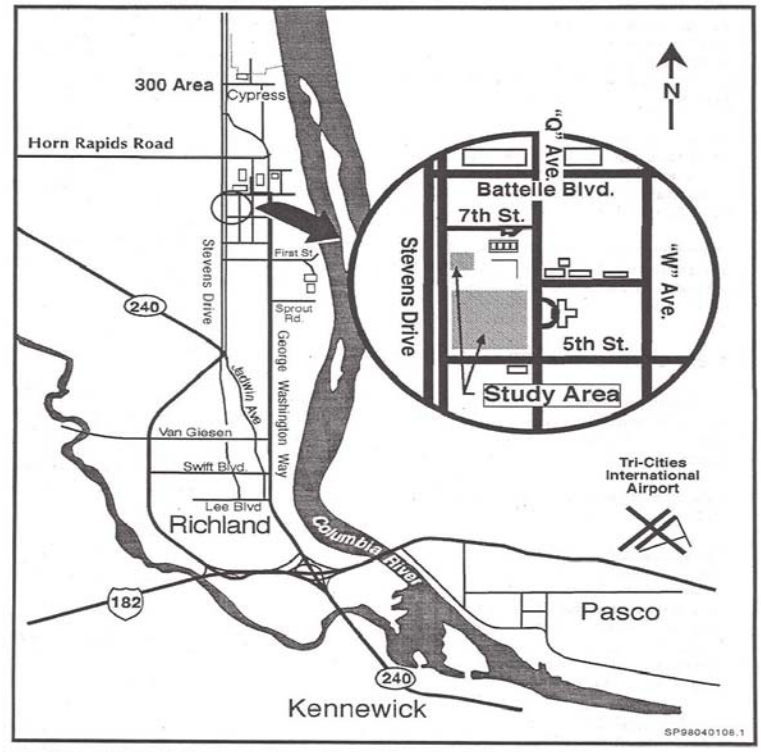

Figure 3 - Bus Lot Location Map

2.0 SUMMARY OF COMPLIANCE WITH MTCA CLEANUP REGULATIONS

The events that contaminated the Bus Lot occurred more than 50 years ago, and more than a decade before Battelle took ownership of the land. When Battelle learned of the suspected contamination, it investigated, taking samples at 15 sites (designated SA-1 through SA-15) and submitting the samples for laboratory analysis. Results of the analysis showed contamination or a potential for contamination above MTCA levels at sites SA-1 through SA-5, sites SA-7 and SA-8, and sites SA-10 and SA-11. Contaminants found at different sites included heavy metals, hydrocarbons, and pesticides. Asbestos pipe insulation was identified at two sites.

Battelle informed Ecology of the contamination, received permission to remediate the site under the Voluntary Cleanup Program, conducted appropriate studies, and successfully remediated the site. Battelle excavated and disposed of all contaminants in accordance with MTCA requirements, removed and dispositioned the asbestos in accordance with applicable regulations, and conducted site restoration activities. Table 1 summarizes remediation activities for each site.

Table 1 - Summary of Remediation at Former AEC Bus Lot

Site Excavated	Post-Excavation Site Sampling Conducted For	Sampling Result - Method A Unrestricted	Sampling Result – TEE Unrestricted	Backfilled w/ Clean Soil	Waste Disposed of in Licensed Facility
SA-1	Cd, Pb, Zn	Below All Cleanup Levels	Below All Concentration Levels	Yes	Yes
SA-2	Cd, Pb	Below All Cleanup Levels	Below All Concentration Levels	Yes	Yes
SA-3	Cd, Pb, Zn, TPH-DRO	Below All Cleanup Levels	Below All Concentration Levels	Yes	Yes
SA-4	Pb, TPH-DRO	Below All Cleanup Levels	Below All Concentration Levels	Yes	Yes
SA-5	Pb, DDT, DDD, DDE	Below All Cleanup Levels	Below All Concentration Levels	Yes	Yes
SA-7	Cd, Pb, Zn, TPH-DRO	Below All Cleanup Levels	Below All Concentration Levels	Yes	Yes
SA-8	Pb, DDT, DDD, DDE, Dieldrin	Below All Cleanup Levels	Below All Concentration Levels	Yes	Yes
SA-10	Pb	Below All Cleanup Levels	Below All Concentration Levels	Yes	Yes
SA-11	Pb	Below All Cleanup Levels	Below All Concentration Levels	Yes	Yes

2.1 Regulatory Requirements

WAC 173-340-515 sets forth requirements for conducting and documenting remediation under the Voluntary Cleanup Program. WAC-173-340-515(3)(a) states that Ecology will determine whether voluntary cleanup actions have met the substantive requirements of MTCA, and whether further action is necessary. As discussed below, Battelle's voluntary cleanup of the Bus Lot has met all applicable MTCA remediation standards.

WAC 173-340-515 (4)(a) requires any person conducting an independent cleanup action to submit a report to the Department within ninety days of the completion of the action. An action is considered complete if no remedial action other than compliance monitoring has occurred at a site for ninety days. Since Battelle completed all remedial actions at the Bus Lot on Tuesday, February 2, 2010, it must submit the remedial action report for the former AEC Bus Lot not later than August 1, 2010.

WAC 173-340-515(4)(b) sets forth the content required in a remedial action report. The subsection sets forth three required elements:

1. A release report satisfying the requirements of WAC 173-340-300(2) if that information has not already been reported to Ecology,
2. Sufficient information to show to allow Ecology to determine whether the substantive remediation requirements set out in WAC Chapter 173-340 have been met by the remediation action, and
3. A copy of a restrictive covenant if one is used.

2.2 Release Report

Contaminant releases occurred at the Bus Lot more than a decade before Battelle took ownership of the property, and almost four decades before Battelle was apprised of the contamination. Battelle investigated the suspected contamination, conducting sampling and analysis at 15 locations where contamination was suspected and reviewing monitoring data. Battelle disclosed the results of its investigation to Ecology. In 2008, Battelle submitted a Remedial Investigation report (RI) to Ecology that provided detailed information in response to WAC 173-340-300(2) requirements. Section 3.3 of this report provides a summary of the RI content, including the results of Battelle's site investigations.

2.3 Compliance with WAC Chapter 173-340

The primary purpose of this remediation action report is to document that Battelle's voluntary cleanup of contamination at the Former AEC Bus Lot Property complies with the requirements of WAC Chapter 173-340. The RI concluded that MTCA Method A industrial standards combined with Table 749-2 Terrestrial Ecological Evaluation (TEE) industrial cleanup levels established appropriate cleanup goals for Bus Lot remediation. Results from post-excavation sampling and analysis establish that the remediation met not only Method A industrial and TEE cleanup standards, but Method A and TEE unrestricted use standards as well. Section 4.4 of this report presents a summary of the sampling and analysis results and compares them to applicable MTCA standards.

The FS proposed a specific remediation approach for cleanup of contaminants at the Bus Lot that included soil removal and disposal. Section 4. 0 of this report details the implementation of that approach during the actual remediation. The FS also established requirements for transporting and disposing of the excavated wastes. Section 4.0 below documents the steps taken to meet those requirements.

The requirement for compliance monitoring is invoked depending on the cleanup level attained. Since remediation of the Bus Lot brought all contaminant concentrations substantially below Method A and TEE unrestricted levels, no compliance monitoring at the Bus Lot is required.

2.4 Restrictive Covenant

Upon completion of remediation, WAC 173-340-440(4) requires consideration of a restrictive covenant to protect human health and the environment as well as the integrity of a cleanup action under certain circumstances. Specified circumstances include when a Method A or B cleanup level is used and hazardous substances in concentrations that exceed the cleanup level remain at the site after cleanup, and when an industrial cleanup level is used. Since residual concentrations at the Bus Lot have been shown to be below Method A industrial and Table 794-2 TEE cleanup levels but also Method A and TEE unrestricted levels in all cases, no further action is required to protect human health, the environment, or the integrity of the cleanup action. Battelle does not plan to impose a restrictive covenant on the Bus Lot property.

3.0 BUS LOT DESCRIPTION AND PRE-REMEDIATION STUDIES

This section provides physical and historic information on the Bus Lot and summaries of the Remedial Investigation (RI), Feasibility Study (FS), and Cleanup Action Plan (CAP) previously completed to support the Bus Lot remediation.

3.1 Physical Description

The Bus Lot is located on the north side of the city of Richland in Benton County, in southeastern Washington. The Bus Lot is essentially rectangular in shape, approximately 685 feet long by 580 feet wide, with a small extension to the southeast. It is bounded by Stevens Drive on the west, Einstein Avenue on the east, 5th Street on the south, and the westerly extension of 6th Street on the north. The Bus Lot encompasses approximately ten acres of land.

The Bus Lot is generally flat, with an elevation of approximately 117 m above sea level. Surface soils are generally sand and silty sand. Vadose zone soils are sandy gravel and gravelly sand. The groundwater table lies approximately 12 m below grade.

Figure 4 is a pre-remediation aerial view of the Bus Lot, with the Bus Lot outlined in yellow. Remnants of the maintenance facility and fueling station can be seen on the left side of Figure 4. These remnants were removed during the remediation activity.

3.2 History

Before 1943, the north Richland area was generally utilized for agriculture, though the Bus Lot was likely fallow. In 1943, the US Government took possession of over 670 square miles of land in southeastern Washington, including the Bus Lot for the Manhattan Project. The government established the Hanford Site on this land.

The AEC assumed control of the Hanford Site in 1947. In 1948, the AEC began construction and operation of a bus service for Hanford site construction workers on the Transit Center Parcel, which included the Bus Lot. Facilities included a bus depot, bus lanes, gasoline pumps for fuel, parking areas, and a bus maintenance facility. The only known industrial activity that occurred at this location was light vehicle maintenance performed at the bus maintenance facility. Contamination found at the Bus Lot is consistent with light vehicle maintenance activities.

The Transit Center ceased operation in 1954. By July 1, 1955, the AEC had transferred all North Richland property including the Bus Lot to the Army Corps of Engineers (Corps). By 1964, the Corps had demolished all structures on the Bus Lot and had removed an underground storage tank previously used to store gasoline for the bus fleet. Later in 1964, the U.S. Government transferred much of the North Richland property, including the Bus Lot, to the City of Richland.

Battelle purchased 275 acres of this North Richland property, including the Bus Lot, from the City of Richland in 1965. Other than installing groundwater wells and an air monitoring station, Battelle has not developed or used the Bus Lot since its purchase.

In 1992, a PNWD subcontractor collected control samples from the northeast part of the Bus Lot in connection with a nearby underground storage tank removal. Laboratory analysis showed total petroleum hydrocarbons (TPH) concentrations above then existing background levels. Subsequent investigation found several localized areas within the Bus Lot that exhibited hazardous substance levels exceeding MTCA cleanup standards then in effect. PNWD informed Ecology of the investigation and findings and received authorization to proceed with remediation of the Bus Lot under the Voluntary Cleanup Program. No interim remedial actions were taken.

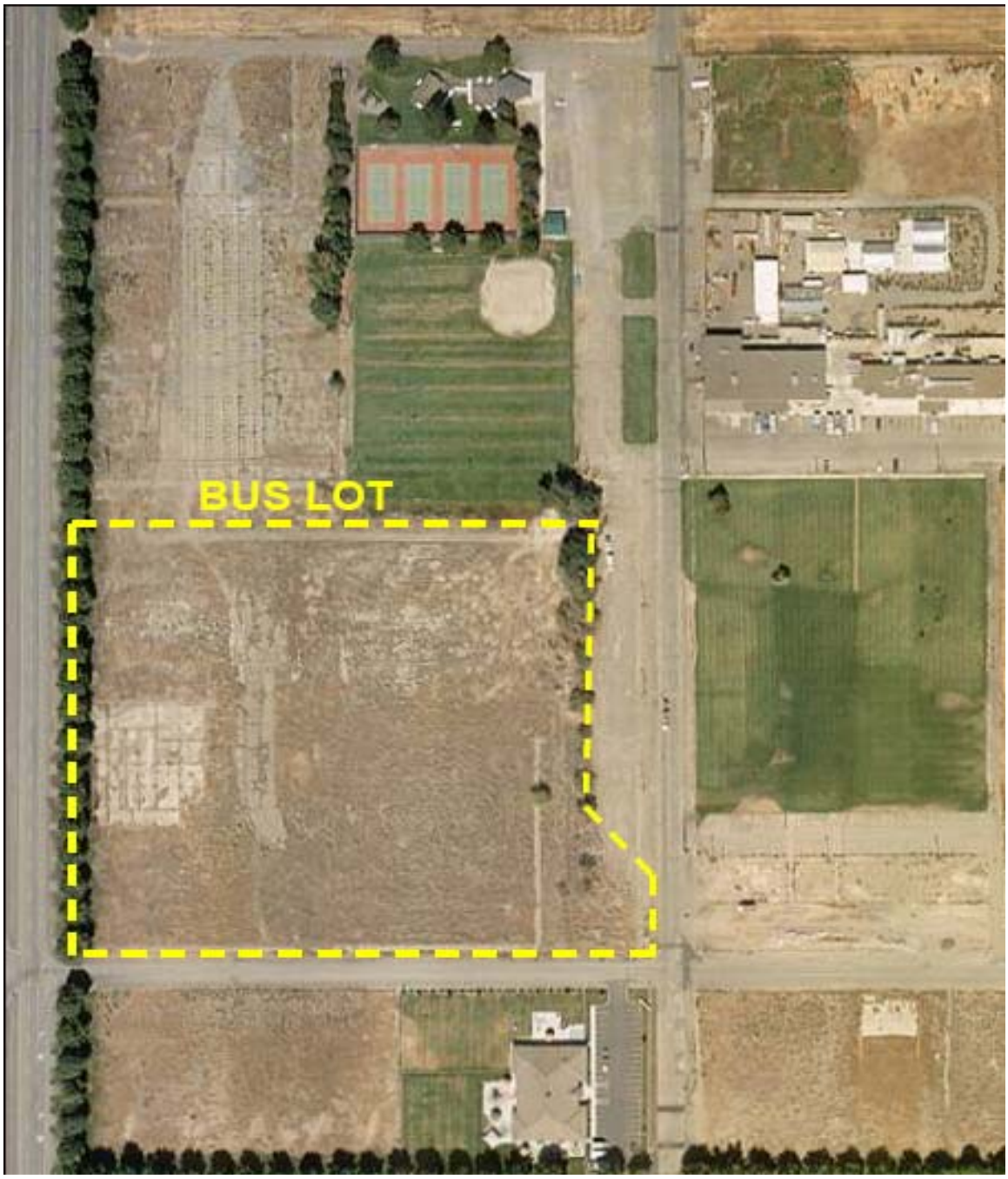

Figure 4 Pre-Remediation Aerial View of the Bus Lot

3.3 Remedial Investigation

Results of the RI for the Bus Lot are contained in *Remedial Investigation for the Former Atomic Energy Commission Bus Lot Property* (PNWD, 2008). The RI summarized sampling and analysis of soils at selected locations across the Bus Lot and near an electric substation that had been located in the northwestern portion of the Transit Center Parcel. Battelle took surface samples, subsurface samples, volatile organic soil samples, soil gas probe samples, and

insulation samples. Subsurface samples were taken at various depths. Samples at the tank depression were taken at approximately 3 m. Soil gas samples were taken to a depth of 1.2 m. Insulation samples were taken at random locations and depths within the two underground enclosures.

Laboratory analysis found no contamination above MTCA Method A cleanup levels on the eastern portion of the Bus Lot or near the substation site but did identify hazardous substances in concentrations exceeding Method A industrial cleanup levels at several locations in the western portion of the Bus Lot. Substances identified included cadmium, lead, zinc, total petroleum hydrocarbons (TPH), Dichlorodiphenyltrichloroethane (DDT), Dichlorodiphenyldichloroethane (DDD), Dichlorodiphenyldichloroethylene (DDE), and dieldrin. No contamination above MTCA cleanup levels was found at the other locations sampled.

An analysis of previously obtained historical and sampling data led to the following conclusions:

(1) The groundwater down gradient from the Bus Lot did not appear to contain contaminants above established action levels, except for nitrates. These originate from offsite and are not associated with Bus Lot contamination or historical operations.

(2) The likelihood that a singular release event occurred that would contribute to present day or future levels of contamination that exceed established action levels was low.

(3) The detected contamination was consistent with the Bus Lot location and operations. Since no subsequent activity that would have left contaminants of this nature had taken place on the Bus Lot, all contaminants appeared to be the result of the Bus Lot operation.

(4) Much of the Bus Lot surface was paved with asphalt and concrete when the land was in use. The pavement likely protected subsurface soil from contamination by Bus Lot operations. Paving may, however, have contributed to oil concentrations detected below action levels at some locations.

(5) Contaminants appeared to be limited in extent and restricted to the locations in which they were detected. No residual products or sources of further contamination were detected by observation or sampling. The contaminants detected were not likely to be rapidly transported through the soil column. The contamination that occurred had been subject to more than 50 years of weathering, biodegradation, and other natural processes. Any substantial migration that was likely to occur had already occurred and would no longer be impacting groundwater at the Bus Lot or elsewhere.

MTCA requires that soil cleanup levels to be achieved by remediation be based on estimates of the reasonable maximum exposure expected under both current and future site use conditions. The selection of an appropriate MTCA cleanup level is based upon the evaluation and consideration of the following criteria:

- Potential risks to human health and ecological receptors
- Future land use
- Consideration of public concerns
- Regulatory classifications

The City of Richland classifies the Bus Lot as part of a Business Research Park District. The Business Research Park classification protects industrial land for a range of business research

and business park uses (City of Richland Ordinance 34-04, Chapter 23.46, *Business Research Park Use District).*

Land use activities near the Bus Lot include industrial and research & development uses, recreation, agriculture, and childcare. Plans call for the child care facility to be moved. Future uses of the Bus Lot land are likely to be either open space or a research-associated facility.

Based on the anticipated uses of the Bus Lot, their compatibility with development of the Business-Research Park, and the limited types and levels of contaminants detected, MTCA Method A and Table 749-2 Terrestrial Ecological Evaluation (TEE) cleanup levels were found appropriate. Considering the future uses of the Bus Lot and surrounding areas, industrial cleanup levels were determined to be appropriate per WAC 173-340-745.

WAC 173-340-7490 through -7493 contain the TEE procedures for sites where a release of a hazardous substance to soil may threaten the terrestrial environment. Under applicable procedures, the Bus Lot qualified for a simplified terrestrial ecological evaluation pursuant to WAC 173-340-7492. The RI for the Bus Lot included a simplified TEE procedure that concluded that the Bus Lot did not qualify for a determination that it posed no threat to ecological receptors, but that it did meet standards for application of the Table 749-2 concentrations as appropriate TEE cleanup levels.

Combining MTCA Method A industrial levels with Table 749-2 cleanup levels and using the more conservative of the levels met the objectives of the simplified TEE, and established applicable cleanup levels for each hazardous substance found. Table 2 summarizes the analytical results from the 1998 samples and compares them with cleanup levels specified in the RI. Table 2 also presents a side-by-side comparison of Method A and Table 749-2 Industrial cleanup levels for each contaminant previously found on the Bus Lot, highlighting the more conservative level for each contaminant, which resulted in final planned MTCA cleanup levels for the Bus Lot.

Pipe insulation samples taken from the bottom area of the two steam pit structures contained amosite and chrysotile asbestos. MTCA does not regulate asbestos. The remediation plan that was developed included removing the asbestos for disposal when the steam lines were removed.

3.4 Feasibility Study

The Bus Lot FS, *Feasibility Study for the Former Atomic Energy Commission Bus Lot Property* (PNWD, 2008) developed and evaluated five cleanup alternatives: Onsite treatment, soil removal and disposal, containment, soil removal and offsite treatment, and no action/institutional controls. Screening eliminated onsite treatment, containment, and no action/institutional controls. Soil removal and disposal and soil removal and offsite treatment alternatives were evaluated in detail. The evaluation led to selection of soil removal and disposal as the preferred remediation alternative for the Bus Lot. Advantages of the preferred alternative included:

- Elimination of probable multiple transportation events with attendant higher risks from increased handling and transport distances,
- Lower energy expenditure by reducing transportation and eliminating thermal treatment
- Satisfactory disposal of contaminants that thermal treatment would not address (e.g., lead).

The proposed alternative was found to be protective of human health and the environment, highly implementable, and cost effective. Eight separate areas within the Bus Lot site were

identified for excavation and removal of contaminated materials. Confirmatory soil sampling was scheduled after excavation to ensure that applicable cleanup standards would be met.

Table 2 - Pre-Remediation Sample Results that Exceeded MTCA Method and Table 749-2 Industrial Cleanup Levels

Contaminant	Location(s)	Concentration Detected	Cleanup Levels	
			Method A Industrial	Table 749-2 TEE Industrial[b]
		mg/Kg[a]	mg/Kg[c]	mg/Kg[c]
Cadmium	Underground Enclosure (SA-1)	357	2	36
Cadmium	Steam Pit (SA-2)	101	2	36
Cadmium	Large Seepage Pit (SA-3)	4.6	2	36
DDT/DDD/DDE	North Storm Drain (SA-5)	1.25	N/A	1
DDT/DDD/DDE	West Sanitary Sewer (SA-8)	1.1	N/A	1
Dieldrin	West Sanitary Sewer (SA-8)	0.29	8.2[d]	0.17
Lead	Underground Enclosure (SA-1)	1,030	1,000	220
Lead	Steam Pit (SA-2)	295	1,000	220
Lead	Large Seepage Pit (SA-3)	973	1,000	220
Lead	Small Seepage Pit (SA-4)	356	1,000	220
Lead	North Storm Drain (SA-5)	669	1,000	220
Lead	West Sanitary Sewer (SA-8)	885	1,000	220
Lead	Fuel Island (SA-10)	355	1,000	220
Lead	Soil Depression (SA-11)	841	1,000	220
Methylene Chloride[e]	Large Seepage Pit (SA-3)	1.3	0.02	NA
Methylene Chloride[e]	Soil Depression (SA-11)	1.7	0.02	NA
TPH	Large Seepage Pit (SA-3)	3,000	2,000	15,000[f]
TPH	Small Seepage Pit (SA-4)	2,100	2,000	15,000[f]
Zinc	Underground Enclosure (SA-1)	1800	N/A	570
Zinc	Large Seepage Pit (SA-3)	1520	N/A	570

[a] All units are in mg/Kg.
[b] WAC 173-340-900 contains Table 749-2, "The Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure".
[c] Numbers in red show applicable cleanup levels.
[d] Cleanup level not specified in Table 745-1 of WAC 173-340-900. This level was calculated utilizing CLARC values for Method C (soil, industrial) of MTCA.
[e] Methylene Chloride was detected in some samples, but was qualified due to detection in lab blanks. Samples with levels that were not qualified are reported in the table, but are not targets of cleanup. Detection of methylene chloride is inconsistent with Bus Lot history and use.
[f] Cleanup levels are the values listed for the Diesel Range Organics.

Previous analysis of a lube pit sample did not indicate a need for remediation at SA-7. However, confirmatory soil samples from beneath the lube pit floor were planned to verify that no contamination had spread underground . Figure 5 depicts the locations of areas within the Bus Lot that required remediation or confirmatory sampling.

3.5 Cleanup Action Plan

The Bus Lot CAP, *Draft Cleanup Action Plan for the Former Atomic Energy Commission Bus Lot Property*, (PNWD, 2008) contained plans for excavation, stockpiling of excavated soil,

disposition of contaminants, and confirmatory sampling at each area identified for remediation as well as confirmatory sampling at the lube pits. All contaminants above applicable MTCA industrial thresholds were to be removed from the Bus Lot and disposed of at licensed off-site facilities. The goal was a site that would conform to industrial use requirements while providing protection for ecological receptors.

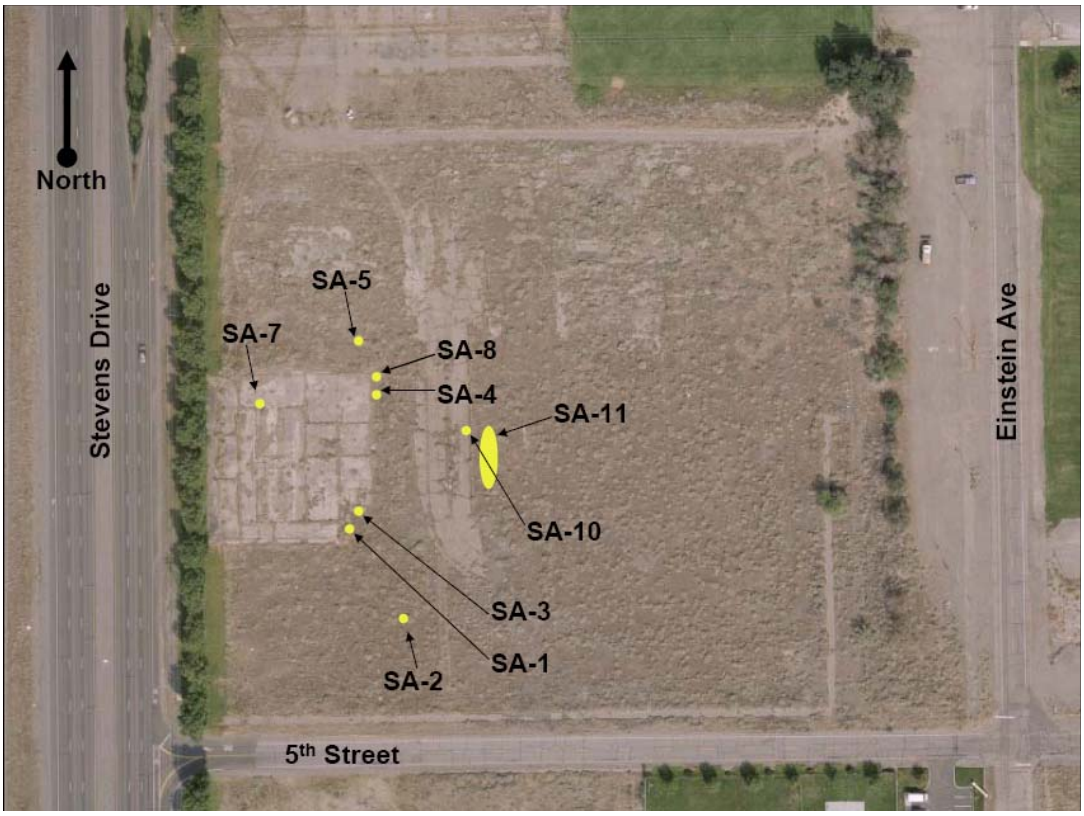

Figure 5 - Bus Lot Sites that Required Remediation or Confirmatory Sampling

4.0 CONDUCT OF REMEDIAL ACTIONS

Remediation activities followed the strategy presented in the CAP. Before the start of actual remediation, excavation locations were staked and marked, equipment was moved onsite, vegetation was removed, and pre-watering was conducted.

The CAP defined a target excavation column for each location where contamination above MTCA soil cleanup levels was suspected. The depths and cross sections of each target column was conservatively calculated to capture suspected contamination. Individual locations were verified with GPS coordinates.

Figure 6 - Start of Excavation

Excavation of each target column was conducted to or beyond the depth and aerial extent specified in the cleanup action plan. Each excavation met the minimum slope requirement of 1.5:1, which meant that, at each location, a substantial volume of clean soil was taken from side slopes outside the target excavation column. Soil taken from outside target excavation columns was stockpiled in designated areas. With the exception of SA-11, the site of the previously removed underground fuel tank, all soil removed from within the target excavation columns was presumed to be contaminated and was stockpiled in areas separated from the clean soil stockpiles. As they proceeded, excavations were observed for odors or visible signs of contamination. These, if detected, would result in additional excavation as needed. Figure 6 shows the start of excavation at a target column.

Prior sampling and analysis showed that soil at SA-11 did not contain actionable levels of contaminants above a depth of approximately 3 m. The target soil column at SA-11 was presumed to be free of actionable contaminants to a depth of 2.5 m. Soil removed from the SA-11 target column at 2.5 m or less was stockpiled as presumed clean. SA-11 soil from depths greater than 2.5 m was stockpiled as contaminated.

Asbestos materials were identified at two locations. All asbestos was removed and disposed of by certified asbestos workers in accordance with applicable regulations.

Concrete and metal remnants of former Bus Lot facilities were also encountered. Concrete and metal structures were broken up, removed, and taken to licensed facilities for recycling (Figure 7).

Figure 7 - Broken Concrete

All excavations and soil stockpiles were sampled. Based on lab analysis of samples, contaminated soils were disposed of at licensed facilities.

Clean soil was used to fill all excavations. The site was graded and hydromulched. Table 2 summarizes volumes of material disposed and disposal facilities used.

4.1 Remedial Actions Performed at Each Location

The following discussion includes details of remediation actions on a location-by-location basis.

Large and Small Steam Pits (SA-1 and SA-2) were subsurface concrete structures, as shown in Figure 8. Three asbestos-insulated pipes entered pit SA-1; two asbestos-insulated pipes entered pit SA-2.

Asbestos at each site was removed and disposed of in accordance with 40 CFR 61, Subpart M and 29 CFR 1926.1101. Removal of asbestos-containing insulation and piping was performed as a Class I activity pursuant to with WAC 296-62-077.

Figure 8 - Steam Pit

The steam pits were removed and size reduced. Soil and piping were removed from around and below the pits. Soil presumed contaminated was stockpiled separately from clean soil.

Following soil removal, three confirmatory samples were taken at each steam pit location. Analysis of samples verified that no contaminants above Method A and TEE unrestricted levels were present at SA-1 and SA-2. The SA-1 and SA-2 excavations were backfilled with clean soil.

Large and Small Seepage Pits (SA-3 and SA-4): The large and small seepage pits were vertical concrete pipes partially filled with soil and cobbles. These seepage pits were removed and size reduced. Volumes of soil were removed from beneath and around each pit location.

Sites SA-4 and SA-8 (discussed below) were proximate to one another. Work on the two sites was combined into a single excavation. SA-3 soil presumed contaminated was stockpiled separately from clean soil. Because of the proximity to SA-8, contaminated soil from SA-4 was placed in the separate stockpile reserved for contaminated soil from SA-5 and SA-8.

Following soil removal, three confirmatory samples were taken at each seepage pit location. Analysis of samples verified that no contaminants above Method A and TEE unrestricted levels were present at SA-3 and SA-4. The sites were backfilled with clean soil.

North Storm Drain (SA-5): The north storm drain structure was removed, size reduced, and disposed of. Soil was removed from around and beneath the drain location. Soil presumed contaminated was placed in a stockpile containing contaminated soil from SA-4 and SA-8. This pile was positioned separately from clean soil and other contaminated soil.

Following soil removal, three confirmatory samples were taken at SA-5. Analysis of samples verified that no contaminants above Method A and TEE unrestricted levels were present at SA-5. The site was backfilled with clean soil.

Four Foundation Lube Pits (SA-7): Results from the single sample taken within the foundation lube pits were below industrial screening levels. Nevertheless, Battelle planned to take confirmatory samples after excavation and removal of rubble. Battelle opted instead to remove the entire maintenance facility foundation as part of the remedial activity. During removal of the foundation, it was discovered that the floor drains in the lube pits drained to a concrete sump under the floor. The sump, once exposed, was found to contain water and residual oil stains, with a noticeable odor. A drain/waste/vent pipe (bell and spigot construction) that may have served this sump was also discovered on the west side of the concrete foundation, which contained water and also produced a noticeable odor. Battelle conducted additional excavation until all odor-producing soil was removed. The odor-producing soil was presumed contaminated and was stockpiled separately.

Following removal of soil and rubble, nine confirmatory samples were taken at SA-7 locations. Analysis of samples verified that no contaminants above Method A and TEE unrestricted levels were present at SA-7. The sites were backfilled with clean soil.

West Sanitary Sewer (SA-8): The man way access to the west sanitary sewer was removed, size reduced and stockpiled for disposal. Soil around and beneath the man way access was removed. SA-8 was proximate to SA-4. Work on the two sites was combined into a single excavation.

Contaminated soil and rubble from SA-8 was placed in a stockpile containing contaminated soil from SA-4 and SA-5. This pile was positioned separately from clean soil and other contaminated soil.

Confirmatory soil sampling was performed at three points on the bottom of the SA-8 excavation. Analysis verified that no contaminants above Method A and TEE unrestricted levels were present at SA-8. The sites were backfilled with clean soil.

Fuel Island (SA-10): The two buried fuel lines that ran between the fuel island and the soil depression to the east (former site of the buried fuel tank) were removed, as was a minimum of 0.5 m soil around the lines and the concrete fuel island itself. Excavation of the fuel lines was also helpful in confirming the former location of the buried fuel tank. The soil removed was stockpiled as contaminated soil.

Confirmatory soil sampling was performed in two places at the bottom of the SA-10 excavation. Analysis of samples verified that no contaminants above Method A and TEE unrestricted levels were present at SA-10. The sites were backfilled with clean soil.

Figure 9 - Excavation of SA-11

Soil Depression (SA-11): The SA-11 location was formerly the site of a buried fuel tank of approximately 10,000 gallons capacity. The tank was removed before Battelle took ownership of the Bus Lot. The 1998 sampling activity detected lead contamination at SA-11 at a depth of approximately 3 m.

The SA-11 location was excavated sufficiently to produce a bottom footprint of 9 by 15 meters minimum at a depth of 4 m. The top 2.5 m of excavated soil and all side slope material was stockpiled as "presumed clean" material. The bottom 1.5 m of soil, excluding side slope material was presumed to be contaminated and was stockpiled for disposal at a licensed facility. Four confirmatory soil samples were taken at the bottom of the excavation. Analysis of samples verified that no contaminants above Method A and TEE unrestricted levels were present at SA-11. The site was backfilled with clean soil. Figure 9 shows excavation activity at SA-11.

4.3 Stockpiled Soil

Excavated soil was placed in six stockpiles. One large and three smaller piles held soils presumed contaminated or chemically contaminated. A second large pile held soil from SA-11 that was "presumed clean", and a third large pile held clean soil produced by the requirement to excavate at 1.5:1 slopes. Figure 10 shows soil pils SP-1, SP-5, and SP-11

Analysis of 1998 samples indicated that contaminated soils from the tank depression and from SA-1, SA-2, SA-3, SA-10, and SA-11 could be disposed of in a solid waste landfill. The presumably contaminated soils from these sites were placed in a common stockpile, SP-1. Post-excavation samples were taken from SP-1 for analysis, and confirmed that this designation was correct.

Detection of DDT, DDD, DDE, and Dieldrin in 1998 samples drove remediation at SA-5 and SA-8. These pesticide elements require disposal in a hazardous waste disposal facility. Soils excavated from SA-5 and SA-8 were stored in stockpile SP-5. Contaminated soils from SA-4, which had been excavated in common with SA-8, were also placed in SP-5, and samples were taken.

Figure 10 - Soil Piles SP-1, SP-5, and SP-11

The 1998 sampling left the issue of potential contamination at the SA-7 lube pits open. Upon discovery of the oil sump and vent pipe during excavation of the garage foundation, the contaminated soil excavated from SA-7 was stockpiled in two piles, SP-7A and SP-7B and then sampled.

Soil stockpile SP-11 consisted of "presumed clean" soil, the top 2.5 m of soil excavated from the tank depression together with all side slope material. Samples for analysis were taken at five points on the SP-11 stockpile to determine whether the presumption was correct that the soil was clean. The bottom 1.5 m of soil, excluding side slope material was presumed contaminated, based on 1998 sample results.

4.4 Sampling and Analysis of Excavated Sites and Soil Piles

After all excavation concluded, Battelle personnel conducted sampling for contaminants at all excavated locations. Battelle personnel also performed multipoint sampling at each contaminated stockpile (SP-1, SP-5, SP-7A, and SP-7B) and at SP-11, the stockpile of "presumed clean" soil. Table 3 presents field sample log information.

The samples, which were taken and handled in accordance with MTCA-compliant protocols, were sent to GEL Laboratories, LLC, which performed the analysis of samples.

The analysis of samples from excavated sites showed that no contaminants above unrestricted levels remained at any locations. The analysis of samples from the soil stockpiles showed that piles SP-1, SP-5, SP7A, and SP-7B should be disposed of at licensed disposal facilities and that the soil in pile SP-11 could be used as backfill. Table 4 summarizes these results.

4.5 Completion of Site Remediation; Designation and Disposition of Waste; Recycling

Based on results from laboratory testing and analysis of samples (electronic copy included on a compact disk), Battelle concluded that all sites had been remediated to Method A and TEE Unrestricted levels and that no additional excavation or other direct remediation activity was required. Battelle informed Department of Ecology personnel of the analytical results and received a concurrence from Ecology that no additional excavation or other treatment of soil at the Bus Lot sites was needed.

Figure 11 - Loading Contaminated Soil

Battelle also used the analytical results to complete a waste designation process for the stockpiles of excavated soil. Battelle applied waste code WT02 to stockpiles SP-5A, SP-7A, and SP-7B, and found that no waste code was necessary for stockpile SP-1 or any excavated soil that had been presumed clean. Soil from stockpiles SP-5A, SP-7A, and SP-7B was loaded for haul-out and transportation to the Chemical Waste Management Northwest, Inc. hazardous waste facility in Arlington, Oregon for disposal. Soil from stockpile SP-1 was loaded and transported to the Columbia Ridge landfill for disposal.

Clean soil was used to backfill the excavations. Figure 11 shows contaminated soil being loaded for transportation to a licensed facility.

All recyclable concrete and steel recovered during excavation was transported to licensed facilities for recycling. Oil-stained concrete from the fuel island was dispositioned at the Richland landfill. Table 5 provides information on the haul-out of recycled materials and waste.

4.6 Site Restoration

All excavations were backfilled to grade with stockpiled soil, restoring the prior elevation. The site was graded and gently compacted. After completion of fill activities, hydromulch was applied to protect disturbed areas and achieve final stabilization.

Finally, remediation work and demobilization of equipment was completed.

5.0 CONCLUSION

The Former AEC Bus Lot Property has been successfully remediated in compliance with WAC Chapter 173-340. All previously contaminated sites have been cleaned. The remediation process removed all contamination to levels substantially below unrestricted cleanup levels.

All contaminated soil has been removed from the site and permanently disposed of in licensed landfills. These removal and disposition actions have reduced or eliminated the potential for hazardous releases and release sources. The remediation actions that were taken are irreversible.

6.0 CERTIFICATION STATEMENT

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who managed the gathering and evaluation of information and those persons directly responsible for gathering and evaluating the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

J T Gilbert 3/4/10

James L. Gilbert, P.E.

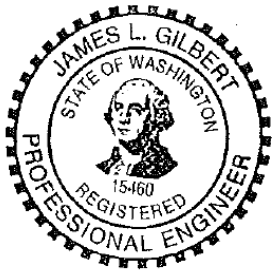

Table 3 - Former AEC Bus Lot - November 16, 2009 Field Sample Log

SAMPLE LOCATORS				SAMPLED FOR		
SITE	LID #	SAMPLE ID	SOURCE	METALS	TPH-DRO	PESTICIDES
SA-1	1	1109SA1A	LARGE STEAM PIT	X		
SA-1	2	1109SA1B	LARGE STEAM PIT	X		
SA-1	3	1109SA1C	LARGE STEAM PIT	X		
SA-2	4	1109SA2A	SMALL STEAM PIT	X		
SA-2	5	1109SA2B	SMALL STEAM PIT	X		
SA-2	6	1109SA2C	SMALL STEAM PIT	X		
SA-3	7	1109SA3A	LARGE SEEPAGE PIT	X	X	
SA-3	8	1109SA3B	LARGE SEEPAGE PIT	X	X	
SA-3	9	1109SA3C	LARGE SEEPAGE PIT	X	X	
SA-4	10	1109SA4A	SMALL SEEPAGE PIT	X	X	
SA-4	11	1109SA4B	SMALL SEEPAGE PIT	X	X	
SA-4	12	1109SA4C	SMALL SEEPAGE PIT	X	X	
SA-5	13	1109SA5A	NORTH STORM DRAIN	X		X
SA-5	14	1109SA5B	NORTH STORM DRAIN	X		X
SA-5	15	1109SA5C	NORTH STORM DRAIN	X		X
SA-7	16	1109SA7A	NE FOUNDATION LUBE PIT	X	X	
SA-7	17	1109SA7B	NE FOUNDATION LUBE PIT	X	X	
SA-7	18	1109SA7C	SW FOUNDATION LUBE PIT	X	X	
SA-7	19	1109SA7D	SW FOUNDATION LUBE PIT	X	X	
SA-7	20	1109SA7E	W PIT / SUMP	X	X	
SA-7	21	1109SA7F	W PIT / SUMP	X	X	
SA-7	22	1109SA7G	W PIT / SUMP	X	X	
SA-7	23	1109SA7H	E PIT / SUMP	X	X	
SA-7	24	1109SA7I	E PIT / SUMP	X	X	
SA-7	25	1109SA7J	E PIT / SUMP	X	X	
SA-8	26	1109SA8A	WEST SANITARY SEWER	X		X
SA-8	27	1109SA8B	WEST SANITARY SEWER	X		X
SA-8	28	1109SA8C	WEST SANITARY SEWER	X		X
SA-10	29	1109SA10A	FUEL ISLAND N PIPE	X		
SA-10	30	1109SA10B	FUEL ISLAND N PIPE	X		
SA-10	31	1109SA10C	FUEL ISLAND S PIPE	X		
SA-10	32	1109SA10D	FUEL ISLAND S PIPE	X		
SA-11	33	1109SA11A	TANK DEPRESSION	X		
SA-11	34	1109SA11B	TANK DEPRESSION	X		
SA-11	35	1109SA11C	TANK DEPRESSION	X		
SA-11	36	1109SA11D	TANK DEPRESSION	X		
SP-11	37	1109SP11A	TANK DEPRESSION SOIL PILE	X		
SP-11	38	1109SP11B	TANK DEPRESSION SOIL PILE	X		
SP-11	39	1109SP11C	TANK DEPRESSION SOIL PILE	X		
SP-11	40	1109SP11D	TANK DEPRESSION SOIL PILE	X		
SP-11	41	1109SP11E	TANK DEPRESSION SOIL PILE	X		
SP-1	42	1109SP1A	GENERAL SOIL PILE W/O SA5 & 8	X	X	

SAMPLE LOCATORS				SAMPLED FOR		
SITE	LID #	SAMPLE ID	SOURCE	METALS	TPH-DRO	PESTICIDES
SP-1	43	1109SP1B	GENERAL SOIL PILE W/O SA5 & 8	X	X	
SP-1	44	1109SP1C	GENERAL SOIL PILE W/O SA5 & 8	X	X	
SP-1	45	1109SP1D	GENERAL SOIL PILE W/O SA5 & 8	X	X	
SP-1	46	1109SP1E	GENERAL SOIL PILE W/O SA5 & 8	X	X	
SP-5	47	1109SP5A	SA5 /SA8 SOIL PILE	X		X
SP-7	48	1109SP7A	W PIT / SUMP PILE	X	X	
SP-7	49	1109SP7B	E PIT / SUMP PILE	X	X	
SA-7	50	1109SADA	DUPLICATE (1109SA7B)	X	X	
SA-7	51	1109SADB	DUPLICATE (1109SA7E)	X	X	
SA-10	52	1109SADC	DUPLICATE (1109SA10C)	X		

Table 4 - Former AEC Bus Lot - MTCA Cleanup Levels and Sampling Results

MTCA CLEAN-UP LEVELS									
METHOD	TABLE	CD	PB	ZN	TPH-DRO	DDD[1]	DDE[1]	DDT[1]	DIELDRIN
		MG/KG	MG/KG	MG/KG	UG/KG	UG/KG	UG/KG	UG/KG	UG/KG
METHOD A UNRESTRICTED	TABLE 740-1	2*	250	NA	2,000,000	NA	NA	3,000	NA
METHOD A INDUSTRIAL	TABLE 745-1	2	1,000	NA	2,000,000	NA	NA	4,000	NA
TEE UNRESTRICTED	TABLE 749-2	25	220*	270*	460,000*	1,000*	1,000*	1,000*	170*
TEE INDUSTRIAL	TABLE 749-2	36	220	570	15,000,000	1,000	1,000	1,000	170
*RED = MOST RESTRICTIVE LIMIT									

SAMPLING LOCATORS				CONTAMINANTS - RESULTS							
SITE	LID #	SAMPLE ID	SOURCE	CD	PB	ZN	TPH-DRO	DDD[1]	DDE[1]	DDT[1]	DIELDRIN
SA-1	1	1109SA1A	LARGE STEAM PIT	0.101U	5.36	47.8					
SA-1	2	1109SA1B	LARGE STEAM PIT	0.100U	4.19	47.3					
SA-1	3	1109SA1C	LARGE STEAM PIT	0.0996U	3.86	47.6					
SA-2	4	1109SA2A	SMALL STEAM PIT	0.117U	23.3	62.8					
SA-2	5	1109SA2B	SMALL STEAM PIT	0.107U	20.9	58.2					
SA-2	6	1109SA2C	SMALL STEAM PIT	0.117U	26.6	58.5					
SA-3	7	1109SA3A	LARGE SEEPAGE PIT	0.102U	2.18	42.9	2250U				
SA-3	8	1109SA3B	LARGE SEEPAGE PIT	0.104U	2.15	43.4	2240U				
SA-3	9	1109SA3C	LARGE SEEPAGE PIT	0.103U	2.97	44.2	3980J				
SA-4	10	1109SA4A	SMALL SEEPAGE PIT	0.105U	5.44	49.6	3380J				
SA-4	11	1109SA4B	SMALL SEEPAGE PIT	0.108U	6.54	45.8	3610J				
SA-4	12	1109SA4C	SMALL SEEPAGE PIT	0.107U	7.28	58.6	2890				
SA-5	13	1109SA5A	NORTH STORM DRAIN	0.103U	4.29	45.2		0.360U	0.360U	0.360U	0.360U
SA-5	14	1109SA5B	NORTH STORM DRAIN	0.103U	4.14	45.5		0.360U	0.360U	0.360U	0.360U
SA-5	15	1109SA5C	NORTH STORM DRAIN	0.102U	5.23	44.3		0.710U	0.710U	1.67J	0.710U
SA-7	16	1109SA7A	NE FOUNDATION LUBE PIT	0.102U	18.3	99.8	24600				
SA-7	17	1109SA7B	NE FOUNDATION LUBE PIT	0.107U	4.92	46.9	8780				
SA-7	18	1109SA7C	SW FOUNDATION LUBE PIT	0.103U	4.36	46.9	4460J				
SA-7	19	1109SA7D	SW FOUNDATION LUBE PIT	0.104U	7.17	59.9	6330J				
SA-7	20	1109SA7E	W PIT / SUMP	0.833	23.2	53.4	22800				
SA-7	21	1109SA7F	W PIT / SUMP	0.67	9.2	61.6	28500				
SA-7	22	1109SA7G	W PIT / SUMP	0.744	18	51.2	33500				
SA-7	23	1109SA7H	E PIT / SUMP	0.822	55.8	146	65800				
SA-7	24	1109SA7I	E PIT / SUMP	0.711	26.6	94.8	31800				
SA-7	25	1109SA7J	E PIT / SUMP	0.839	36.7	90.8	92900				

SAMPLING LOCATORS				CONTAMINANTS - RESULTS							
SITE	LID #	SAMPLE ID	SOURCE	CD	PB	ZN	TPH-DRO	DDD[1]	DDE[1]	DDT[1]	Dieldrin
SA-8	26	1109SA8A	WEST SANITARY SEWER	0.113U	18.2	60.8		6.75P	11.5	72.4	0.782U
SA-8	27	1109SA8B	WEST SANITARY SEWER	0.111U	8.24	52.9		2.8JP	2.37J	14.9	0.742U
SA-8	28	1109SA8C	WEST SANITARY SEWER	0.103U	5	46		1.71JP	1.74JP	7.24	0.713U
SA-10	29	1109SA10A	FUEL ISLAND N PIPE	0.103U	12.2	50.4					
SA-10	30	1109SA10B	FUEL ISLAND N PIPE	0.104U	6.59	45.7					
SA-10	31	1109SA10C	FUEL ISLAND S PIPE	0.103U	4.13	44.8					
SA-10	32	1109SA10D	FUEL ISLAND S PIPE	0.105U	4.37	48.7					
SA-11	33	1109SA11A	TANK DEPRESSION	0.101U	2.03	43.4					
SA-11	34	1109SA11B	TANK DEPRESSION	0.103U	2.12	47.5					
SA-11	35	1109SA11C	TANK DEPRESSION	0.0989U	1.52	37.5					
SA-11	36	1109SA11D	TANK DEPRESSION	0.103U	3.01	38.6					
SP-11	37	1109SP11A	TANK DEPRESSION SOIL PILE	0.101U	5.26	48.2					
SP-11	38	1109SP11B	TANK DEPRESSION SOIL PILE	0.0996U	4.19	47.1					
SP-11	39	1109SP11C	TANK DEPRESSION SOIL PILE	0.105U	6.08	44.7					
SP-11	40	1109SP11D	TANK DEPRESSION SOIL PILE	0.102U	4.52	45.6					
SP-11	41	1109SP11E	TANK DEPRESSION SOIL PILE	0.102U	4.75	48.4					
SP-1	42	1109SP1A	GENERAL SOIL PILE W/O SA5 & 8	0.435J	2.84	34	2750J				
SP-1	43	1109SP1B	GENERAL SOIL PILE W/O SA5 & 8	0.592	6.89	46.5	8000				
SP-1	44	1109SP1C	GENERAL SOIL PILE W/O SA5 & 8	0.594	6.43	46.5	6220J				
SP-1	45	1109SP1D	GENERAL SOIL PILE W/O SA5 & 8	0.667	2.99	48.2	2830J				
SP-1	46	1109SP1E	GENERAL SOIL PILE W/O SA5 & 8	0.686	3.35	46.6	2520J				
SP-5	47	1109SP5A	SA5 /SA8 SOIL PILE	0.103U	12.2	51.7		2.12J	2.56J	11.2	0.696U
SP-7	48	1109SP7A	W PIT / SUMP PILE	0.633	9.97	50.1	13600				
SP-7	49	1109SP7B	E PIT / SUMP PILE	1.09	74.1	84.1	82300				
SA-7	50	1109SADA	DUPLICATE (1109SA7B)	0.616	4.77	48.4	7790				
SA-7	51	1109SADB	DUPLICATE (1109SA7E)	0.83	22.9	57.3	28700				
SA-10	52	1109SADC	DUPLICATE (1109SA10C)	0.104U	4.55	44.8					

NOTES:

U - Undetected (detection limit used)

J - Value is estimated

P - ORGANICS - The concentrations between the primary and confirmation columns/detectors is >40% different. For hplc, difference is <70%

Table 5 - Former AEC Bus Lot - Haul-Out Summary

ITEM	RECYCLABLE STEEL	RECYCLABLE CONCRETE	HAZARDOUS WASTE DISPOSAL	SOLID WASTE DISPOSAL	OIL-STAINED CONCRETE
WHERE SHIPPED	RAY POLAND & SONS	RAY POLAND & SONS	CHEMICAL WASTE MANAGEMENT ARLINGTON	COLUMBIA RIDGE LANDFILL	RICHLAND LANDFILL
NUMBER OF TRIPS	1	72	5	37	1
VEHICLE TYPES	TRAILER	SIDE DUMP	TRUCK AND PUP	TRUCK AND PUP	SIDE DUMP
TOTAL VOLUME OR WEIGHT SHIPPED	1 TON	1,925 TONS	127.08 TONS	1209.77 TONS	25.85 TONS

REFERENCES

29 CFR 1926, 2009, "Safety and Health Regulations for Construction" Code of Federal Regulations, as amended.

40 CFR 61, Subpart M, 2009 "National Emission Standard for Asbestos," Code of Federal Regulations, as amended.

City of Richland Ordinance 34-04, Chapter 23.46, 2004, Business Research Park Use District, Richland, Washington.

December 9, 2009 Letter from Edith Kent, Project Manager, GEL Laboratories, to Greg T. Varljen, Battelle Memorial Institute, Pacific Northwest Division. with Attached Analytical Results from Samples, Work Orders: 241323, 241334, 241338; SDGs: 105228-01, 105228-01A, 105228-01B

PNNL-11923, 1998, Sampling and Analysis Plan for the Former Atomic Energy Commission Bus Lot Property, Pacific Northwest National Laboratory, Richland, Washington.

PNWD 2009, Draft Cleanup Action Plan for the Former Atomic Energy Commission Bus Lot Property, Battelle Pacific Northwest Division, Richland, Washington.

PNWD 2008, Draft Feasibility Study for the Former Atomic Energy Commission Bus Lot Property, Battelle Pacific Northwest Division, Richland, Washington.

PNWD 2008, Draft Remedial Investigation for the Former Atomic Energy Commission Bus Lot Property, Battelle Pacific Northwest Division, Richland, Washington.

RCW 70.94, 2009, "Washington Clean Air Act," Revised Code of Washington, as amended.

WAC-173-340, 2007, Model Toxics Control Act, Washington Administrative Code, as amended.

WAC 296-62, 2008, General Occupational Health Standards, Washington Administrative Code, as amended.