PERIODIC REVIEW

Southwest Harbor Project Remediation Area 2 – Salmon Bay Steel Site

Harbor Avenue and SW Hanford Street
Seattle, Washington
FSID# - 2385

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1.0 INTRODUCTION

This document is a review by the Washington State Department of Ecology (Ecology) of post-cleanup site conditions and monitoring data at the Salmon Bay Steel portion of Southwest Harbor Project Remediation (SWHP), referred to as Remediation Area 2 (Site). Cleanup at this Site was implemented under the Model Toxics Control Act (MTCA) regulations, Chapter 173-340 Washington Administrative Code (WAC)

The purpose of this periodic review is to determine whether the cleanup remedy at the Site continues to be protective of human health and the environment.

Cleanup actions at this Site were conducted in accordance with the requirements of Prospective Purchaser Consent Decree 95-2-05415-3 dated March 6, 1996 entered into between the Port of Seattle (Port) and Ecology. The remedy involved the containment of hazardous materials. Concentrations of total petroleum hydrocarbons (TPH), lead, cadmium, polychlorinated biphenyls (PCBs), and other hazardous substances remain in soil at concentrations exceeding MTCA Method A and Method B cleanup levels. The MTCA cleanup levels for soil are established under WAC 173-340-740 and the MTCA Method C cleanup levels for soil are established under WAC 173-340-745. The MTCA cleanup levels for ground water are established under WAC 173-340-720.

WAC 173-340-420 (2) requires that Ecology conduct a periodic review of a site every five years under the following conditions:

(a) Whenever the department conducts a cleanup action
(b) Whenever the department approves a cleanup action under an order, agreed order or consent decree
(c) Or, as resources permit, whenever the department issues a no further action opinion;
(d) and one of the following conditions exists:
    1. Institutional controls or financial assurance are required as part of the cleanup
    2. Where the cleanup level is based on a practical quantitation limit
    3. Where, in the department's judgment, modifications to the default equations or assumptions using site-specific information would significantly increase the concentration of hazardous substances remaining at the site after cleanup or the uncertainty in the ecological evaluation or the reliability of the cleanup action is such that additional review is necessary to assure long-term protection of human health and the environment.

When evaluating whether human health and the environment are being protected, the factors the department shall consider include [WAC 173-340-420(4)]:

- The effectiveness of ongoing or completed cleanup actions, including the effectiveness of engineered controls and institutional controls in limiting exposure to hazardous substances remaining at the site;

- New scientific information for individual hazardous substances of mixtures present at the site;
- New applicable state and federal laws for hazardous substances present at the site;
- Current and projected site use;
- Availability and practicability of higher preference technologies; and
- The availability of improved analytical techniques to evaluate compliance with cleanup levels.

The department shall publish a notice of all periodic reviews in the Site Register and provide an opportunity for public comment.

2.0 SUMMARY OF SITE CONDITIONS

2.1 Introduction

The SWHP comprises approximately 185 acres of land generally bordered by Harbor Avenue and non-Port industrial and commercial properties on the west, SW Spokane Street and non-Port commercial properties on the south, Elliot Bay and Florida Street on the north, and the original Terminal 5 area on the east. Most of the SWHP overlies former tideflats that have been filled and used for various industrial purposes, including railroad yards, wood treatment, steel scrap storage, and municipal and wood waste landfilling. A vicinity map is available as Appendix 6.1.

The purpose of the SWHP is to redevelop and enlarge an existing container shipping terminal for American President Lines and other Port of Seattle customers in order to meet projected container service demands here and abroad. Much of the project area land has contaminated soils and sediments that required remediation. The project to facilitate cleanup and pollution prevention on more than 200 acres, restore and enhance habitat and natural resources, and increase water-dependent maritime uses and public use of shoreline.

For the purposes of upland cleanup, the project area has been divided into five remediation areas (RAs), RA1 through RA5. The remediation areas were defined based on previous ownership and land use. The Site Plan available as Appendix 6.2 shows the SWHP area and the boundaries of each RA. The five RAs within the SWHP are as follows:

- The Spokane Street Properties and BNBY (RA-1),
- The former Salmon Bay Steel Property (RA-2),
- The former West Seattle Landfill and Purdy Scrap/former Seattle Steel Inc. (SSI) property (RA-3),
- The Pacific Sound Resources Superfund site (RA-4), and
- The former Lockheed Yard 2 (RA-5).

The Site is located at 3425 26th Avenue SW in Seattle, Washington, west of Harbor Island and the West Waterway of the Duwamish River. RA2 includes approximately 22 acres of property recently used for Salmon Bay Steel operations north of SW Spokane Street. The property includes two large warehouses, a scale, and railroad spurs. The property has been used to store scrap metal prior to re-melting, and slag, a byproduct of the steel-making process. Slag has been used as fill throughout the history of the property to bring the Site from tidelands to existing grade. Slag mantles the Site at depths of up to 25 feet. The Longfellow Overflow Line (LOL), a 72 inch diameter storm sewer, traverses the Site from south to north. The adjacent 29th Avenue Right Of Way (ROW) encompasses approximately 0.75 acres and is also an industrial property which has been filled similarly to the Site.

The Site and the 29th Avenue ROW are zoned for industrial use and lie within zoning designation IG2 (General Industrial 2). The Site is completely surrounded by land zoned for industrial use, designated by either IG 1 or IG2 (General Industrial 1 or 2). To the west of the

industrial area, land is zoned for commercial use within 500 feet of the Site and for residential use within 600 feet. The Salmon Bay Steel mill and a small commercial zone are immediately to the south of the Site. All the land north of the Site to Elliott Bay and east of the Site to the West Waterway of the Duwamish River is zoned for industrial use. The 29th Avenue ROW is surrounded by land designated IG2 except for the extreme western boundary which abuts Harbor Avenue. Property on the western side of Harbor Avenue is zoned for commercial use. Zoning in the Site vicinity is implemented by City of Seattle, which is conducting land use planning under the Growth Management Act (GMA).

2.2 Site History

The Site, the 29th Avenue ROW, and adjacent properties were initially tidal flats of Elliott Bay. From 1895 to about 1920, the U.S. Army Corps of Engineers constructed the east and west waterways in Elliott Bay at the mouth of the Duwamish River and began filling the tidal flat area that was later to become the Seattle Steel Company site. In 1905, the Seattle Steel Company rolling mill was opened just south of RA2 and SW Spokane Street.

The Seattle Steel Company was renamed Pacific Coast Steel in 1911. From the 1920's to the early 1930's, areas north of the Spokane Street, including portions of RA2, were filled with sediment from the Duwamish River, slag from the steel mill, sawdust and wood debris, other soil, and miscellaneous debris. In 1929, Bethlehem Steel bought the steel mill. Filling of the RA2 by Bethlehem Steel continued during the late 1930's using slag, soils, sediments, and other miscellaneous materials. In addition, the Former Eastern Products Warehouse was constructed on the southeast corner of the Site.

In the early 1940's, four fuel oil ASTs were installed within concrete containment dikes adjacent to 26th Avenue SW. Filling of the tideflats continued during the 1940's and 1950's. The four ASTs were removed in the 1960's.

Additional fill material was added to RA2 during the 1960's. The steel mill stockpiled slag materials over most of RA2 excluding areas where railroad tracks existed. Expansion of the steel mill by Bethlehem Steel continued with the construction of a rebar fabrication mill in 1968. This new mill (Rebar Shop) was built on the former location of the four fuel ASTs along 26th Avenue SW. By 1994, the entire tide flat area north to SW Florida Street had been filled.

Bethlehem Steel purchased the West Seattle Landfill Site (RA3) located northwest of RA2 from the Port of Seattle in 1967. In January 1985, Seattle Steel, Inc. bought the mill and associated north properties from Bethlehem Steel, renamed it Seattle Steel, and operated the facility for several years. Salmon Bay Steel purchased the main plant (including RA2) in May 1991. Seattle Steel, Inc. owned the property adjacent to RA2 on the north side until acquired by the Port of Seattle in 1993.

2.3 Early Site Investigations

Although the Remedial Investigation / Feasibility Study (RI/FS) was conducted under MTCA jurisdiction, the United States Environmental Protection Agency's (USEPA) Resource

Conservation and Recovery Act (RCRA) and Toxic Substances Control Act (TSCA) programs have authority on specific issues of contamination.

Several investigations took place at the Site between 1986 and 1993 prior to the RI/FS, culminating with Resource Conservation and Recovery Act (RCRA) Facility Assessments (RFAs) contracted by the United States Environmental Protection Agency (USEPA) in 1993. The RFAs identified four potential Solid Waste Management Units (SWMUs). Five other areas of concern were identified during Site inspections, utility work, and other Site activities prior to the RI/FS. The nine areas were defined as follows:

Area A - Investigated as an upgradient area during the Phase I investigation.
Area B - Former operational solid waste disposal area (SWMU 11).
Area C - Slag, mill scale, and scrap stockpile area.
Area D - Former chemical waste disposal area and Renton Effluent Transfer System (RETS) Line.
Area E - Slag, mill scale, and construction debris fill area (SWMU 8).
Area F - Former aboveground storage tank area.
Area G - Former spent pickle liquor disposal area (SWMU 10).
Area H - Former oil disposal area.
Area I - Suspected trash disposal area (SWMU 9).

These areas are identified in the Site Plan available as Appendix 6.2.

2.4 Cleanup Levels and Points of Compliance

2.4.1 Soil Screening Levels

Cleanup levels were not identified in the CAP. Instead of cleanup levels, Cleanup action levels were proposed, which included both capping action levels and excavation action levels. Capping action levels were defined as soil concentrations above which soils must be covered to prevent exposure. Capping action levels are equivalent to the MTCA Method A Cleanup Levels for TPH and lead, and to the MTCA C Industrial Cleanup Level for PCBs. For contaminants found at the Site without a Method C cleanup level, Method A cleanup levels for industrial land use were used. Excavation action levels were defined as soil concentrations above which soils must be excavated. Excavation action levels were only defined for PCBs. Soils with PCB concentrations above 2.3 milligrams per kilogram would require either treatment/disposal or placement below a more protective cover type.

MTCA (WAC 173-340-745 states that industrial sites meeting the following criteria may use the industrial soil cleanup standards:

- The site is zoned or has been otherwise officially designated for industrial use through a local comprehensive land use planning process.
- The site is currently used for industrial purposes or has a history of use for industrial purposes.

- The site is expected to be used for industrial purposes for the foreseeable future due to site zoning, statutory or regulatory restrictions, comprehensive plans, adjacent land use, and other relevant factors.
- The cleanup action provides for institutional controls implemented in accordance with WAC 173-340-440.
- The industrial standards may not be applied to industrial properties where hazardous substances remaining at the property after remedial action pose a threat to human health and the environment in non-industrial adjacent areas.

Remediation Area 2 and the 29th Avenue ROW meet all of these criteria. The Site is zoned for industrial use (classification IG2) and the adjacent properties have been used as for industrial purposes since the time they were created by filling this portion of Elliott Bay. Institutional controls will be implemented the Site as a part of the remedial action. Therefore, the Site meets all the requirements for using industrial soil Method C cleanup levels.

The use of this Site as a container shipping terminal included plans for installation of pavement or railroad ballast over the surface of the entire Site. In conjunction with institutional controls, these cover materials provide compliance at the ground surface with all MTCA soil cleanup standards for the Site by eliminating the ingestion and direct contact pathways. These characteristics ensure that contaminated soils remaining below cover materials will not pose a threat, even to nearby non-industrial areas.

For the purpose of this review, MTCA Method C cleanup levels will be used to determine whether the remedy is protective of human health and the environment. When no MTCA Method C cleanup level exists, MTCA Method A, and Method A industrial cleanup levels will be used. Because cleanup actions were initiated in 1995, this review will use cleanup standards applicable at that time.

2.4.2 Groundwater Cleanup Levels

Because the Consent Decree for the Site did not address groundwater, groundwater cleanup levels were not established for the Site. As part of the groundwater monitoring program conducted between 2008 and 2011 (discussed in Section 2.6.1), screening levels were used to evaluate concentrations of contaminants of concern. The screening levels were developed based on protection of surface water because groundwater discharges to Elliot Bay, and groundwater at the Site has been determined to be non-potable for the following reasons:

- The aquifer is not currently used for drinking purposes.
- Municipal drinking water supply is available and is the source required by the King County Department of Health.
- Contaminants in the shallow groundwater do not pose a threat to deeper groundwater supplies.
- If the shallow groundwater were pumped for drinking water, rapid saltwater intrusion will likely occur, making it nonpotable.

- Institutional regulatory restrictions against placing a drinking water well within the proximity of a landfill, sewer line, etc, severely restrict the placement of a drinking water well at the Site.

Screening levels were selected by choosing the most stringent Applicable or Relevant and Appropriate Requirements (ARARs) for surface water for each contaminant of concern. These ARARs were identified from the Clean Water Act (Section 304), the National Toxics Rule (40 CFR 131), Washington State Water Quality Standards (WAC 173-201a), and MTCA Method B surface water cleanup standards.

The selected screening levels are available in the table below:

Analyte	Screening Level (ug/L)
TPH	
Diesel range	500
Heavy oil range	500
Metals	
Total antimony	640
Total arsenic, inorganic	0.14
Total chromium	50
Total copper	2.4
Total lead	8.1
Total nickel soluble salts	8.2
cPAHs	
Benzo(a)anthracene	0.018
Benzo(a)pyrene	0.018
Benzo(b)fluoranthene	0.018
Benzo(k)fluoranthene	0.018
Chrysene	0.018
Dibenzo(a,h)anthracene	0.018
Indeno(1,2,3-cd)pyrene	0.018
sVOCs	
bis(2-ethylhexyl) phthalate	2.2
PCBs	
Aroclor 1016	0.0058
Aroclor 1254	0.0017
Aroclor 1260	0.03
Total PCBs	0.000064
VOCs	
Tetrachloroethane;1,1,2,2-	4

Trichloroethane;1,1,1-	420000
Trichloroethane;1,1,2-	16
Dichloroethane;1,2-	37
Tetrachloroethene	0.39
Trichloroethene	6.7
Dichloroethene;1,1-	3.2
Dichloroethene;1,2-,trans	10000
Vinyl Chloride	2.4

For the purpose of this review, these screening levels represent the most stringent ARARs for surface water at the Site and they will be used as cleanup levels to determine whether the remedy is protective of human health and the environment.

2.4.3 Ground Water Point of Compliance

For groundwater, the point of compliance is the point or points where the groundwater cleanup levels must be attained for a Site to be in compliance with the cleanup standards. The groundwater standard point of compliance is established throughout the Site form the uppermost levels of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the Site.

2.4.4 Soil Point of Compliance

For soil, the point of compliance is the area where the soil cleanup levels shall be attained. For soil cleanup levels based on the protection of groundwater, as they are for this Site, the point of compliance is established as soils throughout the Site.

2.5 Remedial Investigation / Feasibility Study Summary

The RI/FS field investigation occurred in two phases. The Phase I investigation consisted of installing, sampling, and testing 9 groundwater monitoring wells and 18 test pits. Soil collected from test pits and soil borings was logged and characterized, and selected samples were submitted for chemical analysis. Groundwater monitoring wells were installed, developed, sampled for chemical analysis, and monitored for water level elevations.

The general objectives of the Phase II investigation were to provide additional information necessary to complete the RI/FS in accordance with MTCA and to obtain additional geologic, hydrogeologic, and contaminant information for the Site to address the following issues:

- Identify contaminant areas that are appropriate for remediation.
- Further assess groundwater quality for the shallow groundwater unit.
- Further assess the impact of the RETS Line on the Site hydrogeology.
- Further assess the impact of the Longfellow Overflow Line on the Site hydrogeology.
- Assess the potential impact of Site groundwater on downgradient surface water quality.
- Further characterize surface and near surface soils that may be disturbed during Site redevelopment. This data will also be used to evaluate fugitive dust as a contaminant transport mechanism.

- Further assess leaching potential of contaminants found in slag and soil.
- Further evaluate upgradient and background groundwater quality.
- Evaluate soils beneath existing buildings.
- Develop a methodology for slag/soil remediation.

The Phase II investigation program included the drilling, sampling and testing of 13 soil borings and 16 test pits, installation of 12 monitoring wells in all but one soil boring, and collection of sediment and water samples from the LOL. In addition, two test excavations were excavated and field screened. Air sampling was performed during test excavation activities.

Soil samples collected from soil borings and test pits were characterized and logged. Selected samples were submitted for chemical and/or geotechnical analysis. Groundwater monitoring wells were installed and developed. Water levels were measured and groundwater samples were analyzed.

The investigation of the 29th Avenue ROW occurred after the RI of RA2 on September 20, 1994. The objectives of the 29th Avenue ROW investigation were to evaluate the nature and extent of contamination, identify potential contaminant areas that require cleanup, and evaluate whether the remedial actions being proposed for RA2 were appropriate for the 29th Avenue ROW property. The investigation consisted of the excavation, sampling, and testing of two test pits.

The following are the major conclusions of the RI:

2.5.1 Soil and Fill

Petroleum hydrocarbons (TPH), PCBs, and lead were the most significant contaminants present in the solid materials. Lead, TPH, and PCBs were detected in nearly all the solid material samples; however, in most samples the concentration of PCBs was below the MTCA Method C industrial cleanup level of 17 mg/kg. There is no Method C industrial cleanup level for TPH or lead. Most samples contained lead below the Method A industrial cleanup level of 1000 mg/kg. Most of the samples located throughout the Site contained TPH above the Method A cleanup level of 200 mg/kg.

During the Phase I and II investigation, 157 soil samples were collected from soil borings and test pits located throughout RA2. These samples were analyzed for VOCs, SVOCs, PCBs, pesticides, TPH, metals, pH, total organic carbon, and Toxicity Characteristic leaching Procedure (TCLP) metals. PCBs, petroleum hydrocarbons, and lead were generally found throughout RA2 at levels above MTCA Method A and Method B standards, but below MTCA Method A and Method C industrial standards. However, the concentration of these compounds significantly exceeded the Method C cleanup levels (or Method A level where no Method C value exists) in a number of small discrete, localized areas.

Test pit excavations were dug in areas that were identified in Phase I as having elevated PCBs, TPH, and metals concentrations. The soil in these areas was extensively analyzed to try and delineate hot spots. However, hot spots were not observed, indicating that these areas were not

laterally continuous. The random nature of contamination is characteristic of all of the slag/soil fill material on the Site, which accounts for approximately the upper 20 feet of soil across the entire property

The majority of contaminant deposition at the Site is surmised to be from disposal of contaminated fill and incidental operations at the Site. The distribution of these contaminants is a function of their deposition (i.e., placement of contaminated fill, random spills, leaks, maintenance operations, etc.) and the filling process that has taken place at the Site over nearly 100 years.

Depths to the water table range from 6 to 10 feet below ground surface, therefore, these fill materials have been in direct contact with the groundwater for over 50 years. However, groundwater data generally indicated that groundwater had only been marginally impacted. Ecology has determined that the highest beneficial use of groundwater at this Site is not for drinking water. Instead, the goal is the protection of marine organisms and those who consume marine organisms in Elliott Bay. When Site groundwater data was compared to marine surface water quality criteria, there were isolated exceedances. However, similar to soil contamination, exceedances were random and did not identify patterns of groundwater contamination which would pose a threat to the bay.

During the investigation of the 29th Avenue ROW property six soil samples were collected from two test pits. The samples were analyzed for VOCs, SVOCs, PCBs, pesticides, TPH, metals, cyanide, and pH.

All compounds were detected below MTCA Method C for direct contact with industrial soil and the Method A Industrial Standards except for heavy fraction petroleum hydrocarbons (HTPH). HTPH was generally detected above the Method A standard (200 mg/kg) and therefore, was the only contaminant of concern identified for the 29th Avenue ROW property.

Tables containing soil contaminant detection frequencies of organic, inorganic and volatile concentrations are available as Appendix 6.3.

2.5.2 Groundwater

Nine groundwater monitoring wells were installed and sampled during Phase I. Based on the Phase I report, 11 additional wells were installed during Phase II. Groundwater sampling during Phase II included resampling Phase I wells and sampling Phase II wells along with onsite and near Site wells installed during previous investigations.

The contamination in RA2 groundwater was generally detected throughout the Site at concentrations below screening levels. However, there were isolated locations where contaminant concentrations in groundwater exceed screening criteria.

Volatiles (primarily 1,1,1-TCA and its degradation products) were present at several locations, primarily in the Fill/Alluvial aquifer, at concentrations below surface water quality criteria (SWQC).

No discernable pattern of SVOCs were detected at the Site and the only SVOC which exceeded SWQC levels was bis(2-ethylhexyl)phthalate. Diesel range hydrocarbons (WTPH-D) exceeding screening criteria of 1,000 ug/L were detected in two wells on the west side of the Site. PCBs were primarily detected in monitoring wells with elevated pH values on the northern portion of the Site but were detected in several locations on the southwest boundary of RA2. All PCB detections exceeded SWQC.

Pesticides were detected in monitoring wells located at the north end of RA2. There is no clear pattern to the pesticide detections or to the type of pesticides detected. All pesticide detections exceeded SWQC. SWQC criteria for pesticides are significantly below PQLs achievable with standard methods. Generally few metals were detected in groundwater indicating that few metals are leaching from the slag/soil fill. Of the metals analyzed (dissolved fraction) arsenic was most frequently and widely detected. Dissolved cadmium, copper, and zinc detections exceeded SWQC in one well in only one phase, and dissolved lead exceeded SWQC in two wells in both phases. SWQC criteria are below PQLs for copper and nickel.

Tables containing groundwater contaminant detection frequencies of organic, inorganic and volatile concentrations are available as Appendix 6.4.

Groundwater compliance monitoring was conducted for the entire SWHP between 2008 and 2011. Groundwater data from this compliance monitoring are discussed in section 3.1.2.

2.5.3 Surface Water and Sediments

Surface water and sediment samples were collected during the RI from LOL. The contamination in LOL water and sediment at RA2 decreased as the line traversed the Site to the north. Sediment concentrations were compared to the sediment quality standards (SQS). LOL water at RA2 is not compared to surface water criteria because the majority of the water (approximately 90 percent) in the line originates from Salmon Bay Steel and is regulated by an NPDES permit issued by Ecology.

Several SVOCs were detected in sediment samples. Of these SVOCs, 1,4- dichlorobenzene and phthalates were detected at concentrations which exceed SQS criteria. Petroleum hydrocarbons were detected in both samples. SQS criteria for fuels were not available. PCBs were detected at concentrations exceeding SQS criteria. Metals (including arsenic, cadmium, chromium, copper, mercury, and zinc) were detected at concentrations greater than SQS criteria. These elevated concentrations were primarily detected at a sampling station (LF02) upgradient and adjacent to RA2.

2.5.4 Feasibility Study

The following alternatives were developed for the Site:

Alternative 1: No remedial action
Alternative 2 – Capping all soils
- Alternative 2a: Low permeability pavement and soil/ballast covers
- Alternative 2b: Low permeability pavement and enhanced soil/ballast covers
- Alternative 2c: Excavation in ballast areas – capping below low permeability pavements

Alternative 3: Capping and remediation of soils above excavation action levels
- Alternative 3a: Capping; offsite disposal of contaminated material
- Alternative 3b: Capping; asphalt concrete production
- Alternative 3d: Capping; onsite soil washing
- Alternative 3e: Capping; onsite landfill

The primary pavement design for the alternatives included 8 inched of asphaltic concrete and 12 inches of crushed base course or, 12 inches of concrete. In areas where railroad tracks are to be constructed, a minimum of 24 inches of ballast was required below railroad ties. The proposed pavement and ballast cover designs were considered adequate to minimize human exposure through all pathways with a secondary benefit of limiting downward migration of contaminants into groundwater in paved areas and lateral migration of contaminated particles in stormwater runoff. The combined isolation measures of the pavement cap and ballast cover were carried through all alternatives as the primary remedial measure for soil below capping action levels. Slag/soil removed above excavation action levels was required to be segregated and treated by a secondary remedial technology under each alternative.

Alternatives 2 and 3 require institutional controls to prevent use of groundwater as a drinking water source and to provide adequate controls in the event of future excavation activity in contaminated areas. Groundwater monitoring, and regular inspection of the cap and cover would also be required. All alternatives require deed restrictions due to the presence of contamination above Method A and B cleanup levels.

2.6 Remedial Actions

Alternative 2C, Excavation of soil above excavation action levels in ballast areas and capping below low permeability pavements, was the selected remedial alternative.

2.6.1 Remedial Excavation

The selected remedy for the Site includes consolidation and capping of materials above cleanup standards. All soils with contaminant concentrations above Capping Action Levels were capped. Institutional controls, as well as cap maintenance and monitoring ensured the integrity of the cap and the protectiveness of the remedy. Soils with contaminant concentrations above Excavation Action Levels were excavated from proposed ballast cover areas and placed below more protective pavement caps. Slag/soil fill with contaminant concentrations above Method A, B, and C cleanup levels but below capping action levels remained below pavement and ballast covers. Material with contaminants above cleanup standards is distributed randomly throughout the slag/soil at the Site. The slag/soil fill mantels the entire Site to an average depth of 10 feet.

Eight areas with PCB concentrations exceeding the excavation action level were identified based on the results of the RI/FS. Soil boring and test pit results for samples collected at multiple

depths from each location were used to identify the location and depth of vadose zone soils exceeding the action level.

The initial excavation of each location was then conducted based on the RI results. Excavations proceeded by first removing all Type 1 soil at locations where Type 1 soil was present. Type 1 soil is defined as soil with PCB concentrations less than the excavation action level of 2.3 ppm which was present above deeper soil with PCB concentrations exceeding the excavation action level (Type 2 soil). Type 1 soil was stockpiled on the ground adjacent to the remedial excavations for use as backfill upon completion of the excavation.

After all Type 1 soil was removed, the Type 2 soil (soil known to have PCB concentrations above the action level) was excavated and removed. Excavated Type 2 soil was placed in lined stockpile locations separate from Type 1 soil stockpiles. The Type 2 soil stockpiles were lined and covered with 20-mil plastic. The plastic liner was placed between and over straw bales that were positioned at the perimeter of a rectangle providing adequate volume to contain the excavated Type 2 soil. When a Type 2 stockpile was completed, a cover consisting of 20-mil plastic was placed over the stockpile and was held down with sand.

All but one remedial excavation was excavated to the groundwater table. Only vadose zone soils with PCB concentrations above 2.3 ppm in the proposed ballast areas were required to be removed. Therefore, when the groundwater table was encountered in a remedial excavation, the excavation did not go any deeper.

After each remedial location had undergone the initial excavation, composite confirmation samples were collected from each excavation sidewall area and the excavation bottom area at the one location where the bottom elevation was above groundwater. The composite samples were taken from each excavation surface at the rate of one sample per every 100 square feet of excavation surface from which Type 2 soil was removed.

If the analytical result for a specific excavation surface exceeded the excavation action level, over-excavation of that surface was required. Over-excavation of a remedial location consisted of excavating an additional 2-foot layer of soil from specific excavation surface areas that contained PCB concentrations exceeding the excavation action level. Over-excavation of several remedial locations increased the sidewall surface area to greater than 100 square feet. If the area of an individual excavation sidewall where Type 2 soil existed exceeded 100 square feet, then additional samples were taken at the rate of one composite sample per every additional 100 square feet. Another composite sample or samples were collected from the over-excavated sidewall area and sent for analyses.

Following several rounds of over excavation, four locations continued to contain soil with PCB concentrations above the excavation action level. After a review of the existing data and a meeting with Ecology, it was determined that additional excavation of the remaining locations was not warranted because contamination at these locations was random and highly heterogeneous and the locations were not determined to be source areas of contamination which could pose a threat to human health and the environment..

The final remedy included installation of pavement and ballast cover materials, and implementation of institutional controls. Pavement and ballast covers were installed during later stages of construction of the SWHP, after remediation activities were complete.

2.6.2 Relocation and Placement of Excavated Soil

The final Type 2 soil disposal area, located on RA2 in an area to be covered with asphalt or concrete pavement, was excavated on June 26, 1996. The Type 2 soil was relocated from the stockpile areas adjacent to the remedial excavations to the final disposal area on June 28. The boundary coordinates of the placement area were recorded by surveyors after the Type 2 soil was deposited in the disposal area. Prior to paving above the disposal site area, a brightly colored indicator was placed above the disposal location.

2.7 Long-Term Compliance Monitoring and Maintenance

2.7.1 Compliance Monitoring

Ecology required that groundwater monitoring was to be performed for the entire SWHP on a quarterly basis for a period of five years. Later, the groundwater monitoring plan was modified as part of the Phase II Groundwater Confirmation Monitoring Program in 2008. Per this program, groundwater sampling was required to take place twice annually for 3 years. Sampling was required to take place during the periods of seasonal low (September/October) and seasonal high (December/January/February) groundwater levels. At the end of three years, the monitoring program was evaluated to determine whether redevelopment and remedial actions in the area have provided sufficient protection to groundwater and to determine whether the monitoring strategy should change. An evaluation of groundwater compliance monitoring data is available in Section 3.1.2.

In an October 31, 2011 letter from Ecology to the Port of Seattle, Ecology stated that:

> "Ecology agrees that the groundwater monitoring data collected in October 2008, March 2009, September 2009, June 2010 October 2010 and February 2011 do not show any contaminants exceeding MTCA cleanup standards. The six rounds of groundwater data appear to satisfy the Phase II groundwater monitoring plan. The groundwater monitoring program for RA-1, -2, -3 and -5 are now complete under the Consent Decrees for RA-1, -2, -3 and -5."

It was determined that monitoring data had demonstrated that the Site was not impacting groundwater, and the groundwater monitoring program was terminated with Ecology's concurrence.

2.7.2 Inspections and Maintenance

Requirements for post remediation inspection and maintenance of the Site were described in an Operations and Maintenance Plan. On a semi-annual basis, Port staff inspect RA1-BNBY, RA-2 and RA-3 areas. The integrity of the cover (pavement and ballast) areas, surface water collection systems, and Site security measures are inspected and recorded.

The Site is inspected to determine the condition of pavement and ballast covers including: locations of penetrations; cracks, tears, or gouges in Site covers; persistent ponding of water on pavement and ballast covers or around surface water collection system components; additional surface water drainage problems including siltation in catch basins; recent repair work and/or recent excavation activities, damaged security fencing, and adequacy of security measures.

The most recent available inspection form was from July 2012. The inspection determined that the cap appeared to be generally intact with some exceptions noted. The exceptions included small areas of asphalt lifting near railroad tracks. A summary of the inspection report is available as Appendix 6.5.

3.0 PERIODIC REVIEW

3.1 Effectiveness of completed cleanup actions

3.1.1 Soil and Direct Contact

Based upon the Site visit conducted on September 25, 2012, the Site remains owned by the Port and is used for industrial purposes. The Site has many active uses that are generally dedicated to rail loading and transfer, container storage and trucking. Site infrastructure allows for loading and unloading of containers from ships, transfer of shipping containers to truck and rail, and general use as a railyard. The Site surface covers appear in excellent condition with some cracking and upheaval visible near rail lines. Site personnel regularly perform Site inspections, maintenance on the cap surface, fence maintenance and Site security control.

The capped Site surfaces continue to eliminate direct exposure pathways (ingestion, contact) to contaminated soils. Site maintenance employees continue to conduct asphalt cap repairs and maintenance as necessary. Site surfaces must be maintained to allow for Site operations. A photo log is available as Appendix 6.6.

Because soils remain at the Site with concentrations of hazardous materials exceeding MTCA Method A cleanup levels, institutional controls are required as part of the final remedy.

3.1.2 Ground Water

Groundwater monitoring was conducted for three years at the Site on a semi-annual schedule between October 2008 and February 2011. Three wells within the groundwater monitoring network were considered relevant to RA-2. CMP-1 and CMP-2 are considered background wells and CMP-3 is located immediately downgradient of RA-2; all three of these wells are screened within the fill aquifer. MW-308N and MW-308S are located downgradient from the entire SWHP. MW-308N is located in the fill aquifer and MW-308S is located in the estuarine aquifer and has saltwater intrusion and tidal influence.

Only arsenic and bis(2-ethylhexyl) phthalate were detected in Site wells at concentrations exceeding screening levels. Bis(2-ethylhexyl) phthalate was detected in upgradient well CMP-1 during the February 2011 event at a concentration of 2.4 ug/L, exceeding the cleanup level of 2.2 ug/L. Below is a discussion of arsenic concentrations.

The background well, CMP-2, contained concentrations of arsenic exceeding the selected MTCA Method A cleanup level of 5 micrograms per liter (ug/L) in every monitoring event with a maximum concentration of 29.1 ug/L in October 2010. Downgradient well CMP-3 also exceeded the Site cleanup level of 5 ug/L in every event, but to a lesser degree with a maximum concentration of 11.6 ug/L in October 2008.

MW-308N contained concentrations of arsenic exceeding MTCA Method A cleanup levels in all 6 monitoring events with a maximum concentration of 25.4 ug/L. MW-308S contained arsenic at 8 ug/L in October 2008, but did not contain arsenic at concentrations exceeding MTCA Method A cleanup levels for the final 5 monitoring events. A table containing arsenic concentrations in groundwater is available below.

Arsenic Concentrations in Groundwater (ug/L)

	10/13/2008	4/1/2009	9/2/2009	6/3/2010	10/5/2010	2/9/2011
Upgradient Wells						
CMP-1	2.8	2.7	3.1	2.6	2.8	2.4
CMP-2	**22.7**	**23.2**	**20.8**	**23**	**29.1**	**24.2**
Downgradient Wells						
CMP-3	**11.6**	**6.6**	**8.3**	**7.4**	**7.6**	**8.3**
MW-308N	**25.4**	**16.8**	**15.3**	**16.2**	**22.8**	**16.4**
MW-308S	**8**	3	3	2	0.5	2

Red indicates concentrations exceed MTCA Method A cleanup level

Arsenic concentrations in groundwater at concentrations exceeding MTCA Method A cleanup levels are common in the Puget Sound region; however, concentrations of arsenic are slightly elevated downgradient from the Site when compared to upgradient concentrations. This indicates the Site may be a contributing source of arsenic contamination to groundwater.

Remaining concentrations of arsenic in groundwater are not likely to pose a threat to human health or the environment for several reasons, including:

- Groundwater downgradient from the Site is not potable and will never be used for domestic purposes.
- Property implemented institutional controls will restrict groundwater use at the Site for all future uses.
- Samples collected at the Site were analyzed for total arsenic, while cleanup standards use dissolved arsenic. Dissolved arsenic concentrations at the Site area likely lower than measured total arsenic concentrations.
- MW-308S does not contain arsenic at elevated concentrations, indicating the Site is not likely contributing to contamination in the estuarine aquifer or surface waters of the Puget Sound.
- Arsenic may be becoming mobilized beneath the Site due to reducing groundwater conditions as a result of the former landfill located immediately west of the BNBY area. This mobilized arsenic will likely become fixed and biologically unavailable as soon as it encounters oxidizing conditions near Elliot Bay.
- Arsenic concentrations in groundwater do not exceed Clean Water Act Marine Standards protective of aquatic life of 36 ug/L.

There are no apparent exposure pathways to arsenic contaminated groundwater through *current* Site uses; however, to assure that the remedy remains protective of human health and the environment for future uses, institutional controls should be implemented to incorporate the area north of RA-4 that includes MW-308N and MW-308S. This may not be necessary if the Port is able to demonstrate, through further groundwater analysis, that *dissolved* arsenic concentrations in groundwater are below the Site cleanup level of 5 ug/L.

3.1.3 Institutional Controls

Institutional controls are required at the Site per the Consent Decree and CAP, and as a result of the use of MTCA Method C Industrial cleanup levels for soil. As stated in the CAP, these institutional controls should include:

- Site Fencing and Security
- Health and Safety guidance for future excavation work
- Conformational monitoring requirements and procedures
- Procedures for periodic inspection and maintenance of facility constructed cover
- Restriction of Site use to industrial only

These institutional controls have been implemented at the Site. A restrictive covenant was recorded in 1995 with the following restrictions:

1. No groundwater may be taken for domestic purposes from any well in the area encompassed by the SWHP.
2. Any activity on the Site that may interfere with the Cleanup Action is prohibited. Any activity on the Site that may result in the release to the environment of a hazardous substance that was contained as a part of the Cleanup Action is prohibited unless approved by Ecology or in compliance with the approved Operations and Maintenance Plan.
3. The Site shall not be used for any activities other than traditional industrial uses, as described in RCW 70.105D.020(23), and defined in and allowed under the City of Seattle's zoning regulations.
4. The owner of the Site must give written notice to the Department of Ecology, or to a successor agency, of the owner's intent to convey any interest in the Site.
5. The owner must notify and obtain approval from the Department of Ecology, or from a successor agency, prior to any use of the Site that is inconsistent with the terms of this Restrictive Covenant.
6. The owner shall allow authorized representatives of Ecology the right to enter the Site at reasonable times for the purpose of evaluating compliance with the Cleanup Action Plan and the Consent Decree, to take samples, to inspect Cleanup Actions conducted at the Site and to inspect records that are related to the Cleanup Action.
7. The owner of the Site and the owner's assigns and successors in interest reserve the right under WAC 173-340-440 (1991 ed.) to record an instrument which provides that this Restrictive Covenant shall no longer limit use of the Site or be of any further force or effect.

Based on evaluation of groundwater monitoring data collected at the Site between 2008 and 2011, the coverage area of institutional controls should extend beyond the footprint of the remediation areas to include the property in the vicinity of MW-308N and MW-308S where

arsenic concentrations in groundwater exceed Site cleanup levels; however, this does not prevent the remedy from being protective of human health and the environment. This was discussed in more detail in Section 3.1.2.

If institutional controls are added or modified to incorporate the waterfront area, they should conform to the Uniform Environmental Covenant Act (UECA). UECA was passed in Washington State in 2007, and it requires that certain procedures are followed when restrictive covenants are implemented and they contain specific language so that they will remain enforceable through changes in property ownership.

The existing restrictive covenant is available as Appendix 6.7.

3.2 New scientific information for individual hazardous substances for mixtures present at the Site

There is no new relevant scientific information for the contaminants related to the Site.

3.3 New applicable state and federal laws for hazardous substances present at the Site

Screening levels at the Site are based on current primary and secondary ground water standards, and MTCA Method A, B and C cleanup levels. There are no new relevant state or federal standards applicable to the Site, with the exception of standards for petroleum hydrocarbons. MTCA petroleum hydrocarbon cleanup levels have generally increased since the CAP was written for the Site; however, these changes do not impact whether the remedy is protective of human health and the environment.

3.4 Current and projected Site use

The Site is an active railyard with container storage, tractor-trailer and forklift traffic. These uses are not likely to have a negative impact on the risk posed by hazardous substances contained at the Site as long as the Site surface is actively maintained.

3.5 Availability and practicability of higher preference technologies

The remedy implemented included containment of hazardous substances and it continues to be protective of human health and the environment. While higher preference cleanup technologies may be available, they are still not practicable at this Site.

3.6 Availability of improved analytical techniques to evaluate compliance with cleanup levels

The analytical methods used at the time of the remedial actions were capable of detection below cleanup levels for contaminants of concern at the Site. The presence of improved analytical techniques would not affect decisions or recommendations made for the Site.

4.0 CONCLUSIONS

- The cleanup remedy implemented at the Site is currently protective of human health and the environment.
- Unrestricted use soil cleanup levels have not been met at the Site; however, under WAC 173-340-740(6) (f), the cleanup action is determined to comply with cleanup standards, since the long-term integrity of the containment system is ensured.
- The coverage area of institutional controls should be expanded to include the waterfront property containing MW-308N.

Based on this review, additional actions may be required to assure that the remedy for the Site remains permanently protective. Additionally, it is the property owner's responsibility to continue to inspect the Site to assure that the integrity of the cap is maintained.

4.1 Next Review

The next review for the Site will be scheduled five years from the date of this periodic review. In the event that additional cleanup actions or institutional controls are required, the next periodic review will be scheduled five years from the completion of those activities.

5.0 REFERENCES

Woodward-Clyde. *Cleanup Action Plan – Former SSI Property*. 1995.

Woodward-Clyde. *Operation and Maintenance Plan.* March 1995.

Woodward-Clyde. *Engineering Design Report.* March 1995.

Port of Seattle. *Restrictive Covenant.* July 10, 1995.

Ecology. *Consent Decree No. 95-2-31522-4.* February 22, 1995.

Hart Crowser. *Draft Groundwater Quality Monitoring Evaluation Report.* September 23, 2010.

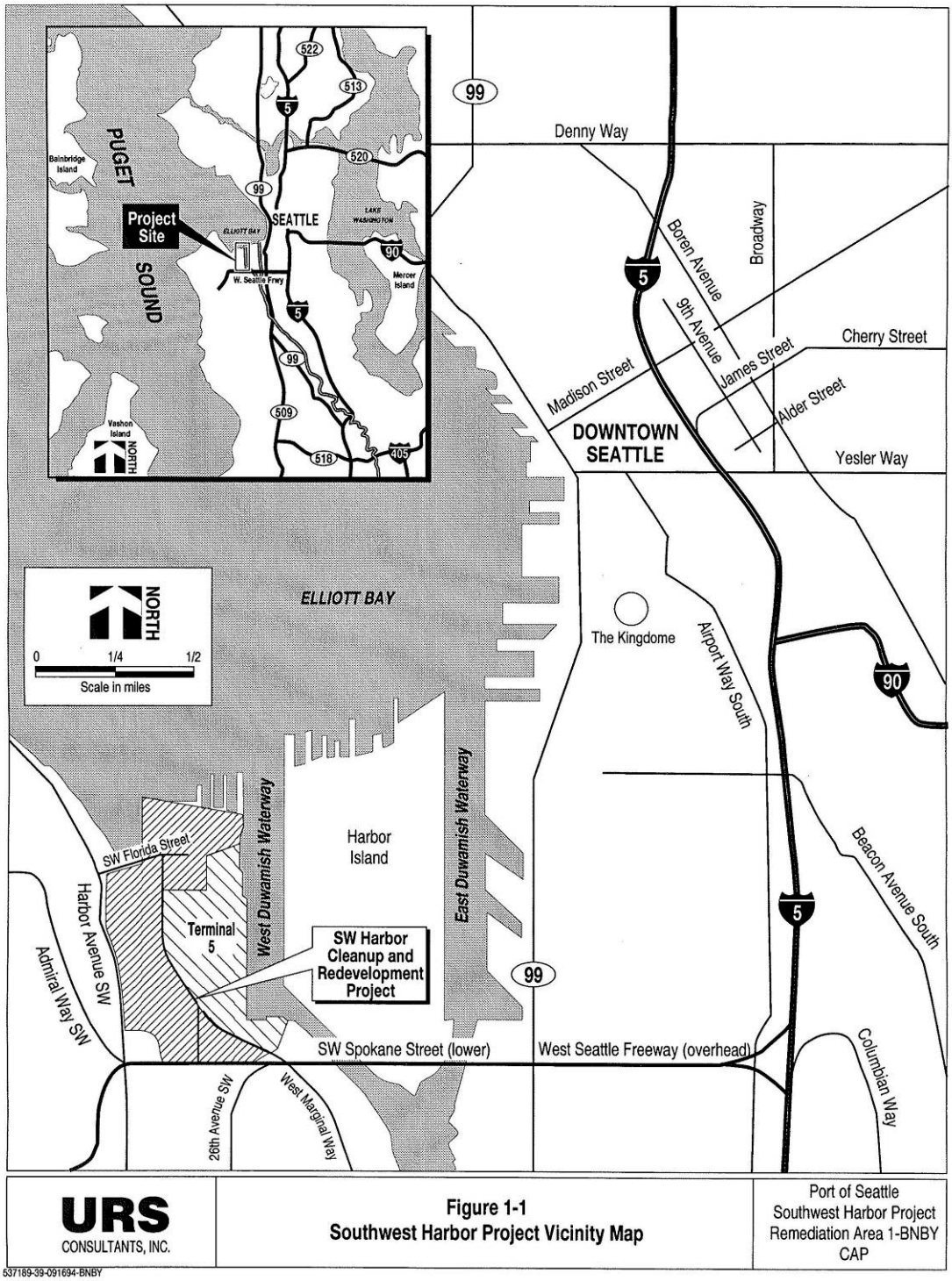
Ecology. *Groundwater Monitoring Program Completion Letter*. October 31, 2011.

Port of Seattle. *Progress Report, RA1, 2, 3 Remediation Projects – Southwest Harbor Project.* August 13, 2012.

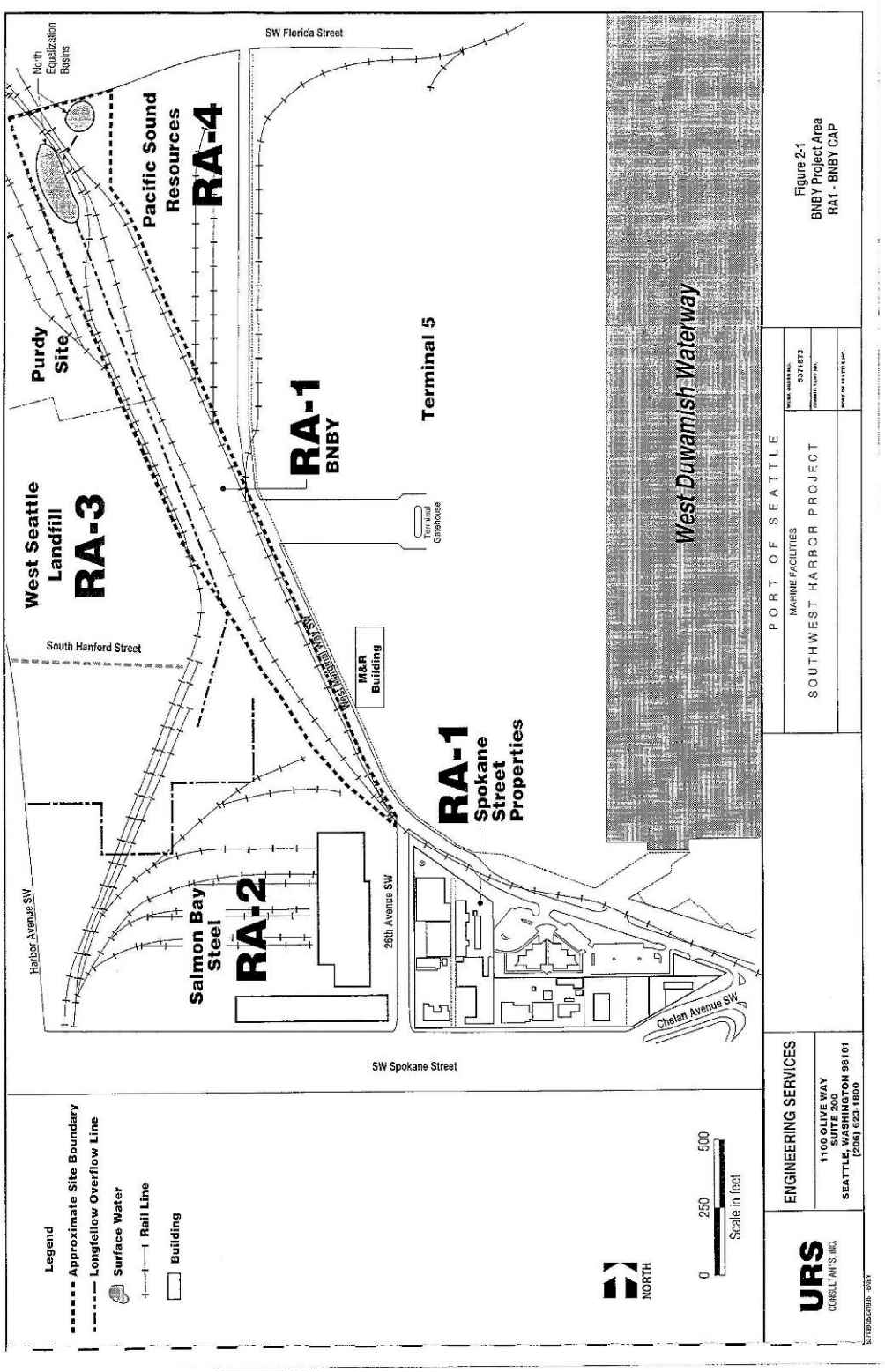
Ecology. *Site Visit.* September 25, 2012.

6.0 APPENDICES

6.1 Vicinity Map



6.2 Site Plan


SW Florica Street
North Equalization Basins
Pacific Sound Resources
RA-4
Purdy Site
West Seattle Landfill
RA-3
RA-1
BNBY
Terminal 5
Terminal Gatehouse
West Duwamish Waterway
South Hanford Street
M&R Building
RA-1
Spokane Street Properties
Salmon Bay Steel
RA-2
Harbor Avenue SW
26th Avenue SW
Chelan Avenue SW
SW Spokane Street
Legend
Approximate Site Boundary
Longfellow Overflow Line
Surface Water
Rail Line
Building
NORTH
0
250
500
Scale in feet
URS
CORPORATION
ENGINEERING SERVICES
1100 OLIVE WAY
SUITE 200
SEATTLE, WASHINGTON 98101
(206) 623-1600
PORT OF SEATTLE
MARINE FACILITIES
SOUTHWEST HARBOR PROJECT
Figure 2-1
BNBY Project Area
RA1 - BNBY CAP

6.3 Soil Contaminant Detection Frequencies

Table 8-2
Detection Frequency Summary for Organics in Soil

Compound Class	Compound	Number of Samples Analyzed	Number of Detections	Average[1] Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Minimum Detected Concentration (mg/kg)	Maximum PQL (mg/kg)	Minimum PQL (mg/kg)
VOCs	1,1,1-Trichloroethane	26	1	0.23	5.8	5.8	0.15	0.015
	1,1-Dichloroethane	26	2	0.15	3.4	0.24	0.15	0.015
	Chloromethane	26	1	0.044	0.07	0.07	0.50	0.05
	Cis-1,2-dichloroethene	26	1	0.013	0.022	0.022	0.15	0.015
	Ethylbenzene	26	2	0.014	0.03	0.019	0.15	0.015
	Styrene	26	1	0.014	0.035	0.035	0.15	0.015
	Toluene	26	1	0.034	0.63	0.63	0.15	0.015
	Xylene	26	2	0.016	0.072	0.035	0.15	0.015
SVOCs	Benzo(a)anthracene[2]	157	18	0.54	4.3	0.015	3.3	0.033
	Benzo(a)pyrene[2]	157	15	0.53	2.0	0.03	3.3	0.033
	Benzo(b,k)fluoranthene[2]	157	19	0.59	6.4	0.036	3.3	0.005
	Chrysene[2]	157	18	0.55	3.8	0.016	3.3	0.01
	Dibenz(a,h)anthracene[2]	157	15	0.51	1.0	0.014	3.3	0.01
	Indeno(1,2,3-cd)pyrene[2]	157	16	0.52	1.9	0.032	3.3	0.01
	Acenaphthylene[3]	157	1	0.51	0.44	0.44	3.3	0.20
	Anthracene[3]	157	9	0.51	1.1	0.054	3.3	0.50
	Benzo(g,h,i)perylene[3]	157	16	0.53	1.7	0.024	3.3	0.01
	Fluoranthene[3]	157	24	0.68	6.9	0.025	3.3	0.01
	Naphthalene[3]	157	10	0.83	26	0.11	3.3	0.10
	Phenanthrene[3]	157	19	0.65	6.6	0.10	3.3	0.05
	Pyrene[3]	157	25	0.78	9.4	0.11	3.3	0.01
	Phenol	130	2	0.62	4.7	2.4	3.3	0.033
	2-Methylnaphthalene	138	2	0.62	6.6	5.2	3.3	0.033

Table 8-2 (Continued)
Detection Frequency Summary for Organics in Soil

Compound Class	Compound	Number of Samples Analyzed	Number of Detections	Average[1] Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Minimum Detected Concentration (mg/kg)	Maximum PQL (mg/kg)	Minimum PQL (mg/kg)
SVOCs (Continued)	4-Methylphenol	138	1	0.58	0.57	0.57	3.3	0.033
	Bis(2-ethylhexyl)phthalate	138	4	0.56	1.2	0.37	3.3	0.033
	Butylbenzylphthalate	138	10	0.60	1.2	0.45	3.3	0.033
	Di-n-butylphthalate	138	26	0.76	5.8	0.36	3.3	0.033
TPH	Diesel	159	51	91	1,900	28	25	10
	HTPH	158	130	755	46,000	10	10	10
PCBs	Aroclor-1242	158	2	0.19	14	0.77	5.0	0.003
	Aroclor-1248	158	102	2.4	52	0.007	5.0	0.003
	Aroclor-1254	158	8	0.71	67	0.008	5.0	0.003
	Aroclor-1260	158	3	0.15	3.7	0.008	5.0	0.003
Pesticides	4,4'-DDD	158	2	0.043	0.037	0.0023	2.5	0.001
	4,4'-DDT	158	9	0.039	0.48	0.0009	2.5	0.001
	Aldrin	158	1	0.041	1.4	1.4	2.5	0.001
	Beta-BHC	158	1	0.037	0.0006	0.0006	2.5	0.001
	Delta-BHC	158	1	0.035	0.0015	0.0015	2.5	0.001
	Dieldrin	158	2	0.035	0.0051	0.0009	2.5	0.001
	Endosulfan II	158	16	0.049	0.90	0.0011	2.5	0.001
	Endosulfan Sulfate	158	1	0.034	0.0007	0.0007	2.5	0.001
	Endrin	158	4	0.036	0.09	0.0007	2.5	0.001
	Endrin Ketone	158	1	0.052	0.0008	0.0008	2.5	0.001
	Methoxychlor	158	3	0.039	0.0029	0.001	2.5	0.001

1 - Average concentration was calculated by adding the detected concentrations and 1/2 the PQL for non-detects, and then dividing by the number of samples analyzed.
2 - Considered a carcinogenic PAH.
3 - Considered a non-carcinogenic PAH.

Table 8-3
Detection Frequency Summary for Inorganics in Soil

Compound Class	Compound	Number of Samples Analyzed	Number of Detections	Average[1] Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Minimum Detected Concentration (mg/kg)	Maximum PQL (mg/kg)	Minimum PQL (mg/kg)
Metals	Antimony	158	101	15	200	7.0	10	5.0
	Arsenic	158	150	13	60	1.0	1.0	1.0
	Barium	158	157	171	630	8.0	5.0	5.0
	Beryllium	158	8	0.29	2.4	0.6	0.5	0.5
	Cadmium	158	119	4.4	110	0.6	0.5	0.5
	Chromium	158	155	526	2,600	8.0	0.5	0.5
	Copper	158	156	377	5,100	7.0	5.0	5.0
	Cyanide	20	1	1.1	2.2	2.2	2.0	2.0
	Lead	158	132	300	6,200	6.0	5.0	5.0
	Mercury	158	59	0.09	1.2	0.05	0.05	0.05
	Nickel	158	150	99	910	6.0	5.0	5.0
	Thallium	155	19	4.0	31	8.0	5.0	5.0
	Zinc	158	158	710	11,000	11	NA	NA

1 - The average concentration was calculated by adding the detected concentrations and 1/2 the PQL for non-detects, and then dividing by the number of samples analyzed.
NA - Not Applicable. Zinc was detected in every sample.

6.4 Groundwater Contaminant Detection Frequencies

Table 8-19
Detection Frequency Summary for Metals in Groundwater

Compound Class	Analyte	Number of Observations	Number of Detects	Average Value	Maximum Value	Minimum Detected Value	Maximum PQL	Minimum PQL	SWQC[1]
Trace Metals (Total) (μg/L)	Arsenic	37	22	15	160	5	5	5	5[2]
	Barium	37	31	107	670	30	50	20	NA
	Cadmium	37	3	5	15	8	8	8	8[3]
	Chromium	37	4	20	220	20	50	20	10,300
	Copper	37	7	56	12	20	50	20	2.5[3]
	Lead	37	11	32	850	5	5	5	5.8[3]
	Nickel	37	4	30	410	40	50	20	7.9[3]
	Zinc	37	18	130	2200	19	50	20	77[3]
Major Metals (Total) (mg/L)	Aluminum	28	27	2.50	39	0.1	0.05	0.05	NA
	Iron	28	26	8.75	140	0.02	0.02	0.02	NA
	Manganese	28	16	0.35	2.6	0.02	0.02	0.02	NA
Trace Metals (Dissolved) (μg/L)	Arsenic	37	19	12	91	5	5	5	5[2]
	Barium	37	30	62	330	20	50	20	NA
	Cadmium	37	1	5	40 J	40 J	8	8	8
	Chromium	37	1	15	20	20	50	20	10,300
	Copper	37	1	15	20	20	50	20	2.5[3]
	Lead	37	2	5	20	15	5	5	5.8[3]
	Zinc	37	9	40	640 J	20	50	20	77[3]
Major Metals (Dissolved) (mg/L)	Aluminum	28	19	0.45	2.1	0.07	0.05	0.05	NA
	Iron	28	20	3.00	65	0.02	0.02	0.02	NA
	Manganese	28	14	0.30	2.7	0.02	0.02	0.02	NA

1 - Surface Water Quality Criteria (SWQC) is the most conservative of the following: WAC 173-201A Chronic Marine, NTR (40 CFR 131) Chronic Marine, NTR Human Consumption of Marine Organisms.
2 - Concentration listed is regional background groundwater concentration rather than the most conservative SWQC of 0.14 μ/L.
3 - The listed criteria is for dissolved metals, not total metals.
NA - No SWQC available.
J - Value is an estimated concentration.

Table 8-22
Detection Frequency Summary for Organic Chemicals Detected in Groundwater

Compound Class	Analyte	Number of Observations	Number of Detects	Average Value[1]	Maximum Value	Minimum Detected Value	Maximum PQL	Minimum PQL	SWQC[2]
VOCs (µg/L)	1,1,1-Trichloroethane	36	7	6	54	4	30	3	NA
	1,1-Dichloroethane	36	12	119	1,800	3	3	3	NA
	1,2-Dichloroethane	36	1	0.81	7	7	10	1	NA
	Chloroethane	36	3	7	19	15	100	10	NA
	cis-1,2-Dichloroethene	36	2	8	140	87	3	3	NA
	trans-1,2-Dichloroethene	36	1	2	12	12	30	3	200,000
	Toluene	36	1	2	7	7	30	3	NA
	Xylene (total)	36	1	2	5	5	30	3	NA
SVOCs (µg/L)	Naphthalene	37	1	9	21	21	100	10	2,350
	Phenol	37	4	10	24	10	100	10	$5 \times 10^{+6}$
	bis(2-Ethylhexyl)phthalate	37	3	11	40	16	100	10	5.9
TPH (µg/L)	Diesel (C10-C22) Range	37	5	330	270	1390	2,500	250	1,000
	HTPH	37	1	730	9,000	9,000	1,000	1,000	1,000
Pesticides (µg/L)	4,4'-DDE	37	1	0.01	0.03	0.03	0.1	0.01	0.0006
	Aldrin	37	2	0.01	0.02	0.02	0.1	0.01	0.0001
	Beta-BHC	37	1	0.01	0.01	0.01	0.1	0.01	0.013
	Endosulfan I	37	1	0.01	0.04	0.04	0.1	0.01	0.0087
	Endrin	37	3	0.01	0.03	0.02	0.1	0.01	0.0023
	Heptachlor	37	1	0.01	0.01	0.01	0.1	0.01	0.0002
	Heptachlor epoxide	37	1	0.01	0.03	0.03	0.1	0.01	0.0001
PCBs (µg/L)	Total	37	12	0.4	7.8	0.1	1	0.1	5×10^{-5}

1 - The average was calculated by summing the detected concentrations and 1/2 the nondetect values then dividing by the number of observations.
2 - Surface Water Quality Control (SWQC) is the most conservative of the following: WAC 173-201A Chronic Marine NTR (40 CFR 131) Chronic Marine, NTR Human Consumption of Marine Organisms.
NA - No SWQC available.

6.5 Maintenance and Inspection Report Summary

Windward environmental LLC

200 West Mercer St. • Suite 401 • Seattle, WA 98119
Phone: 206.378.1364 • Fax: 206.217.0089 • www.windwardenv.com

MEMORANDUM

To: Brick Spangler, Port of Seattle
From: Warren Hansen, Windward Environmental LLC
Subject: Semiannual Inspection of T-5 Ecology-Lead Sites: 2012 Mid-Year Inspection
Date: July 11, 2012

INTRODUCTION

The attached inspection report form is provided in fulfillment of the semiannual inspection requirements for Terminal 5, Ecology Lead Sites RA1, RA2 and RA3 set forth in the Terminal 5 Operations and Maintenance Manual for Environmental Components (Onsite and JMN 1998)

SUMMARY OF FINDINGS

With the exception of several limited areas of asphalt cap damage and cracking the environmental components at the subject areas within Terminal 5 are performing as expected and are in acceptable condition. The localized areas of damage consist of asphalt "uplift" adjacent to the IY rails where they turn from the east-west to north-south alignment in the southern portion of the terminal (within the RA-2 area).

Another issue noted in this same area is the degradation of concrete supporting the fence posts for the fence dividing the IY entrance area from the rail area to the east. The concrete post footings have degraded and soil is being forced to surface; apparently by frost-heave. Other areas of cracking and asphalt uplift noted in the 2011 report have been addressed by the tenant.

The issues noted above are new. The tenant is coordinating with BNSF to address the asphalt issue. According to Eagle Marine, BNSF has recommended that the asphalt simply be rolled back into place, rather than repaired by removal/repaving. While this is probably satisfactory in terms of maintaining the pavement, it is likely the problem will re-occur until the underlying cause is assessed and corrected. The Port should follow up with the tenant as soon as possible to repair the fence posts.

6.6 Photo log

Photo 1: Restricted Railyard Area with Asphalt and Permeable Cover – from the north

Photo 2: Site Fencing and Security – from the south

Photo 3: Asphalt Condition in Vicinity of Rail Lines – from the south

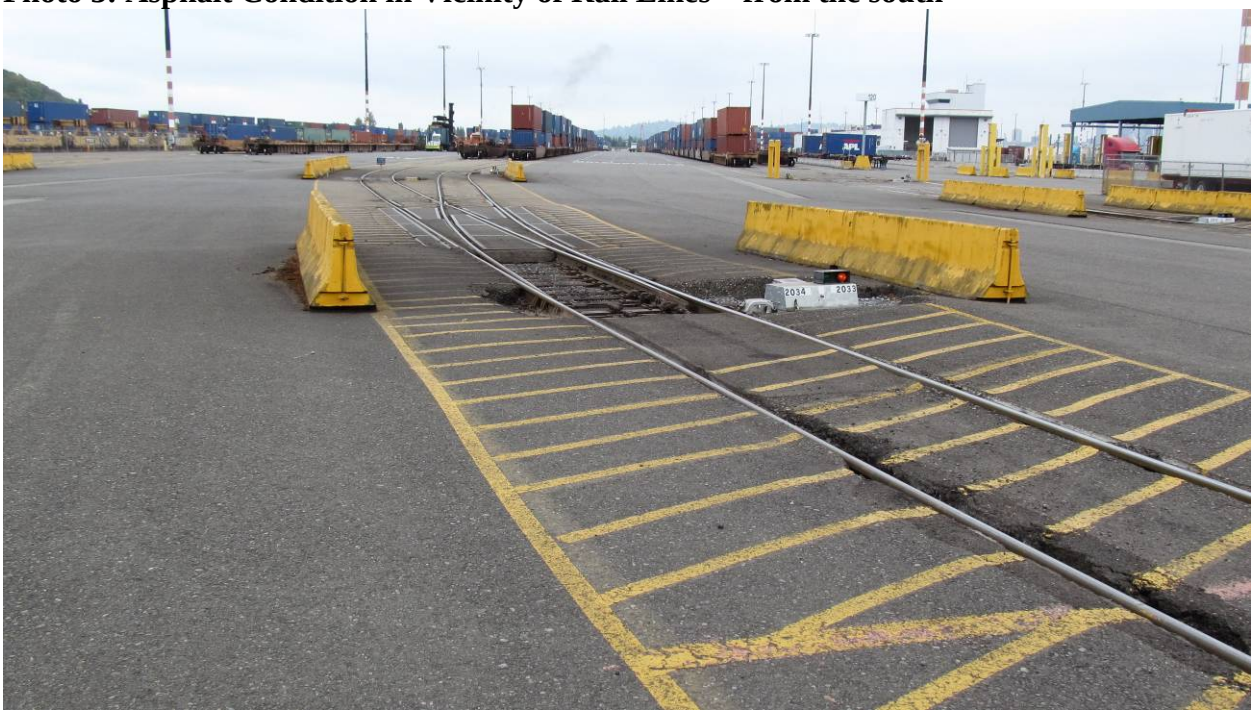
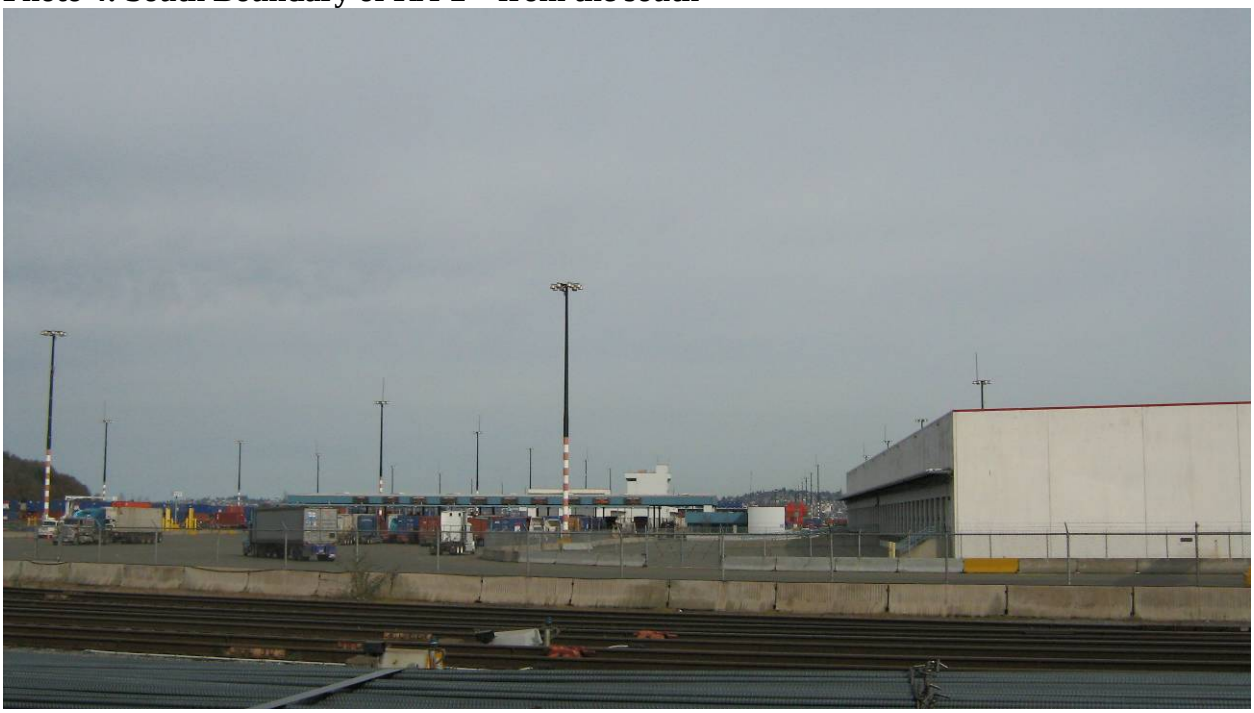


Photo 4: South Boundary of RA-2 – from the south



6.7 Restrictive Covenant

When Recorded Return To:

Christopher M. Carletti, Esq.
Preston Gates & Ellis
701 Fifth Ave., Suite 5000
Seattle, WA 98104

EXHIBIT C
RESTRICTIVE COVENANT

The property that is the subject of this Restrictive Covenant has been the subject of remedial action under Chapter 70.105D RCW. The work done to clean up the property (hereafter the "Cleanup Action") is described in the Consent Decree entered in State of Washington Department of Ecology v. Port of Seattle, King County Superior Court Cause No. 95 2-05455? and in attachments to the Decree and in documents referenced in the Decree. This Restrictive Covenant is required by Ecology under Ecology's rule WAC 173-340-440 (1991 ed.) because the Cleanup Action on the Site resulted in residual concentrations of total petroleum hydrocarbons, polychlorinated biphenyls, arsenic, lead, cadmium, and other hazardous substances which exceed Ecology's Method A and B cleanup levels for soil established under WAC 173-340-740(3). Method C and A industrial soil cleanup standards were used in the Cleanup Action. A closed municipal solid waste landfill and overlying soil and slag, including materials that exceed Method A and C cleanup standards, are contained on site under various covers. The property also contains a system of monitoring wells and a landfill gas collection and treatment system.

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The undersigned, Port of Seattle, is the fee owner of real property in the County of King, State of Washington (legal description attached), hereafter referred to as the "Site." The Site refers to the former Seattle Steel, Inc., property located in Seattle and bounded on the north by S. W. Florida Street; on the east by Burlington Northern railroad tracks; and on the west by Harbor Avenue S.W. The south boundary extends approximately 800 feet south of abandoned Hanford Street. The Port of Seattle makes the following declaration as to limitations, restrictions, and uses to which the Site 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 Site.

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Section 1. No groundwater may be taken for domestic purposes from any well in the area encompassed by the Port's Southwest Harbor Project, which includes the area bounded to the north by Elliott Bay, to the West by Harbor Avenue, to the south by Spokane Street, and to the East by the West Waterway.

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Section 2. Any activity on the Site that may interfere with the Cleanup Action is prohibited. Any activity on the Site that may result in the release to the environment of a hazardous substance that was contained as a part of the Cleanup Action is prohibited unless approved by Ecology or in compliance with the approved Operations and Maintenance Plan. Some examples of activities that are prohibited in the capped areas unless approved by Ecology or in compliance with the approved Operations and Maintenance Plan 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 3. The Site shall not be used for any activities other than traditional industrial uses, as described in RCW 70.105D.020(23), and defined in and allowed under the City of Seattle's zoning regulations.

Section 4. The owner of the Site must give written notice to the Department of Ecology, or to a successor agency, of the owner's intent to convey any interest in the Site. No conveyance of title, easement, lease or other interest in the Site shall be consummated by the owner without adequate and complete provision for the continued operation, maintenance and monitoring of the Cleanup Action.

Section 5. The owner must notify and obtain approval from the Department of Ecology, or from a successor agency, prior to any use of the Site that is inconsistent with the terms of this Restrictive Covenant. The Department of Ecology or its successor agency may approve such a use only after public notice and comment.

Section 6. The owner shall allow authorized representatives of the Department of Ecology or of a successor agency, the right to enter the Site at reasonable times for the purpose of evaluating compliance with the Cleanup Action Plan and the Consent Decree, to take samples, to inspect Cleanup Actions conducted at the Site and to inspect records that are related to the Cleanup Action.

Section 7. The owner of the Site and the owner's assigns and successors in interest reserve the right under WAC 173-340-440 (1991 ed.) to record an instrument which provides that this Restrictive Covenant shall no longer limit use of the Site or be of any further force or effect. However, such an instrument may be recorded only with the consent of the Department of Ecology, or of a successor agency. The Department of Ecology or a successor agency may consent to the recording of such an instrument only after public notice and comment.

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Dated: 6-19-95

Name: M.R. Dinsmore
Title: M.R. Dinsmore
For The Port of Executive Director

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

This is to certify that on the 19th day of June, 1995, before me, the undersigned Notary Public, personally appeared M.R. Dinsmore, to me known to be the Executive Director of the Port of Seattle described in and who executed the

foregoing document, and acknowledged to me that he signed and sealed the same as his free and voluntary act and deed, for the uses and purposes therein mentioned.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year first above written.

NOTARY PUBLIC
State of Washington
DIANA PARKER
Commission Expires April 9, 1998

NOTARY PUBLIC in and for the State of Washington, residing at Seattle
My Commission Expires: 4-9-98
Print Name: DIANA PARKER

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EXHIBIT A

THOSE PORTIONS OF BLOCKS 433, 437, 438, 439, 440 AND 442 IN SEATTLE TIDE LANDS; AND OF BLOCKS 439A, 440A, AND 442A IN HALLER'S SUPPLEMENTAL PLAT OF PORTIONS OF BLOCKS 428, 432, 433, 439, 440, 441, 442, SEATTLE TIDE LANDS, AS PER PLAT RECORDED IN VOLUME 12 OF PLATS, PAGE 9; RECORDS OF KING COUNTY; AND TRACTS A AND B IN PROSPECT TRACTS, AS PER PLAT RECORDED IN VOLUME 10 OF PLATS PAGE 13, RECORD OF KING COUNTY; AND LOTS 1 THROUGH 9 IN BLOCK 1 OF READ'S 1ST ADDITION TO THE CITY OF SEATTLE, AS PER PLAT RECORDED IN VOLUME 16 OF PLATS, PAGE 88, RECORDS OF KING COUNTY; AND OF 28TH AVENUE SOUTHWEST AS VACATED BY CITY OF SEATTLE ORDINANCE NOS. 86694 AND 93905; AND OF 29TH AVENUE SOUTHWEST AS VACATED BY CITY OF SEATTLE ORDINANCE NO 89246 AND 93905; AND OF SOUTHWEST HANFORD STREET AS VACATED BY CITY OF SEATTLE ORDINANCE NO 94599; AND OF SOUTHWEST LANDER STREET AS VACATED BY CITY OF SEATTLE ORDINANCE NO 93905, ALL IN SECTIONS 12 AND 13 OF TOWNSHIP 24 NORTH, RANGE 3 EAST, W.M., DESCRIBED AS FOLLOWS:

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BEGINNING AT THE INTERSECTION OF THE CENTERLINE OF SAID SOUTHWEST HANFORD STREET AS VACATED BY ORDINANCE NO 94599 WITH THE EAST MARGIN OF HARBOR AVENUE SOUTHWEST;
THENCE NORTHWESTERLY, ALONG SAID EASTERLY MARGIN OF HARBOR AVENUE SOUTHWEST, TO THE MOST WESTERLY CORNER OF LOT 1 IN SAID BLOCK 442 AND THE SOUTHERLY MARGIN OF SOUTHWEST FLORIDA STREET;
THENCE NORTH 76°42'13.5" EAST, ALONG SAID SOUTHERLY MARGIN, 382.167 FEET.
THENCE SOUTH 22°43'31" EAST, ALONG THE EASTERLY LINE OF THE PROPERTY CONVEYED IN DEED RECORDED UNDER RECORDING NO. 7208280278. A DISTANCE OF 932.61 FEET TO AN ANGLE POINT IN SAID EASTERLY LINE;
THENCE SOUTH 23°18'50" EAST, 1,002.01 FEET;
THENCE SOUTH 31°27'17" EAST, TO AN INTERSECTION WITH THE CENTERLINE OF SAID VACATED SOUTHWEST HANFORD STREET;
THENCE WESTERLY ALONG SAID CENTERLINE, TO AN INTERSECTION WITH THE CENTERLINE OF SAID VACATED 28TH AVENUE SOUTHWEST;
THENCE SOUTHERLY ALONG SAID CENTERLINE, TO AN INTERSECTION WITH THE EASTERLY PRODUCTION OF THE NORTH LINE OF LOT 40 IN SAID BLOCK 437;
THENCE WESTERLY, ALONG SAID NORTH LINE, TO THE NORTH-SOUTH CENTERLINE OF SAID BLOCK 437;
THENCE SOUTHERLY ALONG SAID NORTH-SOUTH CENTERLINE; TO THE NORTHEAST CORNER OF LOT 13 IN SAID BLOCK 437;

THENCE WESTERLY, ALONG THE NORTH LINE OF SAID LOT 13, TO THE NORTHWEST CORNER OF SAID LOT 13 ON THE EASTERLY MARGIN OF 29TH AVENUE SOUTHWEST;
THENCE NORTHERLY, ALONG SAID MARGIN, TO THE EASTERLY PRODUCTION OF THE SOUTH LINE OF LOT 9 IN BLOCK 1 OF SAID READ'S 1ST ADDITION;
THENCE WESTERLY, ALONG SAID PRODUCED LINE, TO THE SOUTHWEST CORNER OF SAID LOT 9 ON THE EASTERLY MARGIN OF HARBOR AVENUE SOUTHWEST;
THENCE NORTHERLY, ALONG SAID EASTERLY MARGIN, TO THE SOUTHERLY MARGIN OF SAID SOUTHWEST HANFORD STREET AS SHOWN ON SAID PLAT;
THENCE EASTERLY, ALONG SAID SOUTHERLY MARGIN, TO AN INTERSECTION WITH THE SOUTHERLY PRODUCTION OF THE EASTERLY LINE OF SAID HARBOR AVENUE SOUTHWEST AS ESTABLISHED BY ORDINANCE NO 92187;
THENCE NORTHERLY, ALONG SAID SOUTHERLY PRODUCTION, TO THE POINT OF BEGINNING;
SITUATE IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.
ALSO TOGETHER WITH AN EASEMENT FOR INGRESS, EGRESS AND UTILITIES AS DELINEATED IN INSTRUMENT RECORDED MAY 23, 1991 UNDER KING COUNTY RECORDING O. 9105230531;

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ALSO TOGETHER WITH AN EASEMENT FOR THE CONSTRUCTION, INSTALLATION, OPERATION, ILLUMINATION, MAINTENANCE AND REPAIR OF A SIGN AS DELINEATED IN INSTRUMENT RECORDED MAY 23 1991 UNDER KING COUNTY RECORDING NO 9105230532;

SITUATE IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

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