Ecology Cleanup Action Plan
Former Kaiser Aluminum Property
3400 Taylor Way
Tacoma, Washington

July 1, 2016

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TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

LIST OF ABBREVIATIONS AND ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BGS	Below Ground Surface
CAMU	Corrective Action Management Unit
CAP	Cleanup Action Plan
cPAH	Carcinogenic Polycyclic Aromatic Hydrocarbon
DCA	Disproportionate Cost Analysis
Ecology	Washington State Department of Ecology
FS	Feasibility Study
ft	Foot
ft^2	Square Foot
LDR	Land Disposal Restriction
MMP	Materials Management Plan
MTCA	Washington State Model Toxics Control Act
NPDES	National Pollutant Discharge Elimination System
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated biphenyl
Port	Port of Tacoma
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RI	Remedial Investigation
Site	Former Kaiser Aluminum Property
SPL	Spent Pot Lining
WAC	Washington Administrative Code
WSSA	Wet Scrubber Sludge Area
yd^3	Cubic Yards

1.0 INTRODUCTION

This cleanup action plan (CAP) describes the cleanup action at the former Kaiser Aluminum property (Site) located at 3400 Taylor Way in Tacoma, Washington (Figure 1). The 96-acre property is currently owned by the Port of Tacoma (Port). The purposes of this CAP are to describe the history and physical conditions at the Site, identify the Site-specific cleanup standards, identify the selected cleanup action, and describe monitoring to be conducted at the Site to document that cleanup has been completed. The following sections present a summary of the information specified by the Model Toxics Control Act (MTCA) regulations, WAC 173-340-380, to be included in the CAP. The information presented in this CAP is based on the evaluations and analyses developed and presented in the Remedial Investigation/Feasibility Study (RI/FS) report (Landau Associates 2012a). As documented in the RI/FS report, the cleanup action complies with WAC 173-340-350.

The Site is the subject of corrective action obligations under RCW 70.105 and the state Dangerous Waste Regulations, Chapter 173-303 WAC. As described below, Site dangerous waste obligations are being implemented through MTCA. Site remedial actions, including the RI/FS and CAP, are being conducted pursuant to the MTCA rules, Chapter 173-340 WAC, in accordance with the provisions of Agreed Order No. DE-5698 and the Consent Decree between the Port and the Washington State Department of Ecology (Ecology) to which this CAP is an exhibit. The planned cleanup includes incorporation of two interim action cleanups that were conducted at the Rod Mill Area Closed Landfill and in the Spent Pot Lining (SPL) Area, groundwater compliance monitoring, and institutional controls. As described in the RI/FS report, the Port and Ecology agreed that the main components of the cleanup actions would be conducted as approved interim actions to speed up the overall cleanup process in accordance with the Agreed Order. The RI/FS report was made available to the public by Ecology along with Interim Action Work Plans for the SPL Area (SPL IA Work Plan; Landau Associates 2013a) and the Rod Mill Area Closed Landfill (Rod Mill Area Closed Landfill IA Work Plan; Landau Associates 2013b). Following finalization and Ecology approval of the Interim Action Work Plans, the Port implemented interim action activities. Interim action activities are described in the SPL Area Interim Action Completion Report (Landau Associates 2014a) and the Rod Mill Area Closed Landfill Interim Action Completion Report (Landau Associates 2014b). This CAP will be provided for public review together with the Consent Decree. Following finalization of this CAP and the Consent Decree, the remaining components of the selected cleanup actions described in this CAP will be implemented by the Port.

The Port plans to redevelop the property for industrial uses. To facilitate redevelopment, a Materials Management Plan (MMP) was prepared to outline the approach and procedures for managing potentially contaminated soil, waste material, or groundwater encountered during construction activities; the MMP is an Appendix to this CAP. For routine activities involving limited subsurface disturbance (e.g.

utility trenching) the MMP shall be followed. For larger, non-routine construction projects at the Site involving subsurface disturbance, the Port shall submit for Ecology's review and approval a plan for the management of contaminated material that may be generated in the course of the project. Ecology's approval of such a plan shall not necessarily constitute a significant change to this CAP. For instance, mass grading, paving, utility installation and support building construction to convert the Site to terminal use would not constitute a significant change to the Site Cleanup Action Plan so long as the grading and building foundation work is done within the clean fill layer and the utility installation complies with the Material Management Plan.

1.1 SITE DESCRIPTION AND BACKGROUND

The site descriptions below provide information on site conditions prior to implementation of the interim actions described in Section 3.0. The Site encompasses approximately 96 acres of the Blair Hylebos Peninsula in Tacoma, Washington. The Hylebos Waterway is located northeast and the Blair Waterway is located to the southwest of the Site (Figure 1). From 1941 to 1947, the Department of Defense built and operated an aluminum smelter at the Site. In 1947, Kaiser Aluminum & Chemical Corporation (Kaiser Aluminum) purchased the Site and operated the aluminum production facility until 2001. In 2002, Kaiser Aluminum closed the plant and, in 2003, the Port purchased the smelter property from Kaiser Aluminum for redevelopment. Between 2003 and 2010, the Port demolished the smelter complex, shipped thousands of tons of waste to approved disposal, treatment, or recycling facilities, and placed a 2- to 6-foot (ft)-thick layer of structural fill on approximately 80 of the 96 acres.

Currently, all but two of the Kaiser Aluminum buildings (both used for offices) have been removed from the Site; subsurface structures, such as footings and slabs, are still in place and in most areas have been covered with soil and a layer of gravel. Aerial photographs of the Site in 2005 (prior to demolition of the buildings) and in 2010 (following demolition of the buildings) are shown on Figures 2 and 3, respectively. Current uses of the Site include staging of construction materials (primarily soil, crushed concrete, and asphalt) and short-term use by contractors for lay down and staging of materials. The Port is planning to redevelop the Site for other maritime-dependent uses.

The RI/FS described six target areas that are identified in the Agreed Order where previous investigations (and in some areas, remedial actions) had been conducted: the SPL Area; the Rod Mill Area Closed Landfill; the Former Rectifier Yard Area; the Former Log Yard Area; the Rod Mill Former Demister Oil Area; and the Rod Mill Former Stormwater Ditch, South and East Sides (shown on Figures 2 and 3). However, only the SPL Area, the Rod Mill Area Closed Landfill, and the Former Log Yard Area were identified in the RI/FS as areas requiring further remedial action. The RI/FS determined that no further remedial action was required in the Former Rectifier Yard Area, the Rod Mill Former Demister Oil Area,

and the Rod Mill Former Stormwater Ditch, based on the results of previously conducted investigations and/or interim remedial actions in these areas, as described in detail in Section 3.0 of the RI/FS report. Consequently, this CAP will address only those areas identified in the RI/FS as requiring further remedial action: the SPL Area, the Rod Mill Area Closed Landfill, and the Former Log Yard Area. All six target areas identified in the Agreed Order are described in the following sections. The CAP also addresses requirements that will continue to apply to the Wet Scrubber Sludge Area, which was remediated pursuant to the previous (1990) consent decree for the Site in Pierce County Cause No. 90-2-06209 C.

1.1.1 SITE HISTORY & OBLIGATIONS UNDER THE DANGEROUS WASTE REGULATIONS

In 1976 Congress passed the Resource Conservation and Recovery Act (RCRA), which created a legal framework for the generation, handling and disposal of hazardous waste. In 1980 the Environmental Protection Agency (EPA) adopted the first RCRA regulations, established the basic "cradle to grave" approach to hazardous waste management that exists today. The RCRA regulations, among other things, defined which substances constituted "hazardous waste" and set forth permitting other requirements for facilities generating and handling hazardous wastes.

Because spent pot lining generated by Kaiser was a listed hazardous waste under RCRA, the Kaiser Site, and specifically the area where the spent pot liner was managed (the SPL Area), became subject to permitting and other regulation when the RCRA rules were adopted. Kaiser originally submitted a RCRA Part A Permit Application to EPA on October 31, 1980 for the SPL Area. In early 1986, after Washington passed its own hazardous waste management law (RCW 70.105) and implementing regulations (Chapter 173-303 WAC), Ecology assumed regulation of the Kaiser facility from EPA. Ecology's Dangerous Waste regulations include the substantive provisions and requirements of the federal RCRA regulation, as well as additional "state-only" provisions. The state law and regulations do, however, contain some unique terminology; under Ecology's Dangerous Waste regulations RCRA hazardous wastes and "state-only" wastes are collectively referred to as "dangerous waste."

As an operational facility managing dangerous waste, but which did not have a final RCRA permit, Kaiser was considered an "interim status" facility under RCRA and the Dangerous Waste Regulations. As discussed in Section 1.1.2, both the SPL Area and another area, Building No. 65, were used for management of spent pot lining and related materials while the Kaiser facility was producing aluminum and, later, Building 65 was used as part of decommissioning activities for the smelter. Because a dangerous waste was managed in those areas, they constituted Dangerous Waste Management Units (DWMUs) subject to the permitting discussed above. Additionally, DWMUs are required to be "closed" once they cease being used to manage dangerous waste. As noted below, Kaiser undertook activities to "clean close" the SPL pad in 2002 ("clean closure" is defined under the regulations as removing hazardous waste and decontaminating

the unit). Upon purchase of the Site in 2003 the Port submitted a revised Part A Permit Application for the SPL Area (WAD 001882984) to Ecology, reflecting the transfer in ownership of the Site from Kaiser to the Port. In late 2006 and early 2007 the Port undertook activities to clean-close Building 65 during demolition of the smelter. In 2011 Ecology approved the closure plans for the SPL pad and Building 65.

Because the Kaiser facility included a DWMU, any releases of hazardous substances at the facility were subject to "corrective action," even if they were unconnected to the SPL Area or Building 65 and in completely different areas of the property. Areas where a release has occurred are Solid Waste Management Units (SWMUs) under the Dangerous Waste regulations. The areas discussed in Sections 1.1.2-1.1.7 are SWMUs. Corrective action under RCRA encompasses the same cleanup activities as "remedial action" under the federal cleanup law, CERCLA, and many state cleanup laws. Recognizing this fact, EPA allows states that have authorized RCRA programs to use their state cleanup laws for corrective action. In 1994, EPA authorized Ecology to use MTCA as the corrective action tool under the Dangerous Waste regulations [59 Fed. Reg. 55322-01 (Nov. 4, 1994)]. Ecology recently amended the Dangerous Waste regulations to also allow MTCA orders and consent decrees to serve as substitutes for RCRA corrective action and post closure permits.

Ecology has been using MTCA as the corrective action tool at the Kaiser Site since May 11, 2011 and, going forward, the Consent Decree and its related MTCA documents shall be the sole legal and administrative vehicles for implementing substantive obligations of the Dangerous Waste regulations applicable to the Site.

1.1.2 SPENT POT LINING (SPL) AREA

The SPL Area is located within the eastern portion of the Site, as shown on Figures 2 and 3. The SPL Area consists of a portion of the Site which was historically used to dismantle reduction cells and temporarily store SPL and potroom duct dust. From 1943 to 1967, the area was not paved and, for most of the earlier part of this period, the area was not at its present grade. In 1967, the SPL management facility was constructed in the SPL Area, and included a 19,500 square ft concrete pad, runoff sump, storage tanks, and associated piping. The approximate area that the SPL management facility encompassed is shown on Figures 2 and 3. From 1967 until 1985, SPL was temporarily stored on the SPL management facility pad until enough SPL was accumulated for shipment to an offsite disposal facility. During the latter portion of this time, SPL was considered a state-only dangerous waste[1]. A Part A Dangerous Waste Permit application identifying the SPL management facility as a regulated unit for storage of SPL prior to offsite shipment and

[1] SPL was not listed as a federal hazardous waste until 1989, after the SPL management facility had ceased operation.

disposal was submitted in about 1980 (Kaiser Aluminum 1980). In December 1985, Kaiser Aluminum removed all waste from the SPL management facility and ceased use of the facility, replacing it with an indoor facility (Building 65; Kaiser Aluminum 2003). Subsequently, Kaiser Aluminum reverted to generator status for management of SPL waste (Landau Associates 2004).

The SPL management facility, a Resource Conservation and Recovery Act (RCRA) regulated unit, was decommissioned by Kaiser Aluminum in late 2002, per an Ecology-reviewed closure plan (Landau Associates 2003a); Ecology approved the closure in 2011 (Ecology 2011a,b).

1.1.3 ROD MILL AREA CLOSED LANDFILL

The Rod Mill Area Closed Landfill is located within the southeast corner of the Rod Mill Area, southeast of the former Rod Mill building. In about 1980, this area was used by Kaiser Aluminum as a borrow source of sand; the excavated area was subsequently used for disposal of miscellaneous smelter wastes. Based on a review of aerial photographs, it appears that the landfill was covered and closed by Kaiser Aluminum by the mid-1980s. The materials in the Rod Mill Area Closed Landfill reportedly include anode butts, pitch, green cathode, coke, dirty ore, brick, mortar, rubber and plastic products, gutter dust, and general trash (Kennedy Jenks 2003). According to Kaiser Aluminum (Leber, B., 2005, personal communication), SPL is not known to have been placed in the Rod Mill Area Closed Landfill. The Rod Mill Area Closed Landfill was unlined and prior to the recent interim action, was covered with a thin veneer of soil and gravel.

1.1.4 FORMER RECTIFIER YARD AREA

The Former Rectifier Yard Area is located within the southern portion of the Site, as shown on Figures 2 and 3.

Previously, the Former Rectifier Yard Area was occupied by rectifying and voltage regulating transformers, transformer coolant storage tanks, an oil-water separator, a rail line, and related equipment and structures. The yard was the site of a transformer oil spill (leak) in 1986. Photos and former Kaiser Aluminum personnel have indicated that stained soil and gravel fill previously existed in this area of the Site and were removed and replaced (Landau Associates 2003b). As described in the RI/FS report, existing soil in the area meets the cleanup standards for the Site. Most of the area had already been filled with clean (meets MTCA industrial standards) compacted soil imported from other Port projects by the time the RI/FS was completed. Clean fill material was added to bring the remainder of the area up to the surrounding grade concurrent with the completion of the Closed Landfill and SPL Area interim actions. Ecology has monitored the work, after careful review of past soil and groundwater analytical data for the Former Rectifier Yard Area. No further remedial action is needed in this area.

1.1.5 FORMER LOG YARD AREA

The Former Log Yard Area is located within the northern portion of the Site, as shown on Figures 2 and 3. During the 1980s, this area was used for log sorting activities. In 2003/2004, the Port removed wood waste and slag from the Former Log Yard Area and added several feet of fill, primarily from the Port's Blair Waterway widening project. In 2007, the Port placed additional clean fill material from preload activities in other locations on the Site and a surface layer of gravel over the Former Log Yard Area in preparation for future site development. These previous soil cleanup and filling activities at the Former Log Yard Area were conducted with Ecology's concurrence and oversight. Currently, there is approximately 4 to 8 ft of clean fill over any remaining residual Asarco slag.

1.1.6 ROD MILL FORMER DEMISTER OIL AREA

The Former Demister Oil Area is located on the northern side of the former Rod Mill building. During operation of the Rod Mill, a demister that discharged onto the roof of the building reportedly caused oil staining of soil at two downspout locations. The stained area, formed because roof downspouts were disconnected from the buried stormwater piping system, consisted of an approximately 270-ft-long by 33-ft-wide unpaved area between the former building and paved drive lane to the north.

The roof drain system within this area included gutters and several downspouts that originally discharged to buried lateral pipes connected to a stormwater collection and conveyance piping system that was buried along the northern side of the Rod Mill building foundation. This stormwater piping system drained to the east and discharged into a monitoring impoundment located near the northeast corner of the Rod Mill Area. The impoundment discharged stormwater eastward into an offsite southward-draining channel that ultimately discharges to Hylebos Creek. The impoundment has been modified to be a rip-rap lined impoundment; it still serves as a stormwater monitoring point. The stormwater piping system that was located along the northern side of the Rod Mill building foundation was a separate system from the stormwater piping system that was located along the southern side of the building, although both systems discharged to the offsite drainage channel. It is unknown when the downspouts were disconnected from the buried stormwater piping system.

In 2008, the soil impacted by carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and diesel- and motor oil-range petroleum hydrocarbons was removed from the Former Demister Oil Area (Landau Associates 2009a) and, in late 2009 and early 2010, the area was regraded in connection with removal of the Rod Mill building foundation and sumps. No further remedial action is needed in this area.

1.1.7 ROD MILL FORMER STORMWATER DITCH, SOUTH AND EAST SIDES

The Former Stormwater Ditch Area was located to the south of the former Rod Mill building, in the middle of the Rod Mill Area. The southern segment of the ditch was approximately 630 ft long and drained stormwater runoff in a northeasterly direction. The eastern segment of the ditch was approximately 150 ft long and drained stormwater runoff in a southeasterly direction. The ditch segments intersected and a 40-ft-long combined ditch drained to the east into an offsite drainage channel that ultimately discharged to Hylebos Creek. In 2008, the cPAH-impacted soil from the base of the ditch was removed (Landau Associates 2009b) and, in late 2009 and early 2010, the area was filled and regraded in connection with removal of the Rod Mill building foundation and sumps. Stormwater from this area flows into the rip-rap lined impoundment described in Section 1.1.6. No further remedial action is needed in this area.

1.2 SITE CHARACTERIZATION

The environmental investigations conducted at the Site are summarized in the *Compilation Report, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington* (Compilation Report; Landau Associates 2011a) and the RI/FS report. The investigations characterized soil, waste, and groundwater conditions at the Site. The investigations of the Site included a review of the Site's industrial history to confirm that the investigations included all areas likely to have contamination; an evaluation of soil, waste, and groundwater conditions; and laboratory analysis of soil, waste, and groundwater. As discussed in Section 1.1, only the SPL Area, the Rod Mill Area Closed Landfill, and the Former Log Yard Area were identified in the RI/FS as areas requiring further remedial action. The RI/FS determined that no further remedial action was required in the Former Rectifier Yard Area, the Rod Mill Former Demister Oil Area, and the Rod Mill Former Stormwater Ditch, based on the results of previously conducted investigations and/or interim remedial actions in these areas. Therefore, only the SPL Area, the Rod Mill Area Closed Landfill, and the Former Log Yard Area are presented below and through the remainder of this CAP. SPL Area investigation locations are presented on Figure 4. Rod Mill Area Closed Landfill investigation locations are presented on Figure 5. Former Log Yard Area investigation locations are presented on Figure 6. The RI/FS identified preliminary cleanup levels for soil and groundwater; those cleanup levels are used in this CAP and are presented in Tables 1 and 2, respectively.

1.2.1 SPL AREA

Based on the data presented in the RI/FS, process wastes were present in the upper 0.5 to 4.5 ft of soil within and immediately adjacent to the SPL Area. The RI/FS estimated that black carbon waste generally constituted 50 percent or less of the soil/waste mixture in the observed test pits. Other waste materials observed in the SPL Area subsurface included concrete, refractory brick (or cooker brick), and

metal. A greenish-gray material, likely synthetic cryolite, with a moderate chemical odor was encountered in at least one of the test pits. Layers of white material, likely aluminum oxide (alumina), were observed in at least three of the test pits; however, the extent of this material appeared to be limited. Coal tar and petroleum fragments imbedded in the black carbon waste were encountered at some test pit locations. Analytical results for four samples of the SPL Area waste material showed that cyanide, a contaminant associated with SPL, and polycyclic aromatic hydrocarbons (PAHs), typically associated with SPL and other wastes including duct dust and gutter dust, were present in the waste material.

The RI/FS evaluation of the nature and extent of contaminated soil in the SPL Area was based on the analytical results for 19 soil samples collected below the waste material. Cyanide was not present in soil below the waste material at concentrations above the cleanup levels, but cPAHs were present in the soil at concentrations above the cleanup levels at some locations.

The evaluation of impacts to groundwater by the waste materials found in the SPL Area subsurface in the RI/FS was based on a comparison of analytical results for groundwater samples collected from monitoring wells located within, adjacent to, and downgradient of the SPL Area to cleanup levels. During the RI, cyanide was present in groundwater below the SPL Area, but the concentrations met the cleanup levels. cPAHs were present in the groundwater below the SPL Area at concentrations exceeding the cleanup levels; however, concentrations of cPAHs above the cleanup levels were not migrating off site.

1.2.2 ROD MILL AREA CLOSED LANDFILL

Based on the data presented in the RI/FS, waste materials consisting of black carbon waste (including anode fragments, petroleum coke, coal, and coal tar pitch), white waste (aluminum oxide and synthetic cryolite) and to a lesser extent concrete, refractory brick, wood, and rebar were present mixed with soil in the Rod Mill Area Closed Landfill. The depth of the waste material varied but was generally encountered in soil at depths ranging from 4.5 to 9.5 ft below ground surface (BGS). The size of the black carbon waste and concrete observed in the test pits ranged from gravel-sized fragments to cobble-and boulder-sized rubble. The vertical extent of the waste materials was estimated at locations where the pieces of black carbon waste and/or concrete were too large to remove with the excavator, indicating that anode butts and demolition debris are present. The RI/FS estimated that the percent of black carbon waste ranged from less than 5 percent to 75 percent.

The RI/FS evaluation of the nature and extent of contaminated soil in the Rod Mill Area Closed Landfill was based on the analytical results for soil samples collected below the waste material, soil samples collected from depth intervals where waste material was encountered, and soil samples in shallow soil located just outside the limits of the closed landfill. cPAHs and diesel-range petroleum hydrocarbons were present in the fill material below the landfill waste at concentrations above the cleanup levels. cPAHs were

also present in native material below the landfill at concentrations above the cleanup levels. No constituents were detected at concentrations above the cleanup levels in the soil samples collected outside the limits of (but adjacent to) the closed landfill.

The evaluation of impacts to groundwater by the waste materials found in the Rod Mill Area Closed Landfill in the RI/FS was based on a comparison of analytical results for groundwater samples collected from monitoring wells located within, upgradient, and downgradient of the Rod Mill Area Closed Landfill to the groundwater cleanup levels. During the RI, cPAHs, polychlorinated biphenyls (PCBs), and arsenic were detected in shallow groundwater directly below the Rod Mill Area Closed Landfill at concentrations exceeding the cleanup levels; however, cPAHs, PCBs, and arsenic were not detected at concentrations above the cleanup levels in shallow groundwater downgradient of the Rod Mill Area Closed Landfill during the RI. Total and dissolved arsenic were detected during the RI at concentrations above the cleanup levels in intermediate groundwater directly below the Closed Landfill, however, the concentrations of dissolved arsenic in downgradient wells were less than the cleanup level. Based on the results from the RI groundwater monitoring, groundwater contaminants from the Closed Landfill were not migrating off site.

1.2.3 FORMER LOG YARD AREA

As mentioned in Section 1.1.3, wood waste and slag was removed prior to the RI and the Former Log Yard Area was capped with clean soil fill material. Currently, there is approximately 4 to 8 ft of clean fill over any remaining residual Asarco slag. Below any remaining residual slag, fill materials consisting of poorly graded sand and dense gravel with sand and silt are present. Native material was reported as encountered at a depth prior to capping of approximately 10 ft BGS, except at one previous exploration, boring B9, located on the northern portion of the area, where native material was noted at 2.5 ft BGS. Current depth to native material is likely to be up to 17 ft.

Analytical results for soil samples collected in the upper foot of soil during previous investigations conducted prior to waste removal and placement of the clean cap material indicated that soil in the Former Log Yard Area contained copper and zinc at concentrations exceeding the cleanup levels for the protection of groundwater. Concentrations of copper and zinc did not exceed cleanup levels protective of direct contact and concentrations of these metals in groundwater were below preliminary groundwater cleanup levels (discussed below), which demonstrated that soil concentrations were protective of groundwater and, therefore, were protective of human health and the environment. The results also indicate that arsenic was present in the soil underlying the clean cap material at concentrations that exceeded the cleanup level protective of groundwater and direct human contact. Some or all of the soil represented by these samples may have been removed during removal of the wood waste and slag.

Analytical results for groundwater samples collected from direct-push borings during previous investigations indicated arsenic was present in shallow groundwater within the Former Log Yard Area at concentrations that exceeded the groundwater cleanup level. However, the arsenic concentrations in groundwater may have been biased high due to sampling methods. Analytical results for three shallow groundwater samples collected downgradient of the Former Log Yard Area during the RI indicated that concentrations of arsenic above the preliminary cleanup level were not migrating off site except possibly at the northern-most portion of the Site. The northern-most downgradient well, MW-101(S), may intersect groundwater migrating from the adjacent property to the north. Arsenic is known to be present under the cap and in groundwater at the OFA/Pennwalt area adjacent to the northern boundary of the Former Log Yard Area and, therefore, the source of arsenic in groundwater at MW-101(S) is likely to be off site. As indicated in the RI/FS Work Plan (Landau Associates 2012b), it was anticipated that groundwater at the location of MW-101(S) may be impacted by groundwater from the OFA/Pennwalt site; however, alternate locations for this well were constrained by planned future infrastructure work.

2.0 CLEANUP ACTION SELECTION

The RI findings were used in the FS to develop and evaluate remedial alternatives for cleanup of the Site. The RI/FS defines cleanup standards, identifies and evaluates cleanup action alternatives, and identifies a preferred cleanup action alternative that is protective of human health and the environment per MTCA requirements. The following sections describe the cleanup levels, points of compliance, and cleanup action alternatives developed and evaluated in the FS.

2.1 PROPERTY CLEANUP LEVELS

As discussed in the RI/FS report, soil cleanup levels were developed for the detected constituents in accordance with MTCA. These cleanup levels were developed based on the potential receptors and potential exposure pathways described in the RI/FS for all constituents detected during the RI and the 2008 supplemental investigation. Soil cleanup levels are protective of direct human contact and groundwater. Table 1 summarizes cleanup levels for soil. Because groundwater at the Site is near the surface, is unsuitable as a drinking water source, and discharges to marine water, the groundwater cleanup level is based on protection of surface water beneficial use. Groundwater cleanup levels are protective of human ingestion of marine organisms contaminated by releases of impacted groundwater from the Site to adjacent marine surface water and acute or chronic effects to aquatic organisms. Table 2 summarizes cleanup levels for groundwater.

2.2 POINT OF COMPLIANCE

Under MTCA, the point of compliance is the point or points where the cleanup levels must be attained. The point of compliance where soil cleanup levels protective of direct human contact must be attained is throughout the Site from the ground surface to 15 ft. below ground surface, in accordance with WAC 173-340-740(6)(d).

In accordance with WAC 173-340-720(8)(c), Ecology has determined that it is not practicable to meet this groundwater cleanup level within the SPL Area, the Rod Mill Area Closed Landfill, and the Former Log Yard Area portions of the Site within a reasonable restoration time frame. Therefore, conditional points of compliance for groundwater are authorized as close as practicable to the sources of groundwater contamination in these areas, not to exceed the property boundary. The downgradient groundwater monitoring wells at those locations are the points at which groundwater cleanup levels must be confirmed to have been attained.

2.3 EVALUATED ALTERNATIVE CLEANUP ACTIONS

The development of cleanup alternatives included analysis of technologies and process options potentially applicable to conditions at the Site. Potential general response actions and remedial technologies were identified based on the known site conditions, media impacted, contaminant types, and best professional judgment regarding applicable remedial technologies. The identified remedial technologies were screened in the FS on the basis of effectiveness, implementability, and cost. Screened technologies included institutional controls, containment, removal/excavation, and treatment.

Each of the cleanup action alternatives developed for the Site was developed to be protective of human health and the environment and consistent with the MTCA regulations. Each alternative is comprehensive and considers the Site and its future use as a whole, but may include the use of separate cleanup action technologies for the different areas of concern. Cleanup action alternatives were developed for the three cleanup action areas: the SPL Area, the Rod Mill Area Closed Landfill, and the Former Log Yard Area, as described below. Cleanup action alternatives were developed independently for each area, and one preferred alternative was selected for each area. Because the Site cleanup standards are based on industrial land use, each alternative includes an institutional control restricting land usage in the area to industrial. The alternatives developed for each cleanup action area represent an appropriate range of potentially applicable cleanup actions based on technical and economic considerations, Ecology's guidance on the preparation of an FS, and the remedial action objectives for the Site.

Selection of the cleanup action alternatives listed below over the other alternatives presented in the FS is primarily based on the following:

- Each of the selected preferred alternatives achieves the Remedial Action Objectives (RAOs) and each of the threshold requirements, uses permanent solutions to the maximum extent practicable, and provides for a reasonable restoration timeframe.
- Each of the selected preferred alternatives is compatible with the conceptual model of the Site and with potential future redevelopment of the Site.
- The selection of the excavation alternatives for the SPL Area and the Rod Mill Area Closed Landfill allows for removal of contaminants that could be a source for groundwater contamination, and will eliminate the need for long-term groundwater monitoring once it has been demonstrated that contaminated groundwater is not migrating off the Site and that concentrations are stable or declining. This may be demonstrated using a method described in Appendix D in Ecology Publication No. 05-09-091 (Ecology 2005).
- The selection of the excavation alternatives for the SPL Area and the Rod Mill Area Closed Landfill further mitigates the potential for future exposure to construction workers by permanently removing contaminated materials.

2.3.1 SPL AREA

The following Alternatives were developed and evaluated for the SPL Area:

- Alternative 1: SPL Area Partial Excavation, Capping, and Groundwater Monitoring.
- Alternative 2: SPL Area Total Excavation and Groundwater Monitoring.

Based on the results of the evaluation of alternatives conducted for the FS, including the disproportionate cost analysis (DCA), which compares the overall benefit of the alternative to the estimated cost, the preferred cleanup action alternative selected for the SPL Area is:

- Alternative 2: SPL Area Total Excavation and Groundwater Monitoring.

2.3.2 ROD MILL AREA CLOSED LANDFILL

The following Alternatives were developed and evaluated for the Rod Mill Area Closed Landfill:

- Alternative 1: Closed Landfill Area Partial Excavation and Capping, and Groundwater Monitoring
- Alternative 2: Closed Landfill Area Total Excavation and Groundwater Monitoring.

Based on the results of the evaluation of alternatives conducted for the FS, including the DCA, which compares the overall benefit of the alternative to the estimated cost, the preferred cleanup action alternative selected for the Rod Mill Area Closed Landfill is:

- Alternative 2: Closed Landfill Area Total Excavation and Groundwater Monitoring.

2.3.3 FORMER LOG YARD AREA

The FS develops and presents one alternative for the Former Log Yard Area, which consists of implementing institutional controls and groundwater monitoring, and utilizing the protection provided by the previous soil cleanup and the existing clean soil cap that is already placed over the entire area.

Based on the results of the evaluation of alternatives conducted for the FS, including the DCA, which compares the overall benefit of the alternative to the estimated cost, the preferred cleanup action alternative selected for the Former Log Yard Area is:

- Existing Clean Soil Cap and Groundwater Monitoring.

3.0 INTERIM ACTIONS COMPLETED SINCE THE FS

As described in Section 1.0, interim actions have been completed in the SPL Area and the Rod Mill Area Closed Landfill. The interim actions were performed by Clearcreek Contractors of Everett, Washington (Clearcreek) and took place between late spring 2013 and late fall 2013. The interim actions are consistent with the selected alternatives for the Site and were performed in general accordance with the SPL IA Work Plan (Landau Associates 2013a) and the Rod Mill Area Closed Landfill IA Work Plan (Landau Associates 2013b). Details of the completed interim actions are presented in interim action completion reports for the SPL Area (Landau Associates 2014a) and the Rod Mill Area Closed Landfill (Landau Associates 2014b). The purpose of the interim actions was to permanently remove (through offsite excavation and disposal) waste material associated with the SPL Area and Rod Mill Area Closed Landfill. They were implemented prior to completion of the CAP to improve the efficacy of the final cleanup in accordance with Article VII.D of the Agreed Order and to support Port development plans at the Site. These interim actions are summarized below, and are integrated into the cleanup action discussions presented in Section 4.0. The interim actions summarized below meet the complete excavation component of Alternative 2 for the SPL Area and Alternative 2 for the Rod Mill Area Closed Landfill.

3.1 SPL AREA

Waste materials and associated contaminated soil were excavated within the SPL Area as shown on Figure 7. Prior to excavation, the estimated extent of the SPL zone material to be removed was surveyed and staked in the field; the originally planned excavation area was approximately 2.1 acres in size (see Figure 7). However, Landau Associates' personnel and Clearcreek operators used visual observations during excavation, followed by confirmation soil sampling, to determine the actual lateral and vertical extent of the excavation. The final SPL excavation area was approximately 4.1 acres, as shown on Figure 7.

An initial attempt was made to remove and stockpile some of the visually cleaner near-surface soil for potential reuse as backfill material. However, sampling and analysis indicated that most of the stockpiled soil exceeded cPAH cleanup levels. Accordingly, all of the surficial soil overlying the SPL zone material was removed and disposed along with the other excavated material.

Construction observations and confirmation soil sampling during excavation identified conditions that required removal and disposal of a significantly greater amount of material than estimated, as described in the SPL Area Interim Action Completion Report (Landau Associates 2014a). The SPL excavation volume, based on Clearcreek's construction survey data, is estimated to be approximately 24,200 cubic yards (yd^3).

SPL is a K088-listed hazardous waste under federal hazardous waste regulations and Washington Dangerous Waste Regulations. The SPL zone material and associated contaminated soil in the SPL Area is remediation waste under RCRA. Ecology approved the SPL zone material in the SPL Area to be Corrective Action Management Unit (CAMU)-eligible remediation waste and specified treatment levels that the SPL zone material was required to meet before it was disposed at a Subtitle C hazardous waste landfill.

A total of approximately 38,800 tons of excavated material from the SPL Area was disposed at the Waste Management Subtitle C landfill in Arlington, Oregon between August 6, 2013 and November 14, 2013. Detailed disposal documentation is provided in the SPL Area Interim Action Completion Report (Landau Associates 2014a).

Compliance sampling is described in detail in the SPL Area Interim Action Completion Report and consisted of protection monitoring, performance monitoring, and confirmation monitoring. Excavation confirmation samples were collected from the bottom of the excavation area. Confirmation sample results were compared directly to the cleanup levels, and final confirmation sample results indicated that all soil with concentrations of cPAHs greater than the cleanup levels was removed.

Due to SPL Area excavation activities continuing into November and the presence of ponded water within a significant portion of the excavated area, the excavation was left open during the wet season and the excavation will be backfilled and graded when groundwater levels are lower.

The SPL Area was prepared for the wet season by:

- Maintaining the silt fencing previously installed along the Taylor Way fenceline.
- Regrading and hydroseeding the dredged soil stockpile.
- Constructing a surface water diversion berm and swale between the southern edge of the excavation area and the site access road, and excavating a drainage diversion swale across the access road to the monitoring impoundment located in the Rod Mill Area that is described in Section 1.1.6, to limit accumulation of stormwater runoff in the excavated area.
- Hydroseeding of selected exposed soil areas around the SPL Area excavation.

It is currently anticipated that future excavation backfilling will include placement of quarry spalls to raise the lower portion of the excavation above the water table, followed by placement and compaction of dredged soil from the adjacent stockpile to achieve desired backfill grades.

3.2 ROD MILL AREA CLOSED LANDFILL

Rod Mill Area Closed Landfill waste materials and associated contaminated soil were excavated within the approximately 0.9 acre area shown on Figure 8. Prior to excavation, the estimated extent of waste materials was surveyed and staked in the field; however, Landau Associates' personnel and

Clearcreek operators used visual observations during excavation, followed by confirmation soil sampling, to determine the actual lateral and vertical extent of the excavation.

An initial attempt was made to remove and stockpile some of the surficial overburden soil for potential reuse as backfill material; however, sampling and analysis indicated that the stockpiled soil exceeded cPAH cleanup levels. Thus, all the surficial overburden soil was removed and disposed along with the other excavated materials.

Excavation activities generally proceeded from south to north, and as anticipated, the base of the excavation typically extended slightly below groundwater level. About one-half foot of underlying soil was typically removed prior to conducting confirmation soil sampling. Based on confirmation sample results, additional excavation was conducted in two sampling grids (grids 1 and 13) to achieve soil cleanup levels.

The estimated excavation volume presented in the Rod Mill Area Closed Landfill IA Work Plan was about 12,300 yd^3; however, the actual Rod Mill Area Closed Landfill excavation volume, based on Clearcreek's construction survey data, was approximately 9,000 yd^3. The reduced excavation volume reflects the slightly smaller excavation area, the use of steeper temporary cut slopes, and removal of less soil underlying the closed landfill waste materials, as described in the Rod Mill Area Closed Landfill Interim Action Completion Report (Landau Associates 2014b).

Approximately 14,000 tons of Rod Mill Area Closed Landfill waste material and associated contaminated soil was disposed at the LRI Landfill and Recycling facility in Graham, Washington between August 6, 2013 and October 3, 2013. Detailed disposal documentation is provided in the Rod Mill Area Closed Landfill Interim Action Completion Report (Landau Associates 2014b).

Compliance monitoring is described in detail in the Rod Mill Area Closed Landfill Interim Action Completion Report and consisted of protection monitoring, performance monitoring, and confirmation monitoring. Excavation confirmation samples were collected from the sidewalls and the bottom of the excavation area. Confirmation sample results were compared directly to the site-specific cleanup levels, and final confirmation sample results indicated that all soil with concentrations of cPAHs greater than the cleanup level was removed.

Following receipt of Ecology's concurrence to proceed with backfilling excavation grids that met cleanup levels, the base of the excavation was backfilled with quarry spalls to bring the grade above the groundwater table and create a stable base prior to backfilling with soil. Approximately 3,000 tons of quarry spalls were placed within the excavation area. The excavation backfill material was placed to near final grades consistent with the Port's plans for future redevelopment, and graded to slope to the north to promote drainage of stormwater runoff toward the existing monitoring impoundment described in Section 1.1.6.

4.0 COMPONENTS OF THE CLEANUP ACTION

The selected cleanup actions for each area are listed in Section 2.3 above. The components of the selected alternatives for each of the three cleanup action areas are discussed in the following sections.

4.1 SPL AREA

The selected alternative, Alternative 2, includes complete excavation of the SPL waste material and associated contaminated soil in the SPL Area. As discussed in Section 3.1, this component of the selected cleanup action was completed during the interim action excavation activities. All material (SPL waste and impacted soil) with concentrations above the cleanup levels was excavated and disposed of off site. The completed excavation activities are detailed in the SPL Area Interim Action Completion Report (Landau Associates 2014a).

Because the interim action removed all SPL zone material and soil exceeding cleanup levels from the Site, there is no need for institutional controls other than restrictions limiting SPL Area use to industrial and prohibiting groundwater use. Because excavation of the SPL zone material and overlying and underlying contaminated soil has eliminated the source of contaminants to groundwater, it is anticipated that contaminant concentrations in groundwater will decrease following excavation activities. As described in Section 2.8.3 of the SPL Area Interim Action Completion Report (Landau Associates 2014a), two new shallow downgradient groundwater monitoring wells (MW-SPL1 and MW-SPL2) were installed by Holocene Drilling on February 28, 2014. The locations of the two new monitoring wells are near the property boundary adjacent to Taylor Way (see Figure 7) for groundwater compliance monitoring to confirm that groundwater samples continue to meet the cleanup levels and groundwater contaminants at concentrations above the cleanup levels are not migrating from the SPL Area.

The Port will collect groundwater samples following well development, with the samples analyzed for cPAHs, total cyanide, and weak acid dissociable (WAD) cyanide. After analytical results from the initial monitoring event have been received, the Port will discuss the appropriate future monitoring with Ecology. Upon completion of Year 5 monitoring, monitoring will be discontinued if the results show that concentrations are stable or declining and that contaminants are not migrating from the SPL Area. A Performance Groundwater Quality Monitoring Plan is provided in Appendix A and a Groundwater Monitoring Health and Safety Plan is provided in Appendix B.

4.2 ROD MILL AREA CLOSED LANDFILL

The selected alternative, Alternative 2, includes complete excavation of the Rod Mill Area Closed Landfill waste material and associated contaminated soil. As discussed in Section 3.2, this component of

the selected cleanup action was completed during the interim action excavation activities. All material (Rod Mill Area Closed Landfill waste and impacted soil) with concentrations above the cleanup levels was excavated and disposed of off site at LRI Landfill and Recycling in Graham, Washington. The completed excavation activities are detailed in the Rod Mill Area Closed Landfill interim action completion report (Landau Associates 2014b).

Because the interim action removed all Rod Mill landfill waste and soil exceeding cleanup levels from the Site, there is no need for institutional controls other than restrictions limiting the Rod Mill Area Closed Landfill use to industrial and prohibiting groundwater use. As described in the *Groundwater Monitoring Results and Recommendations, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington* Technical Memorandum (Groundwater Monitoring Technical Memorandum, Landau Associates 2013c), the Port collected groundwater samples at the four existing downgradient groundwater monitoring wells in the Rod Mill Area Closed Landfill following interim action excavation activities. The Port has performed a total of three groundwater monitoring events at downgradient wells MW-3(S) and MW-4(S) (two prior to and one following interim action excavation activities) and two groundwater monitoring events at downgradient wells MW-7(S) and MW-8(S) (one prior to and one following interim action excavation activities). cPAHs and PCBs have not been detected above laboratory reporting limits in any of the samples from these four wells. Arsenic has not been detected at a concentration above the cleanup level in the samples from these wells, except the 2008 sample from RM-MW-3(S). Arsenic concentrations in subsequent samples from that well have been less than the cleanup level. As described in the Groundwater Monitoring Technical Memorandum (Landau Associates 2013c), these results adequately demonstrate that groundwater potentially impacted by the Rod Mill Area Closed Landfill is not migrating off site. Additionally, as discussed in this CAP, the Rod Mill Area Closed Landfill interim action excavation removed all landfill waste material and impacted soil. The November 2013 groundwater samples were collected after the completion of the excavation activities. The completion of the interim action has eliminated the potential source of contamination from the Rod Mill Area Closed Landfill to the shallow aquifer. For these reasons, continued sampling downgradient of the Rod Mill Area Closed Landfill is not warranted.

As described in Sections 2.3 and 2.7.3 of the Rod Mill Area Closed Landfill Interim Action Completion Report (Landau Associates 2014b), the four downgradient groundwater monitoring wells at the Rod Mill Area Closed Landfill [MW-3(S), MW-4(S), MW-7(S), and MW-8(S)] were decommissioned by Holocene Drilling on February 28, 2014, as approved by Ecology on January 9, 2014 (Ecology 2014).

4.3 FORMER LOG YARD AREA

Institutional controls and groundwater monitoring will be implemented as part of the Former Log Yard Area cleanup action. Institutional controls will include an environmental covenant that will place restrictions on any future excavation work within the capped Former Log Yard Area. The institutional controls will also include a requirement for periodic (e.g., annual) inspection of the cap with cap repair to be conducted, as necessary, if damage is sustained from site industrial activity or natural events, a restriction of future Log Yard Area use to industrial, and a restriction against groundwater use. A draft Environmental Covenant is provided in Appendix C.

Groundwater monitoring will be implemented at the downgradient monitoring wells, the locations of which will constitute the conditional point of compliance for attainment of groundwater cleanup levels for the Former Log Yard Area. It is assumed that three groundwater monitoring events will be conducted at three downgradient monitoring wells during the first 5 years following the approval of this CAP (Year 1, Year 2, and Year 3) and that additional groundwater monitoring events will be conducted in Year 5. Groundwater monitoring frequency and the number of wells monitored may be adjusted if appropriate, based on the results of monitoring, with the approval of Ecology. For example, if groundwater concentrations in a well meet cleanup levels, monitoring of that well may be terminated. Upon completion of Year 5 monitoring, monitoring will be discontinued if the results show that concentrations are stable or declining and that contaminants are not migrating from the Former Log Yard Area. A Performance Groundwater Quality Monitoring Plan is provided in Appendix A.

4.4 COMPLIANCE WITH MODEL TOXICS CONTROL ACT THRESHOLD REQUIREMENTS

The cleanup actions described above comply with MTCA threshold requirements, including protection of human health and the environment, compliance with cleanup standards associated with a site cleanup, compliance with applicable state and federal laws, and inclusion of a provision for compliance monitoring. The cleanup actions protect human health and the environment through permanent measures to control potential exposure to contaminated waste material and soil. The cleanup actions incorporate the interim action excavations conducted in the SPL Area and the Rod Mill Area Closed Landfill, incorporate the existing cap in the Former Log Yard Area, and implement groundwater compliance monitoring in the SPL Area and the Former Log Yard Area to demonstrate compliance with the established cleanup levels for the Site. Cleanup levels will be achieved at the points of compliance upon completion of the cleanup action. The cleanup actions will be conducted in compliance with applicable local, state, and federal laws. Protection, performance, and confirmational monitoring programs will be implemented to verify adequate

protection of human health and the environment during and after property development to confirm compliance with the cleanup standards.

4.5 COST

The estimated costs for each of the selected alternatives in the three cleanup action areas are presented in detail in the RI/FS. Since the interim action excavations have already been completed in the SPL Area and the Rod Mill Area Closed Landfill, the costs associated with those portions of each alternative are no longer applicable. The estimated costs for each of the three cleanup action areas are summarized below. This is a feasibility study level estimate and the actual costs may be as much as 30 percent less or 50 percent greater than the estimate.

- SPL Area Post-Excavation Groundwater Monitoring: $30,800
- Rod Mill Area Closed Landfill Post-Excavation Groundwater Monitoring: $0
- Former Log Yard Area Institutional Controls and Groundwater Monitoring: $80,000.

These costs, along with the cost for implementing an environmental covenant on the property limiting Site use to industrial, are summarized in Table 3. Table 3 will be used in evaluation of the need for financial assurance and as the basis for the cost estimate for remedial action required under the Agreed Order (Section VII.R.8).

4.6 JUSTIFICATION FOR THE SELECTED CLEANUP ACTION

The cleanup actions for the Site effectively and permanently protect human health and the environment by:

- Protecting human health by preventing direct contact with contaminated waste material and soil through excavation, and through maintenance of the Former Log Yard Area cap.
- Removing contaminated waste material and soil with concentrations greater than the cleanup levels from the SPL Area and Rod Mill Area Closed Landfill and disposing off site (in accordance with applicable regulatory requirements; accomplished through completion of the interim action excavations).
- Providing for groundwater compliance monitoring in two cleanup action areas (SPL Area and Former Log Yard Area).
- Providing for institutional controls in the Former Log Yard Area.
- Providing for institutional controls in the SPL Area and Rod Mill Area Closed Landfill restricting land use to industrial.

The cleanup action will effectively achieve the Site cleanup standards; further limit the potential for exposure to contaminated waste material, soil, and groundwater; and provide permanent protection of human health and the environment from potential risks posed by the Site.

5.0 WET SCRUBBER SLUDGE AREA

A portion of the Site was previously used by Kaiser to dispose of sludge generated by air emissions control equipment at the smelter that contained cPAHs. This area, known as the Wet Scrubber Sludge Area (WSSA), was the subject of a 1990 MTCA consent decree between Kaiser and Ecology (the "WSSA Decree"). The Consent Decree to which this CAP is an exhibit supersedes the WSSA Decree, and consequently this CAP supersedes the remedial action plan attached to the WSSA Decree.

Under the WSSA Decree Kaiser consolidated material, covered some areas with geotextile, capped it with one to two feet of clean soil, and instituted monitoring plans for area groundwater and the soil cap. In the years since the WSSA Decree was entered, groundwater monitoring never revealed any exceedances of applicable cleanup levels. Additionally, the Site has undergone a number of physical and operational changes since the WSSA Decree was entered.

At the time of the WSSA Decree's entry Kaiser was still operating at the Site and the WSSA was within the fenced grounds of the active industrial facility. Based on the nature of the capping remedy and then-current operations at the Site, the WSSA Decree required the following for the WSSA after completion of remedial construction:

- Record a restrictive covenant for the WSSA providing notice of the contaminated material contained there, and prohibiting residential use of the area;
- Make no use without Ecology approval of the portions of the WSSA covered with geotextile;
- Erect barriers (e.g. fences) restricting access to the areas covered with geotextile;
- Post signage prohibiting disturbance of the capped areas;
- Inspect the soil caps on a quarterly basis;
- Institute a groundwater monitoring plan.

Subsequent to the Port's purchase of the Kaiser Site the buildings on the Site were demolished and several feet of additional clean material was added to the clean soil cap in the WSSA. In contrast to the original thin (1'-2') cap originally placed on the WSSA, the additional clean soils at the Site result in a cover thick enough to protect the cap from normal wear and tear and prevent any uncontrolled release of wet scrubber sludge. Based on these facts, signage is no longer needed to provide notice of the covered and capped area, the cap inspection program is no longer required, and Ecology approval is not needed for uses of the WSSA, other than uses that would compromise the integrity of the cap. As noted above, groundwater monitoring revealed no exceedances of applicable cleanup levels and, therefore, groundwater monitoring for the WSSA is no longer necessary. The only ongoing remedial action applicable to the WSSA is compliance with the provisions of the Environmental Covenant, a draft of which is provided in Appendix C. The Environmental Covenant will carry forward the provisions of the original restrictive covenant for the WSSA.

6.0 APPLICABLE STATE AND FEDERAL LAWS

In accordance with MTCA, all cleanup actions conducted under MTCA must comply with applicable state and federal laws, WAC 173-340-710(1). MTCA defines applicable state and federal laws to include legally applicable requirements and those requirements that are relevant and appropriate. Collectively, these requirements are referred to as applicable or relevant and appropriate requirements (ARARs). This section provides a brief overview of potential ARARs for the cleanup of the SPL Area, Rod Mill Area Closed Landfill, and Former Log Yard Area. ARARs that may be applicable to the cleanup action include the following:

- Washington Water Pollution Control Act and the following implementing regulations: Water Quality Standards for Surface Waters (Chapter 173-201A WAC).
- Washington Hazardous Waste Management Act [Chapter 70.105 Revised Code of Washington (RCW)] and its implementing regulations: Dangerous Waste Regulations (Chapter 173-303 WAC).
- Washington Solid Waste Management Act (Chapter 70.95 RCW) and its implementing regulations: Criteria for Municipal Solid Waste Landfills (Chapter 173-351 WAC).
- Hazardous Waste Operations (Chapter 296-843 WAC).
- Federal Clean Water Act National Pollutant Discharge Elimination System (NPDES) Permit and State Construction Stormwater General Permit.
- Tacoma Municipal Code.
- Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 WAC).
- Federal Toxic Substances Control Act (15 U.S.C. §2601 et seq. (1976)).

The generation, handling, and disposal of hazardous waste, and waste management activities at facilities that treat, store, or dispose of hazardous wastes are addressed by RCRA Subtitle C (Hazardous Waste Management). RCRA regulates solid wastes that are hazardous because they may cause or significantly contribute to an increase in mortality or serious illness, or that pose a substantial hazard to human health or the environment when improperly managed. In Washington State, RCRA is implemented by Ecology under the State's Dangerous Waste Regulations (Chapter 173-303 WAC).

RCRA, through Land Disposal Restrictions (LDRs) in 40 CFR Part 268, restricts the land disposal of hazardous waste by establishing minimum treatment standards. If the waste would be determined to be a federal hazardous waste, then the waste must be evaluated to determine if it meets (or can be treated to meet) current land disposal restrictions, prior to selection of offsite disposal facilities. SPL is a K088-listed hazardous waste under federal hazardous waste regulations and Washington Dangerous Waste Regulations; therefore, disposal of media containing SPL is also restricted.

7.0 IMPLEMENTATION SCHEDULE AND RESTORATION TIMEFRAME

Groundwater monitoring at conditional points of compliance downgradient from the SPL Area and the Former Log Yard Area will be initiated following finalization of the Consent Decree. Groundwater compliance monitoring will be performed in accordance with the Performance Groundwater Quality Monitoring Plan provided in Appendix A. Institutional controls will be implemented upon approval of the CAP. A draft Environmental Covenant is provided in Appendix C.

The restoration timeframe is expected to be the time at which groundwater monitoring is completed. Institutional controls and groundwater compliance monitoring will go into effect following approval of the CAP and the issuance of a new Consent Decree.

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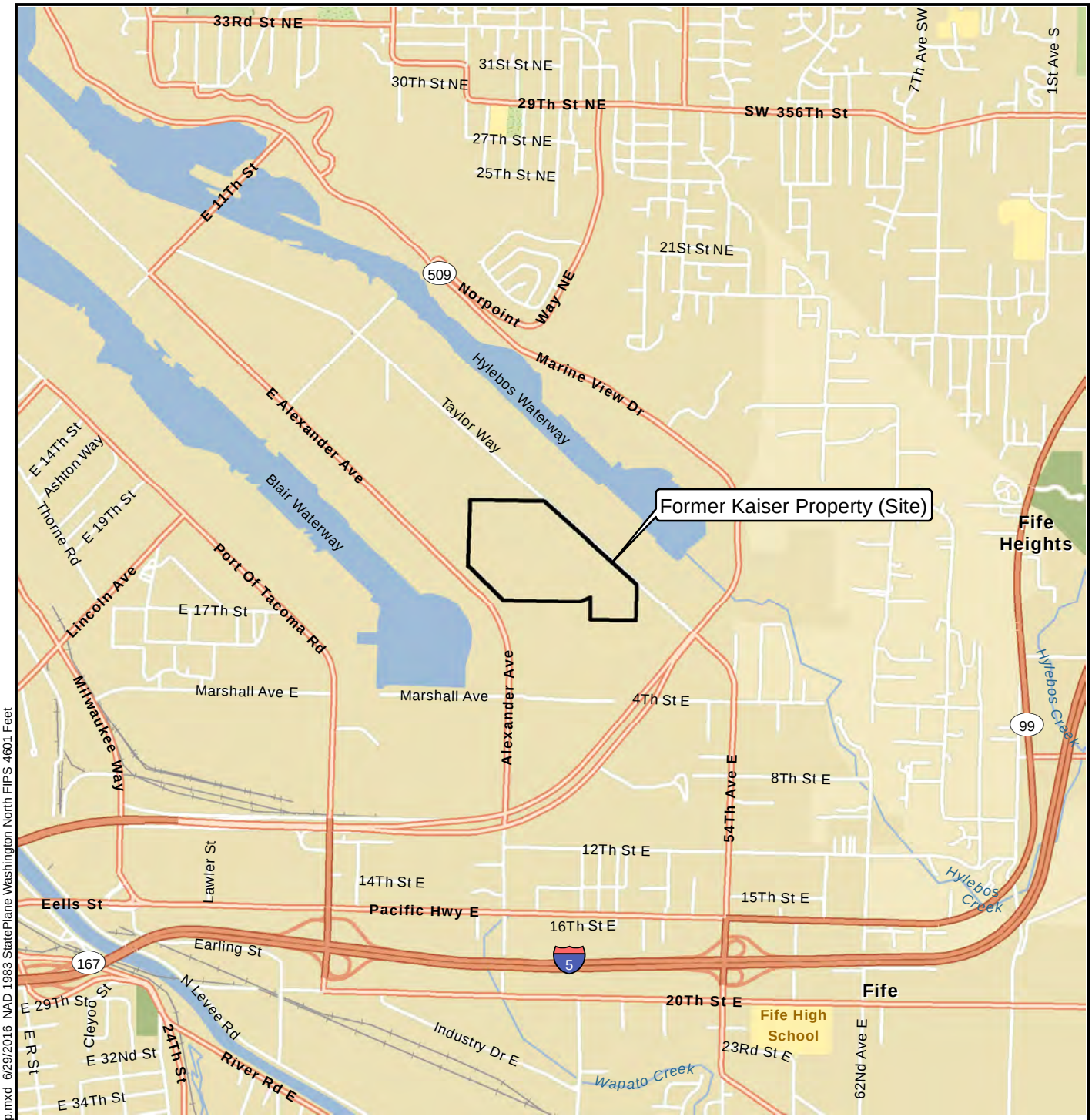

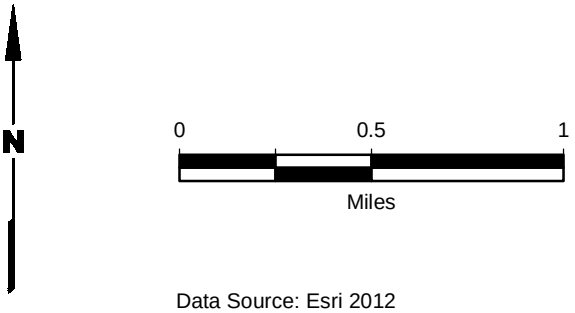

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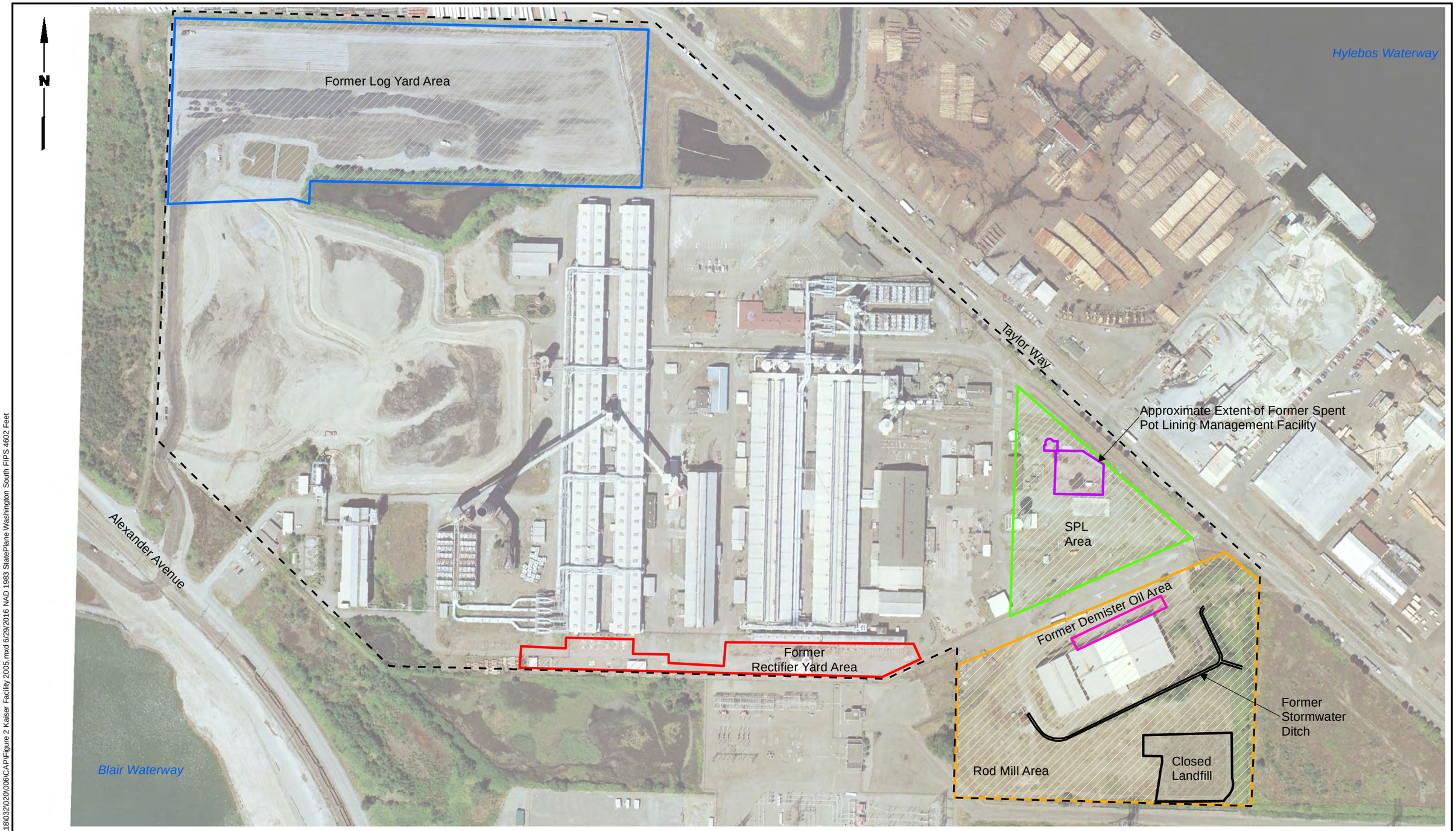
LANDAU ASSOCIATES

Kaiser CAP Report Tacoma, Washington	**Vicinity Map**	Figure 1



G:\Projects\118\032\020\006\CAP\Figure 2 Kaiser Facility 2005.mxd 6/29/2016 NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

Site Boundary

0 250 500

Scale in Feet

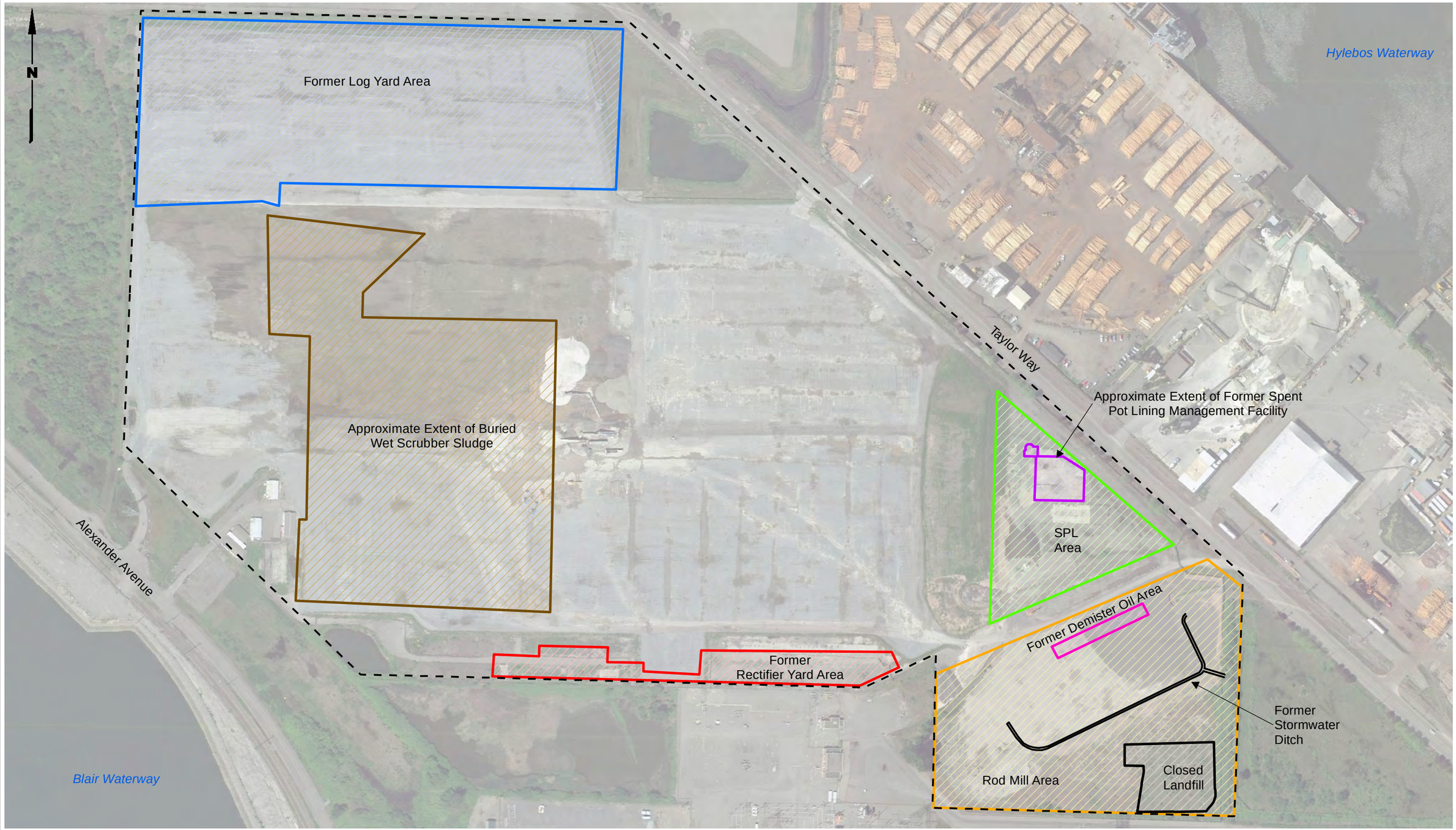
Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Bing Aerials 2005; Pierce County Assessor

LANDAU ASSOCIATES

Kaiser CAP Report Tacoma, Washington	**Site Plan with Historical Site Features**	Figure 2



G:\Projects\118\032\020006\CAP\Figure 3 Kaiser Facility 2010.mxd 6/29/2016 NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

Site Boundary

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Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

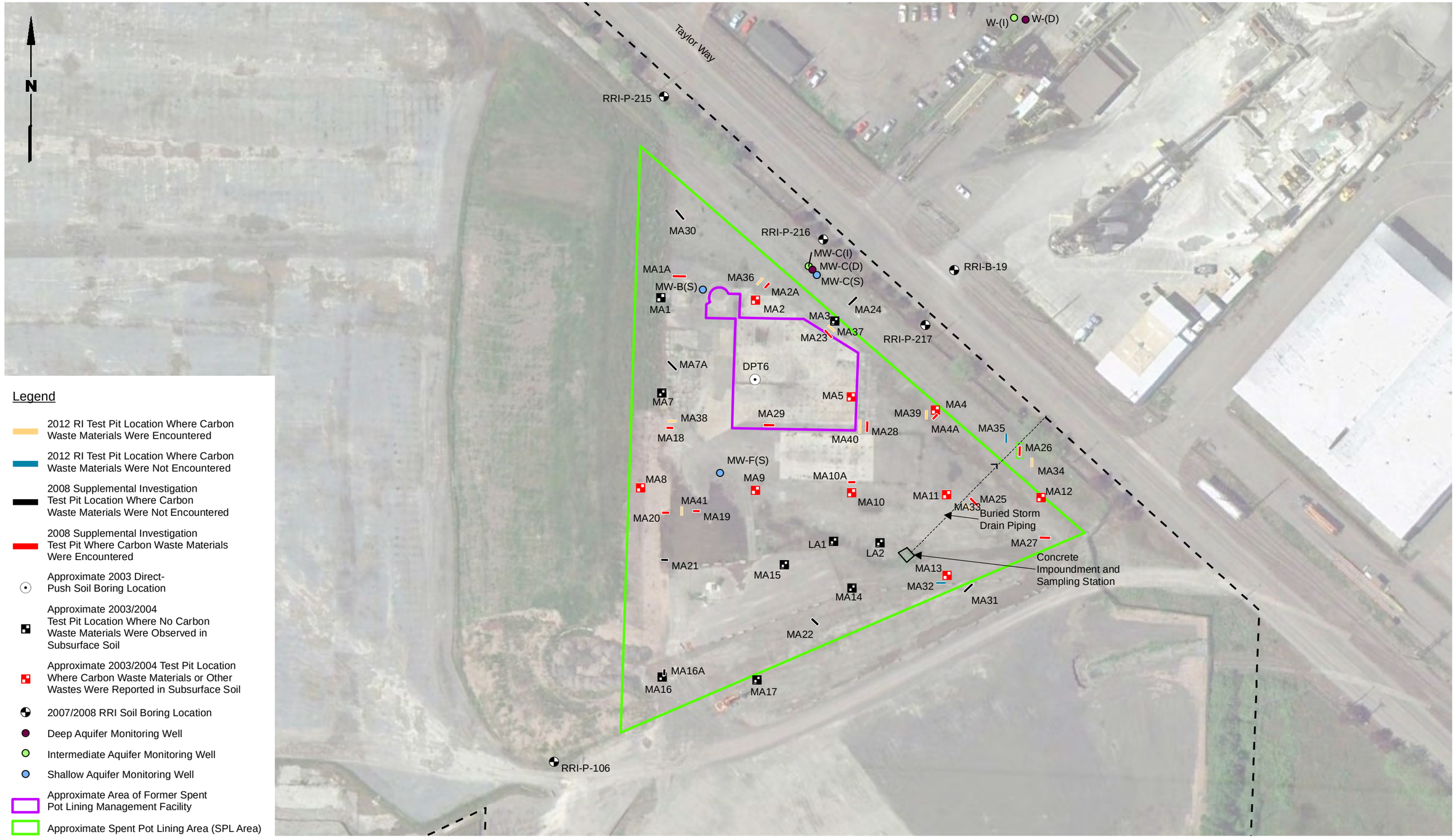
Data Source: Jacobs Engineering; Pierce County Assessor; Google Earth Pro 2010

LANDAU ASSOCIATES

Kaiser CAP Report
Tacoma, Washington

Current Site Plan

Figure
3



Legend

- 2012 RI Test Pit Location Where Carbon Waste Materials Were Encountered
- 2012 RI Test Pit Location Where Carbon Waste Materials Were Not Encountered
- 2008 Supplemental Investigation Test Pit Location Where Carbon Waste Materials Were Not Encountered
- 2008 Supplemental Investigation Test Pit Where Carbon Waste Materials Were Encountered
- Approximate 2003 Direct-Push Soil Boring Location
- Approximate 2003/2004 Test Pit Location Where No Carbon Waste Materials Were Observed in Subsurface Soil
- Approximate 2003/2004 Test Pit Location Where Carbon Waste Materials or Other Wastes Were Reported in Subsurface Soil
- 2007/2008 RRI Soil Boring Location
- Deep Aquifer Monitoring Well
- Intermediate Aquifer Monitoring Well
- Shallow Aquifer Monitoring Well
- Approximate Area of Former Spent Pot Lining Management Facility
- Approximate Spent Pot Lining Area (SPL Area)
- Site Boundary

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

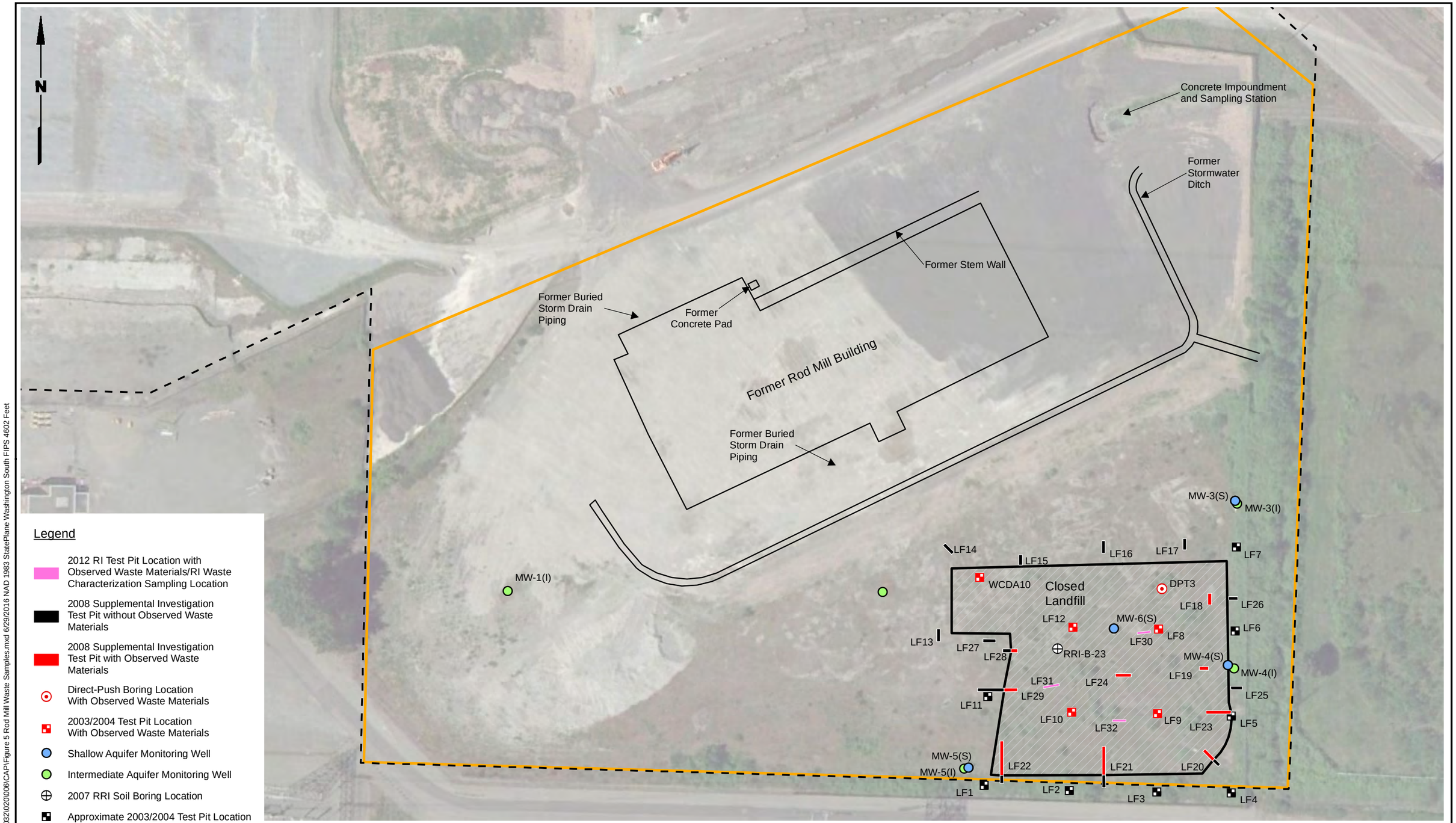
0 100 200
Scale in Feet

Data Source: Port of Tacoma; Jacobs Engineering; Pierce County Assessor; Google Earth Pro 2010

LANDAU ASSOCIATES

Kaiser CAP Report Tacoma, Washington	**SPL Area RI and Previous Investigation Locations**	Figure 4

Document Path: G:\Projects\118\032\020\006\CAP\Figure 4 Kaiser SPL Test Pit Locations.mxd



Legend

- 2012 RI Test Pit Location with Observed Waste Materials/RI Waste Characterization Sampling Location
- 2008 Supplemental Investigation Test Pit without Observed Waste Materials
- 2008 Supplemental Investigation Test Pit with Observed Waste Materials
- Direct-Push Boring Location With Observed Waste Materials
- 2003/2004 Test Pit Location With Observed Waste Materials
- Shallow Aquifer Monitoring Well
- Intermediate Aquifer Monitoring Well
- 2007 RRI Soil Boring Location
- Approximate 2003/2004 Test Pit Location
- Rod Mill Area
- Site Boundary

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 80 160

Scale in Feet

Data Source: Google Earth Pro 2010; Pierce County Assessor

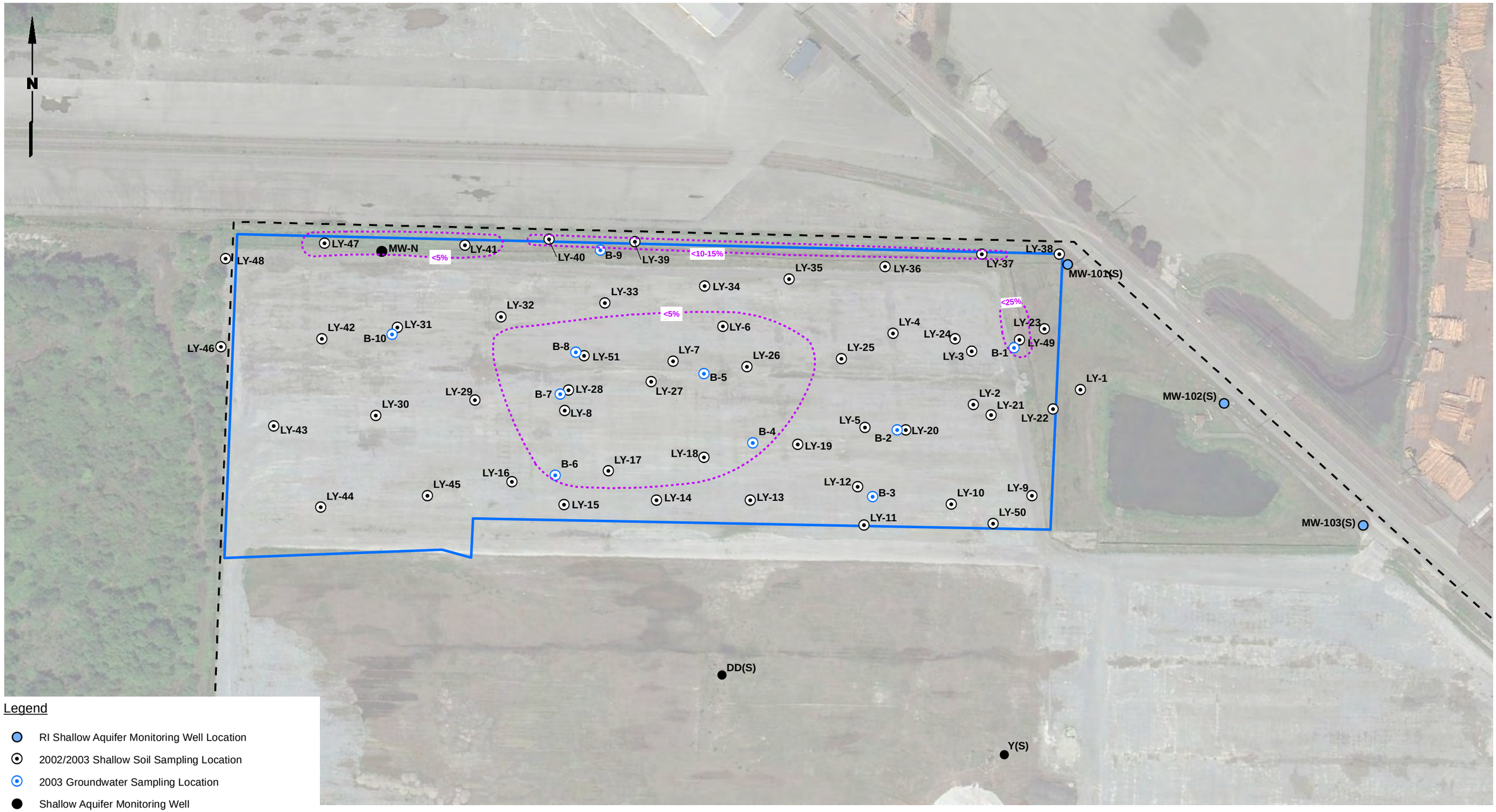
LANDAU ASSOCIATES

Kaiser CAP Report
Tacoma, Washington

Rod Mill Area Closed Landfill RI and Previous Investigation Locations

Figure 5

G:\Projects\118\032\020006\CAP\Figure 5 Rod Mill Waste Samples.mxd 6/29/2016 NAD 1983 StatePlane Washington South FIPS 4602 Feet



Legend

- RI Shallow Aquifer Monitoring Well Location
- 2002/2003 Shallow Soil Sampling Location
- 2003 Groundwater Sampling Location
- Shallow Aquifer Monitoring Well
- Approximate Contour of Slag Material Observed in Surface and Shallow Subsurface Soil at >1% Abundance (Abundance is Based on a Visual Assessement)
- Former Log Yard Area
- Site Boundary

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Google Earth Pro Aerial Image 2010; Kennedy/Jenks

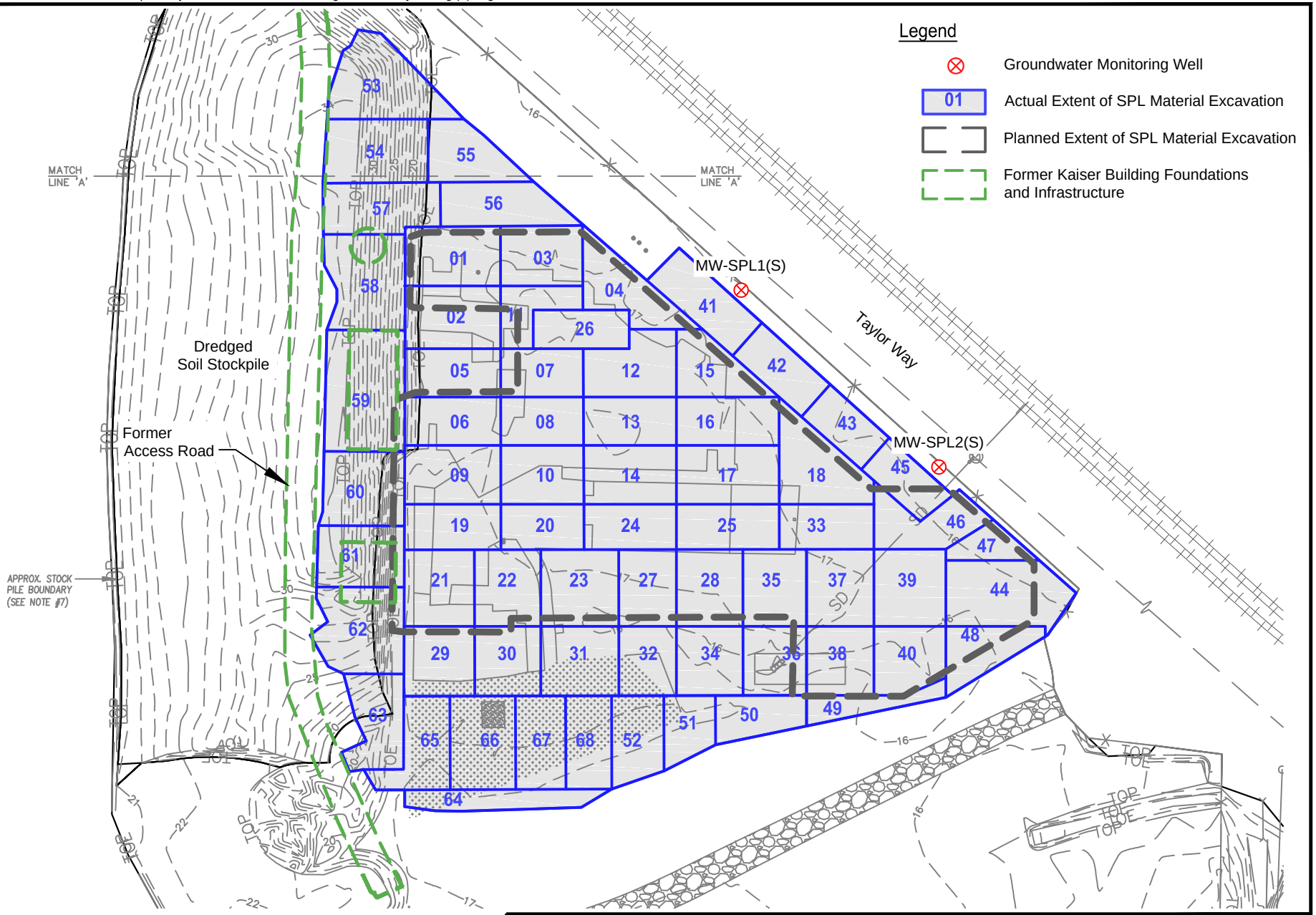
0 150 300

Scale in Feet

LANDAU ASSOCIATES

Kaiser CAP Report Tacoma, Washington	**Former Log Yard Area RI and Previous Investigation Locations**	Figure 6

G:\Projects\1180\32\020\006\CAP\Figure 6 Former Log Yard Area Previous Exploration.mxd 6/29/2016 NAD 1983 StatePlane Washington South FIPS 4602 Feet



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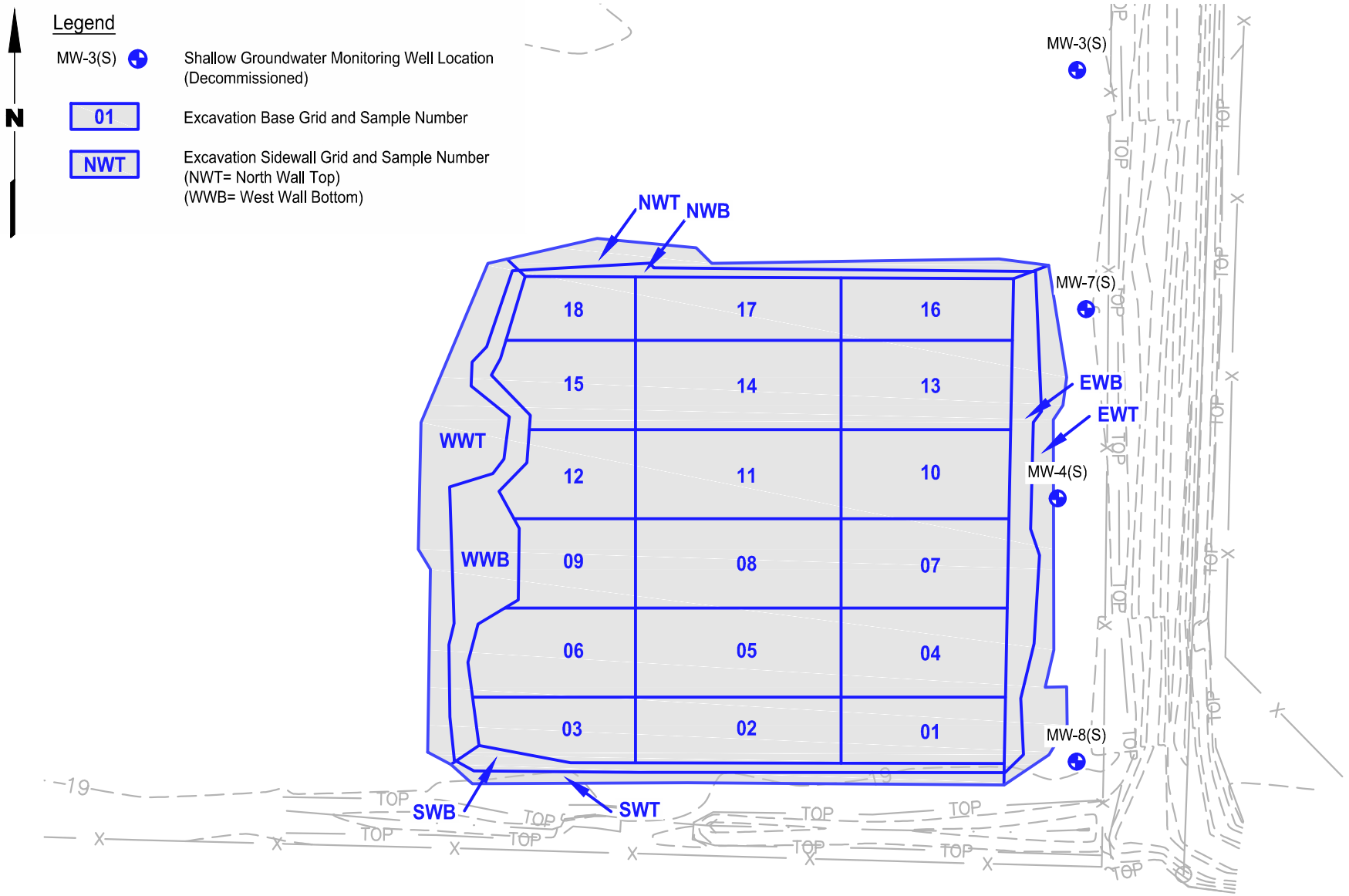
Kaiser CAP Report
Tacoma, Washington

SPL Area Interim Action and Groundwater Monitoring Well Locations

Figure 7



0 50 100
Scale in Feet

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Kaiser CAP Report
Tacoma, Washington

Rod Mill Area Closed Landfill Interim Action

Figure 8

TABLE 1
SOIL CLEANUP LEVELS FOR DETECTED CONSTITUENTS
KAISER CAP REPORT
TACOMA, WASHINGTON

Constituent	MTCA Method C Cleanup Level
METALS (mg/kg)	
Arsenic	20
Copper	36
Chromium (a)	1,000,000
Lead	1,000
Zinc	100
PAHs (µg/kg)	
Benzo(a)pyrene	350
Benzo(a)anthracene	130
Benzo(b)fluoranthene	440
Benzo(k)fluoranthene	440
Chrysene	140
Dibenzo(a,h)anthracene	640
Indeno(1,2,3-cd)pyrene	1,200
Total cPAH - benzo(a)pyrene TEQ (b)	2,000
PCBs (mg/kg)	
Total PCBs	2.0
PETROLEUM HYDROCARBONS (mg/kg)	
Diesel-Range Organics	2,000
Oil-Range Organics	2,000
Mineral Oil-Range Organics	4,000
CONVENTIONALS (mg/kg)	
Cyanide	3,200

(a) Cleanup levels are for Chromium III.

(b) A toxicity equivalency quotient (TEQ) will be calculated for each sample containing carcinogenic PAHs above reporting limits and compared to the benzo(a)pyrene cleanup level in accordance with 173-340-708(8)(e).

TABLE 2
GROUNDWATER CLEANUP LEVELS FOR DETECTED CONSTITUENTS
KAISER CAP REPORT
TACOMA, WASHINGTON

Constituent	MTCA Method B Cleanup Level
VOLATILES (µg/L)	
1,1-Dichloroethane	--
1,2,4-Trimethylbenzene	--
1,3,5-Trimethylbenzene	--
2-Butanone	--
4-Isopropyltoluene	--
4-Methyl-2-Pentanone (MIBK)	--
Acetone	--
Benzene	23
Carbon Disulfide	--
Chloroform	283
Ethylbenzene	2,100
Isopropylbenzene	--
m,p-Xylene	--
Methylene Chloride	590
Naphthalene	4,900
n-Butylbenzene	--
n-Propylbenzene	--
o-Xylene	--
sec-Butylbenzene	--
Toluene	15,000
Total xylene	--
Vinyl Chloride	2.4
PAHs (µg/L)	
1-Methylnaphthalene	--
2-Methylnaphthalene	--
Acenaphthene	640
Acenaphthylene	--
Anthracene	26,000
Benzo(g,h,i)perylene	--
Dibenzofuran	--
Fluoranthene	90
Fluorene	3,500
Naphthalene	4,900
Phenanthrene	--
Pyrene	2,600
cPAHs (µg/L)	
Benzo(a)pyrene	0.018
Benzo(a)anthracene	0.020
Benzo(b)fluoranthene	0.018
Benzo(k)fluoranthene	0.036
Chrysene	0.019
Dibenzo(a,h)anthracene	0.018
Indeno(1,2,3-cd)pyrene	0.018
TEQ (a)	0.030

TABLE 2
GROUNDWATER CLEANUP LEVELS FOR DETECTED CONSTITUENTS
KAISER CAP REPORT
TACOMA, WASHINGTON

Constituent	MTCA Method B Cleanup Level
PCBs (µg/L)	
Aroclor 1016	0.020
Aroclor 1242	--
Aroclor 1248	--
Aroclor 1254	0.020
Aroclor 1260	--
Aroclor 1221	--
Aroclor 1232	--
Total PCBs	0.020
TOTAL METALS (µg/L)	
Arsenic	8.0
Cadmium	8.8
Chromium (total)	50
Chromium III	240,000
Chromium VI	50
Copper	20
Lead	10
Mercury	0.15
Zinc	160
PETROLEUM HYDROCARBONS (mg/L)	
Diesel-Range	0.5
Motor Oil-Range	0.5
CONVENTIONALS (mg/L)	
Total Cyanide	16
WAD Cyanide (b)	0.01

-- Indicates no cleanup level criteria available.

(a) A toxicity equivalency quotient (TEQ) would be completed for each sample containing carcinogenic PAHs above reporting limits and compared to the benzo(a)pyrene cleanup level in accordance with WAC 173-340-708(8)(e). However, federal criteria are established for individual cPAHs.

(b) National Recommended Water Quality Criteria is expressed as free cyanide.

TABLE 3
ESTIMATED REMEDIAL ACTION COST
PORT OF TACOMA KAISER SITE

Area	Institutional Controls/Operation and Maintenance/Long Term Compliance Monitoring					Total Cost
	2016	2017	2018	2019	2020	
Spent Pot Lining Area	$6,000	$5,000	$5,000	$0	$5,000	$21,000
Rod Mill Area Former Landfill	$0	$0	$0	$0	$0	$0
Former Log Yard Area	$8,000	$7,000	$7,000	$2,000	$7,000	$31,000
Wet Scrubber Sludge Area	$0	$0	$0	$0	$0	$0
Implementation of Institutional Controls	$1,000	$0	$0	$0	$0	$1,000
Estimated Remedial Action Cost	$15,000	$12,000	$12,000	$2,000	$12,000	$53,000

APPENDIX A

Performance Groundwater Quality Monitoring Plan

Appendix A
Performance Groundwater Quality Monitoring Plan
Cleanup Action Plan
Former Kaiser Aluminum Property
3400 Taylor Way
Tacoma, Washington

April 18, 2014

Prepared for

Port of Tacoma

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TABLE OF CONTENTS

FIGURES

TABLES

1.0 INTRODUCTION

This Performance Groundwater Quality Monitoring Plan (PGQMP) outlines the approach for groundwater monitoring as part of the implementation of cleanup action at the Port of Tacoma (Port) former Kaiser Aluminum property (Site) located at 3400 Taylor Way in Tacoma, Washington (Figure A-1). This PGQMP is Appendix A to the Site *Draft Cleanup Action Plan, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington* (DCAP; Landau Associates 2014), which is one of the required deliverables under the Agreed Order (No. DE-5698) between the Port and the Washington State Department of Ecology (Ecology). The primary objective of this PGQMP is to provide sampling and analysis procedures and methodologies consistent with accepted procedures such that the data collected will be adequate for use in characterizing environmental conditions. This PGQMP was prepared consistent with the requirements of Washington Administrative Code (WAC) 173-340-820. It provides field, sampling, and analytical procedures to be used during the groundwater monitoring.

2.0 PERFORMANCE GROUNDWATER QUALITY MONITORING

The groundwater monitoring will include groundwater monitoring and sample collection at new wells in the SPL Area and existing groundwater monitoring wells in the Former Log Yard Area, and laboratory analysis of groundwater samples.

Groundwater monitoring will be performed at the following locations:

- **SPL Area:**

  Monitoring at two new shallow downgradient groundwater monitoring wells installed near the property boundary adjacent to Taylor Way [MW-SPL1(S) and MW-SPL2(S)]. The locations of the two new shallow monitoring wells in the SPL Area are shown on Figure A-2.

- **Former Log Yard Area:**

  Monitoring at three existing shallow downgradient monitoring wells [MW-101(S), MW-102(S), and MW-103(S)] as shown on Figure A-3.

2.1 MONITORING WELL DEVELOPMENT

The SPL Area monitoring wells will be developed after construction (prior to the first sampling event) to remove formation material from the well borehole and the filter pack prior to groundwater level measurement and sampling. Development will be achieved by repeatedly surging the well with a surge block and purging up to 10, but no less than 5, well casing volumes. During development, the purged groundwater will be monitored for the following field parameters:

- pH
- Conductivity
- Temperature
- Turbidity.

The wells will be developed until the turbidity of the purged groundwater decreases to 5 Nephelometric turbidity units (NTUs), if practicable. If the well dewaters during the initial surging and purging effort, one final well casing volume will be removed after the well has fully recharged, if practicable. Well development activities will be recorded on a Well Development form.

2.2 WATER LEVEL MEASUREMENTS

Water level measurements will be obtained from each of the wells to be sampled in the SPL Area and the Former Log Yard Area during each monitoring event. All water levels will be measured prior to purging and sampling wells, but after the new wells have been developed and fully recharged to static groundwater level conditions. All water levels will be measured using a decontaminated electronic water

level indicator and will be recorded to the nearest 0.01 ft. Measurements will be taken from the pre-surveyed reference mark at the top of the well casing.

2.3 MONITORING WELL GROUNDWATER SAMPLE COLLECTION

Groundwater samples will be collected from the two new shallow monitoring wells in the SPL Area, and from existing shallow monitoring wells in the Former Log Yard Area [MW-101(S), MW-102(S), and MW-103(S)].

At all new wells, groundwater samples will be collected at least 2 days after well development. Collection of groundwater samples will be completed using the following procedures:

- Immediately following removal of each well monument cover, the well head will be observed for damage, leakage, and staining. Additionally, immediately following removal of the well head cap, any odors will be recorded and the condition of the well opening will be observed. Any damage, leakage, or staining to the well head or well opening will be recorded.
- Prior to sampling, each well will be purged using a pump that is attached to dedicated purge and sample collection tubing (types of pumps used may vary depending on purge volume and depth and include a centrifugal pump, a peristaltic pump, and an electric submersible pump). Purging will begin with a small pumping rate. The rate will be adjusted upward slowly to minimize drawdown (with a target drawdown of less than 0.33 ft) during purging. Purging will continue until at least three casing volumes of water have been removed and specific conductance and temperature have stabilized or until the well goes dry. The purge volume will be calculated based on the following formula:

  $$1 \text{ casing volume (gallons)} = \pi r^2 h \times 7.48 \text{ gal/ft}^3$$

  where: $\pi = 3.14$
  r = radius of well casing in ft
  h = height of water column from the bottom of the well, in ft.

- Field parameters, including pH, temperature, conductivity, dissolved oxygen, and turbidity, will be continuously monitored during purging using a flow cell. Purging of the well will be considered to be complete when all field parameters become stable for three successive readings. The successive readings should be within +/- 0.1 pH units for pH, +/- 3 percent for conductivity, and +/- 10 percent for dissolved oxygen and turbidity.
- Purge data will be recorded on a Groundwater Sample Collection form including purge volume; time of commencement and termination of purging; any observations regarding color, turbidity, or other factors that may be important in evaluation of sample quality; and field measurements of pH, specific conductance, temperature, dissolved oxygen, and turbidity.
- Following the stabilization of field parameters, the flow cell will be disconnected and groundwater samples will be collected. Sample data will be recorded on a Groundwater Sample Collection form, including sample number and time collected; the observed physical characteristics of the sample (e.g., color, turbidity, etc.); and field parameters (pH, specific conductance, temperature, and turbidity).

- Four replicate field measurements of temperature, pH, specific conductance, dissolved oxygen, and turbidity will be obtained using the following procedures:
  - A 250-milliliter (mL) plastic beaker will be rinsed with deionized water followed by sample water.
  - The electrodes and temperature compensation probe will be rinsed with deionized water followed by sample water.
  - The beaker will be filled with sample water; the probes will be placed in the beaker until the readings are stabilized. Temperature, pH, specific conductance, dissolved oxygen, and turbidity measurements will be recorded on the Groundwater Sample Collection form.
  - The above step will be repeated to collect remaining replicates.
- Any problems or significant observations will be noted in the "comments" section of the Groundwater Sample Collection form.
- Groundwater samples will be collected into the appropriate sample containers using a peristaltic pump. A pumping rate of approximately 0.05 gallons per minute [gpm; or 200 milliliters per minute (mL/min)] or less as necessary to minimize drawdown (less than 0.03 ft, or 0.1 meter) will be used to collect all samples for all analyses. Samples will be chilled to 4°C immediately after collecting the sample. Clean gloves will be worn when collecting each sample.

Groundwater samples will be collected and preserved consistent with the analytical method-specific requirements presented in Table A-1. The laboratory will provide the appropriate sample containers for sample collection.

2.4 GROUNDWATER SAMPLE LABORATORY ANALYSES

The analysis of groundwater samples collected within the SPL Area and the Former Log Yard Area varies by area. The associated chemical analyses and target reporting limits for the groundwater samples are identified in Table A-2 and described below. Laboratory analysis will be conducted by Analytical Resources, Inc, of Tukwila, Washington or other Ecology-accredited laboratory. Analyses will be conducted within the specified holding times, presented in Table A-1.

2.4.1 SPL AREA SHALLOW MONITORING WELLS

Groundwater samples collected from the new monitoring wells in the SPL Area will be analyzed for the following constituents:

- Weak Acid Dissociable (WAD) cyanide and total cyanide using Standard Method SM4500CN-I.
- cPAHs using EPA Method 8270 with selected ion monitoring (SIM) and large volume injection (LVI).

After analytical results from the initial monitoring event have been received, the SPL Area monitoring program will be reassessed and the Port will discuss the appropriate future monitoring with Ecology.

2.4.2 FORMER LOG YARD AREA SHALLOW MONITORING WELLS

Groundwater samples collected from the existing monitoring wells located downgradient of the Former Log Yard Area will be analyzed for total arsenic using EPA Method 200.8.

2.5 QUALITY ASSURANCE AND QUALITY CONTROL

Quality control procedures and quality assurance and control (QA/QC) objectives and procedures are described in the Quality Assurance Project Plan (QAPP) presented in Appendix B of the *Work Plan, Remedial Investigation/Feasibility Study, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington* (RI/FS Work Plan; Landau Associates 2012).

2.6 SAMPLE TRANSPORTATION AND HANDLING

The transportation and handling of soil and groundwater samples will be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to release of samples. Samples will be kept in coolers on ice until delivery to the analytical laboratory. At the end of each day, samples will be logged on a chain of custody (COC) form. The COC will also note the analyses to be completed for each sample and any special instructions. The COC will accompany each shipment of samples to the laboratory.

2.7 SAMPLE CUSTODY

The primary objective of sample custody is to create an accurate, written record that can be used to trace the possession and handling of samples so that their quality and integrity can be maintained from collection until completion of all required analyses. Adequate sample custody will be achieved by means of approved field and analytical documentation. Such documentation includes the COC record that is initially completed by the sampler and is, thereafter, signed by those individuals who accept custody of the sample. A sample is in custody if at least one of the following is true:

- It is in someone's physical possession
- It is in someone's view
- It is secured in a locked container or otherwise sealed so that tampering will be evident
- It is kept in a secured area, restricted to authorized personnel only.

Sample control and COC in the field and during transportation to the laboratory will be conducted in general conformance with the procedures described below:

- As few persons as possible will handle samples.
- Sample bottles will be obtained new or pre-cleaned from the laboratory performing the analyses.
- The sample collector will be personally responsible for the completion of the COC record and the care and custody of samples collected until they are transferred to another person or dispatched properly under COC rules.
- The coolers in which the samples are transported will be accompanied by the COC record identifying their contents. The original record and laboratory copy will accompany the shipment. The other copy will be forwarded to Landau Associates along with sample collection forms.

When samples are transferred, the individuals relinquishing and receiving the samples will sign the COC form in the appropriate space and record the date and time of transfer.

A designated sample custodian at the laboratory will accept custody of the samples and certify that the sample identification numbers match those on the COC record. The custodian will then enter sample identification number data into a log that will be maintained by the laboratory.

All documentation and other project records will be safeguarded to prevent loss, damage, or alteration. If an error is made on a document, corrections will be made by drawing a single line through the error and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated and, if necessary, a footnote explaining the correction will be included. Errors will be corrected by the person who made the entry, whenever possible.

2.8 EXPLORATION AND SAMPLE IDENTIFICATION

This section describes the how the explorations and samples will be identified.

2.8.1 SPL AREA

The new groundwater monitoring wells will be identified as MW-SPL1(S) and MW-SPL2(S). Groundwater samples will be identified using the monitoring well identification and the date. For example, the groundwater sample collected from shallow well MW-SPL1(S) will be identified as MW-SPL1(S)-month/day/year.

2.8.2 FORMER LOG YARD AREA

Groundwater samples will be identified using the monitoring well identification and the date. For example, the groundwater sample collected from shallow well MW-101(S) will be identified as MW-101(S)-month/day/year.

2.9 SAMPLING EQUIPMENT DECONTAMINATION

The decontamination procedures described below will be used by field personnel to clean sampling and related field equipment. Deviation from these procedures must be documented in field records.

All sampling equipment used (e.g., water level indicators, etc.) will be cleaned using a three-step process, as follows:

1. Scrub surfaces of equipment that would be in contact with the sample with brushes using an Alconox solution
2. Rinse and scrub equipment with clean tap water
3. Rinse equipment a final time with deionized water to remove tap water impurities.

Decontamination of the reusable sampling devices will occur between the collection of each sample. Decontamination of sampling equipment that contains a visible sheen that cannot be removed with Alconox soap will include a hexane rinse (or other appropriate solvent) prior to the tap water rinse. All decontamination effluent will be temporarily stored in a 55-gallon drum for disposal.

2.10 RESIDUAL WASTE MANAGEMENT

This section describes the management of well development water, purge water, decontamination water, and solid waste in the form of personal protective equipment (PPE) generated during groundwater sampling. Waste material will be separated according to media (soil, water, and solid waste). A brief description of waste management procedures is provided in the sections below.

2.10.1 DECONTAMINATION WATER, PURGE WATER, AND WELL DEVELOPMENT WATER

Decontamination water, purge water, and well development water generated during groundwater sampling will be placed on the ground near the groundwater monitoring well from which it was generated.

2.10.2 PERSONAL PROTECTIVE EQUIPMENT (SOLID WASTE)

Solid waste will be managed separately from soil and water. All solid waste will be collected and placed in a container as designated by the Port. Disposal will be in accordance with appropriate regulations.

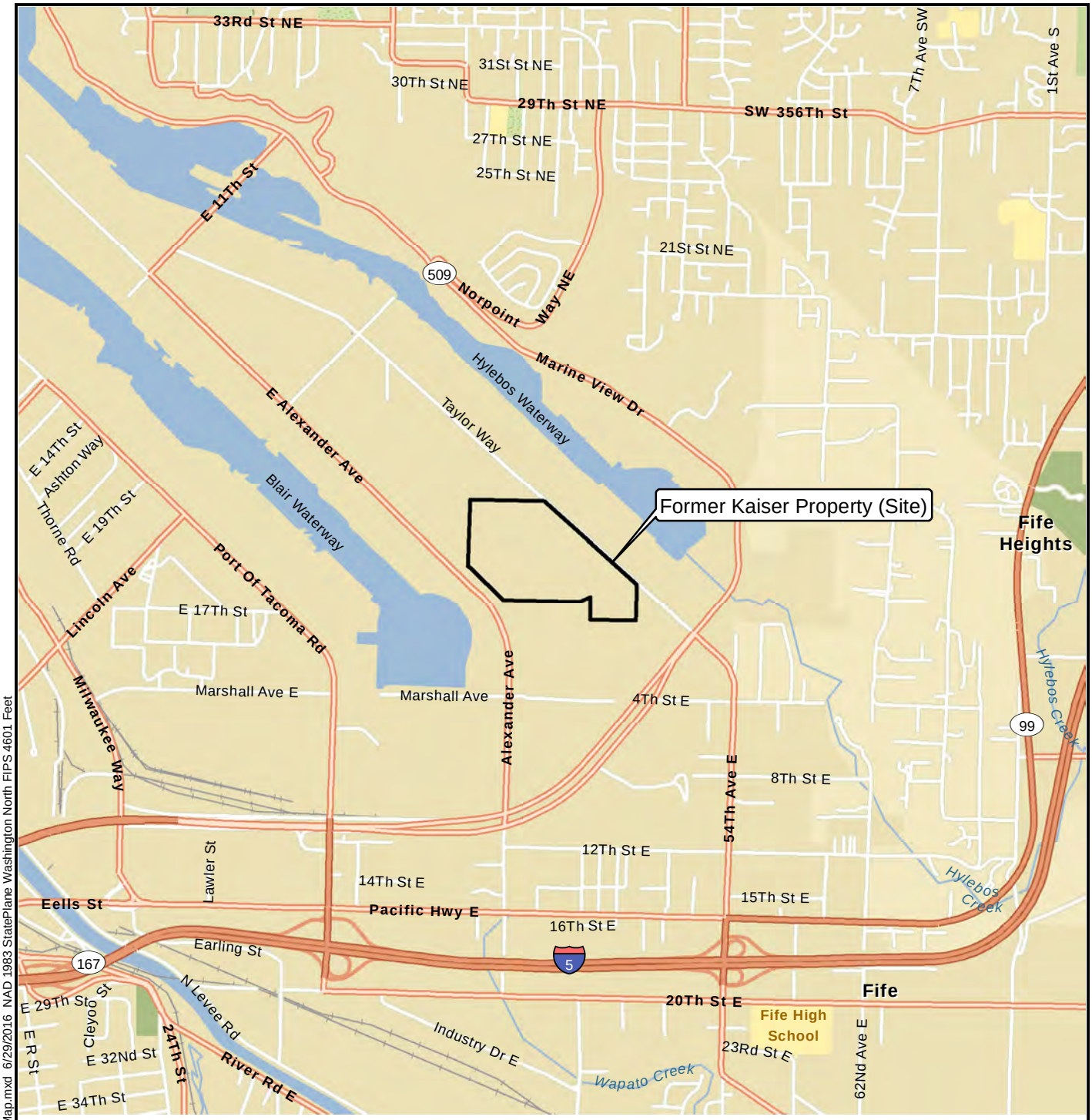
3.0 HEALTH AND SAFETY

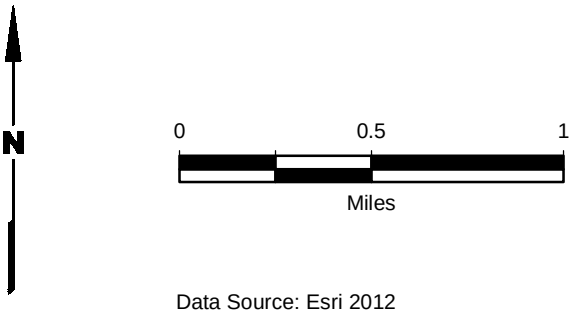
A project health and safety plan for implementation of field activities described in this PGQMP is provided in Appendix C of the *Work Plan, Remedial Investigation/Feasibility Study, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington* (RI/FS Work Plan; Landau Associates 2012). A copy of the health and safety plan is also provided in Appendix B of the draft CAP. All Landau Associates employees will follow the procedures described in this plan. Landau Associates subcontractors will either adopt this plan or prepare their own plan that is at least as protective as this plan.

4.0 REFERENCES

Landau Associates. 2014. *Draft Cleanup Action Plan Report, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington*. Prepared for Port of Tacoma. March 25.

Landau Associates. 2012. *Work Plan, Remedial Investigation/Feasibility Study, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington.* Prepared for Port of Tacoma. January 27.



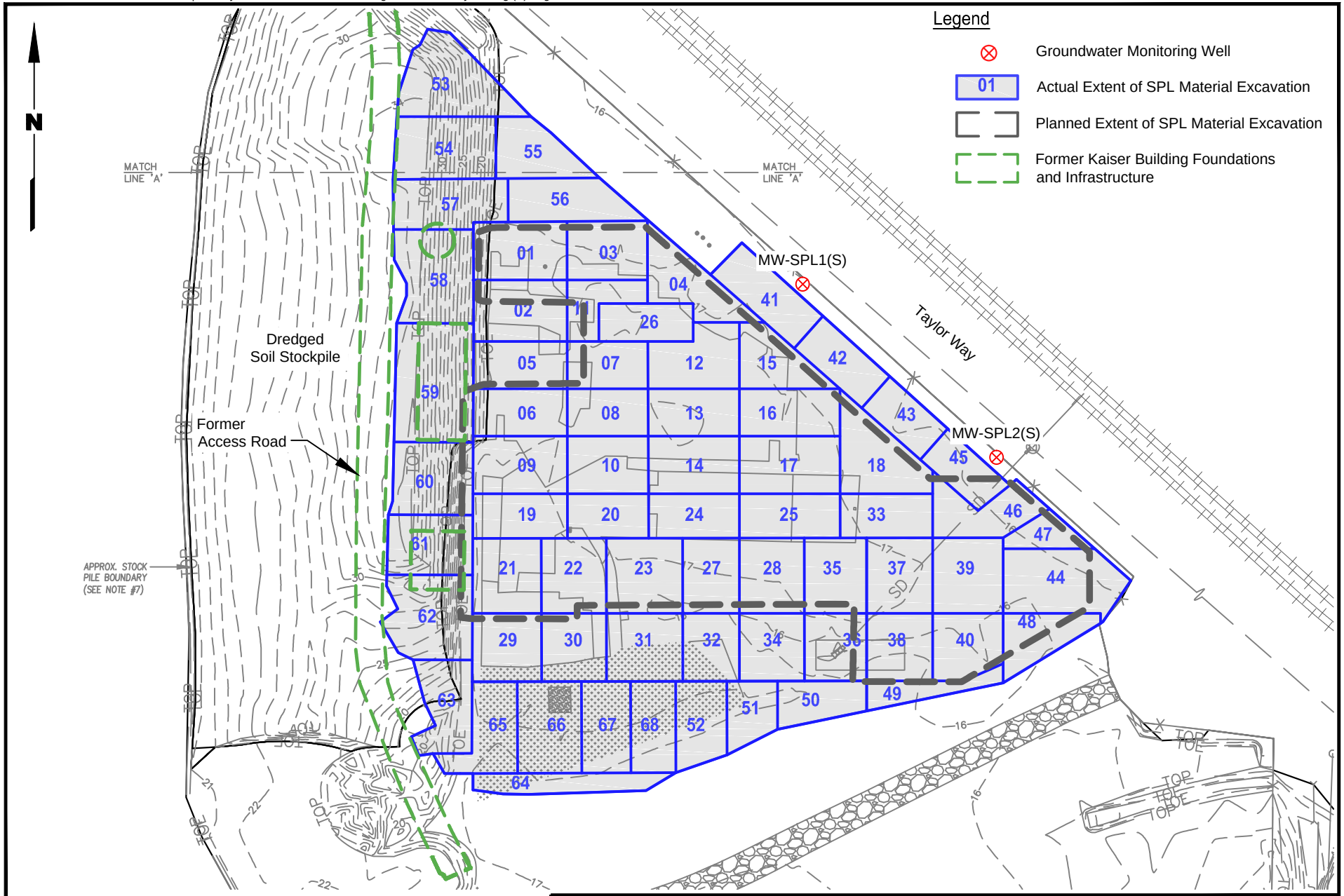


Data Source: Esri 2012

G:\Projects\118\032\020006\CAP\Figure A-1 Vicinity Map.mxd 6/29/2016 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

Kaiser CAP Report Tacoma, Washington	**Vicinity Map**	Figure A-1

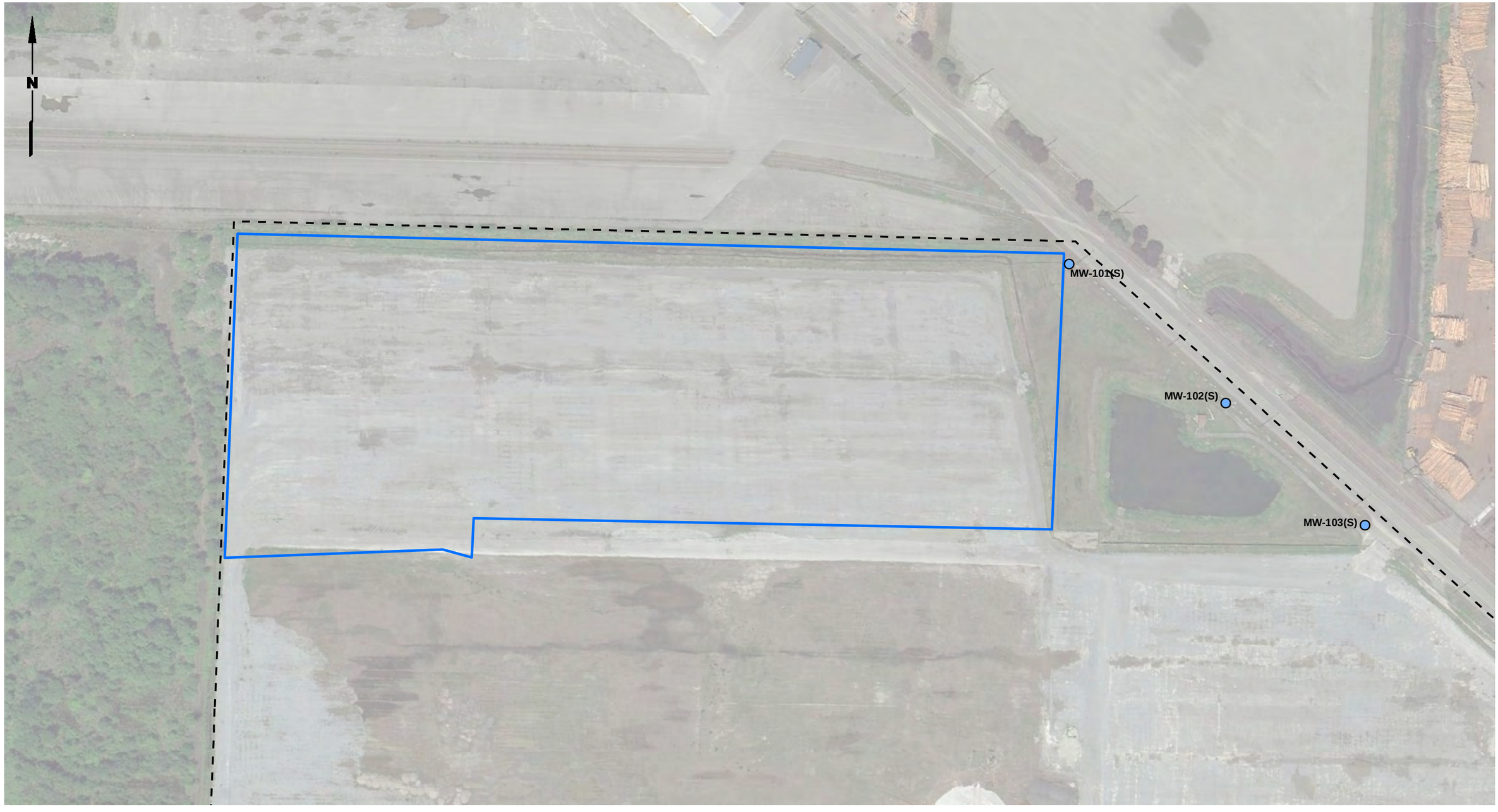


LANDAU ASSOCIATES

Kaiser CAP Report
Tacoma, Washington

SPL Area Groundwater Monitoring Well Locations

Figure
A-2



G:\Projects\118\032\020\006\CAP\Figure A-3 Former Log Yard Area Previous Exploration.mxd 6/29/2016 NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

- RI Shallow Aquifer Monitoring Well Location
- Former Log Yard Area
- Site Boundary

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Google Earth Pro Aerial Image 2010; Kennedy/Jenks

0 150 300

Scale in Feet

LANDAU ASSOCIATES

Kaiser CAP Report
Tacoma, Washington

Former Log Yard Area Groundwater Monitoring Well Locations

Figure
A-3

TABLE A-1
SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES
GROUNDWATER COMPLIANCE SAMPLING AND ANALYSIS PLAN
FORMER KAISER ALUMINUM PROPERTY
TACOMA, WASHINGTON

Analyses	Area Planned for Sample Collection	Sample Container	Preservation	Holding Time
Groundwater Samples				
Total cyanide	SPL Area	1 - 500 ml polyethylene	Add 10N $NaOH_;$ Cool 6ºC (a)	14 days
WAD Cyanide	SPL Area	1 - 500 ml polyethylene	Add 10N $NaOH_;$ Cool 6ºC (a)	14 days
cPAHs	SPL Area	2 - 1 L amber glass	Store Cool at 6°C	7 days
Total Metals (arsenic)	Former Log Yard Area	500-mL polyethylene	Add $HN0_3$; Store cool at 6°	6 months

(a) If sulfide is present, do not preserve, notify laboratory, and ship the sample to the laboratory immediately. Holding time is 48 hours if sulfide is present.

TABLE A-2
SUMMARY OF GROUNDWATER SAMPLE ANALYTICAL METHODS AND TARGET REPORTING LIMITS
GROUNDWATER COMPLIANCE SAMPLING AND ANALYSIS PLAN
FORMER KAISER ALUMINUM PROPERTY
TACOMA, WASHINGTON

		WATER	
Analyte	**Analytical Method**	**Reporting Limits (a)**	**Units**
TOTAL METALS			
Arsenic	EPA Method 200.8	0.0002	mg/L
CONVENTIONALS			
Total Cyanide	SM4500	0.005	mg/L
WAD Cyanide	SM4500	0.005	mg/L
CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS (cPAHs)			
Benzo(a)anthracene	EPA-8270 SIM (b)	0.01	µg/L
Chrysene	EPA-8270 SIM (b)	0.01	µg/L
Total Benzofluoranthenes	EPA-8270 SIM (b)	0.01	µg/L
Benzo(a)pyrene	EPA-8270 SIM (b)	0.01	µg/L
Indeno(1,2,3-cd)pyrene	EPA-8270 SIM (b)	0.01	µg/L
Dibenz(a,h)anthracene	EPA-8270 SIM (b)	0.01	µg/L

(a) Reporting limit goals are based on current laboratory data and may be modified during the investigation process as methodology is refined.
Laboratory reporting will be based on the lowest standard on the calibration curve.
Instances may arise where high sample concentrations, nonhomogeneity of samples, or matrix interferences preclude achieving the desired reporting limits.

(b) Method 8270 for selected soil and groundwater samples will be performed using selected ion monitoring.
A large volume injection will also be used for groundwater samples to obtain lower reporting limits.

APPENDIX B

Site Health and Safety Plan (HASP)

Appendix B
Health and Safety Plan
Remedial Investigation/Feasibility Study
Former Kaiser Aluminum Property
3400 Taylor Way
Tacoma, Washington

January 31, 2012

Prepared for

Port of Tacoma

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TABLE OF CONTENTS

TABLES

ATTACHMENTS

Site Health and Safety Plan
Summary

Site Name: Former Kaiser Aluminum Property

Location: 3400 Taylor Way, Tacoma, Washington

Client: Port of Tacoma

Proposed Dates of Activities: 2012

Type of Facility: Former aluminum smelter; currently vacant land

Land Use of Area Surrounding Facility: Industrial

Site Activities: Excavating test pits, drilling soil boreholes using hollow-stem auger techniques, well installation, soil and groundwater sampling, and waste characterization sampling, and managing investigation-derived wastes.

Potential Site Contaminants: Metals, diesel- and motor oil-range petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), vinyl chloride, polychlorinated biphenyls (PCBs), and cyanide

Routes of Entry: Skin contact with soil, groundwater, or waste materials; incidental ingestion of soil, water, or waste materials; and inhalation of airborne droplets, dusts, or vapors

Protective Measures: Hard hat, safety glasses, gloves, protective clothing, steel-toed boots

1.0 INTRODUCTION

This Site-specific health and safety plan (HASP) addresses procedures to minimize the risk of chemical exposures, physical accidents to onsite workers, and environmental contamination.

1.1 PURPOSE AND REGULATORY COMPLIANCE

The HASP covers each of the required elements as specified in 29 CFR 1910.120 or equivalent Washington State Department of Labor and Industries regulations. When combined with the Landau Associates Health and Safety Program, this Site-specific HASP meets all applicable regulatory requirements.

This HASP will be made available to all Landau Associates' personnel and subcontractors involved in field work on this project. For subcontractors, this HASP represents minimum safety procedures. Subcontractors are responsible for their own safety while present onsite or conducting work for this project. Subcontractor work may involve safety and health procedures not addressed in the HASP. By signing the documentation form provided with this HASP (Attachment B-3), project workers also certify their agreement to comply with this HASP. Both Landau Associates and its subcontractors are independently responsible for the health and safety of their own employees on the project.

1.2 CHAIN OF COMMAND

The Landau Associates chain-of-command for health and safety on this project involves the following individuals:

Landau Associates' Task Manager: Stacy Lane. The Task Manager, in conjunction with the Project Manager (Kris Hendrickson), has overall responsibility for the successful outcome of the project. The Task Manager, in consultation with Corporate Health and Safety (H&S) Manager and the Project Manager, makes final decisions regarding questions concerning the implementation of the Site HASP.

Landau Associates' Project H&S Coordinator: To be determined. As the Project H&S Coordinator, this individual is responsible for implementing the HASP in the field. The Project H&S Coordinator informs subcontractors of the minimum requirements of this HASP. This person will conduct ambient air monitoring to determine the level of personal protective equipment (PPE) and monitor for PPE upgrade action levels. This person will also assure that proper protective equipment is available and used in the correct manner, decontamination activities are carried out properly, and that employees have knowledge of the local emergency medical system.

Landau Associates' Corporate H&S Manager: Christine Kimmel. The Landau Associates Corporate H&S Manager has overall responsibility for preparation and modification of this HASP. In the

event that health and safety issues arise during Site operations, the H&S Manager will attempt to resolve them in discussion with the appropriate members of the project team.

Project Team Members: Project team members are responsible for having the correct training and understanding the H&S requirements for this project and implementing these procedures in the field. Team members will receive technical guidance from the Project H&S Coordinator.

1.3 SITE WORK ACTIVITIES

This HASP covers Site field activities to be conducted throughout the remedial investigation (RI) at the Port of Tacoma (Port) former Kaiser Aluminum property. The field activities associated with the RI include:

- Excavating test pits
- Installation of shallow and possibly intermediate groundwater monitoring wells using hollow-stem auger methods
- Collection of groundwater samples following installation and development of the wells
- Collection of water level data at the monitoring wells
- Collection of soil samples from test pits
- Collection of waste characterization samples
- Management of investigation-derived wastes.

1.4 SITE DESCRIPTION

The property encompasses approximately 96 acres of the Blair Hylebos Peninsula in Tacoma, Washington. The Hylebos Waterway is located northeast of the property and the Blair Waterway is located to the southwest. An aluminum smelter operated at the property until 2001. Currently, only two buildings (both used for offices) remain onsite; subsurface structures, such as footings and slabs, are still in place and in most areas have been covered with soil and a layer of gravel. Current uses of the property include staging of construction materials (primarily soil, crushed concrete, and asphalt), and short-term use by contractors for lay down and staging of materials. The three targeted areas to be investigated include the Spent Pot Lining Area (SPL Area), the Rod Mill Area Closed Landfill used for disposal of miscellaneous smelter wastes, and the Former Log Yard Area. The SPL Area is located on the eastern portion of the property and is an area that was historically used to dismantle reduction cells, and temporarily store SPL and potroom duct dust. The Rod Mill Area Closed Landfill is located on the southwest portion of the property and consists of a landfill that was used for disposal of miscellaneous smelter wastes. The Former Log Yard Area is located on the northern portion of the property and was previously used for log sorting activities.

2.0 HAZARD EVALUATION AND CONTROL MEASURES

2.1 TOXICITY OF CHEMICALS OF CONCERN

Based on previous information and knowledge of the types of activities conducted at the Site, the following chemicals may be present: metals, diesel- and motor oil-range petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), vinyl chloride, polychlorinated biphenyls (PCBs), and cyanide. Human health hazards of these chemicals are summarized in Table B-1. The information provided in this table covers potential toxic effects that might occur if relatively significant acute and/or chronic exposure occurred. However, this information does not indicate that such effects are likely to occur from the planned Site activities. The chemicals that may be encountered at this Site are not expected to be present at concentrations that could cause significant health hazards from short-term exposures. The types of planned work activities and use of monitoring procedures and protective measures will further limit potential exposures at this Site.

Health standards are presented using the following abbreviations:

- TWA – Time-weighted average exposure limit for any 10-hour work shift
- IDLH – Immediately Dangerous to Life or Health.

2.2 POTENTIAL EXPOSURE ROUTES

2.2.1 INHALATION

Inhalation of dusts generated during soil sampling and drilling could be an issue if the weather is dry, windy, or warm. Exposure via this route could potentially occur if chemicals are present in the soil and dust particles become airborne during Site activities or if volatile organic compounds (VOCs) are liberated when samples are exposed to air or during drilling of soil boreholes. Visual indicates of dust will be used to indicate if dust suppression activities are warranted.

2.2.2 SKIN CONTACT

Exposure via this route could occur if contaminated soil, groundwater, or waste materials contact the skin or clothing. Protective clothing and decontamination activities specified in this HASP will minimize the potential for skin contact with the contaminants.

2.2.3 INGESTION

Exposure via this route could occur if individuals eat, drink, or perform other hand-to-mouth contact in the contaminated (exclusion) zones. Decontamination procedures established in this HASP will minimize the inadvertent ingestion of contaminants.

2.3 HEAT STRESS AND HYPOTHERMIA

2.3.1 HEAT STRESS

Use of impermeable clothing reduces the cooling ability of the body due to evaporation reduction. This may lead to heat stress. If such conditions occur during Site activities, appropriate work-rest cycles will be utilized and water or electrolyte-rich fluids (Gatorade or equivalent) will be made available to minimize heat stress effects.

Also, when ambient temperatures exceed 70°F, monitoring of employee pulse rates will be conducted. Each employee will check his or her pulse rate at the beginning of each break period. Take the pulse at the wrist for 6 seconds, and multiply by 10. If the pulse rate exceeds 110 beats per minute, then reduce the length of the next work period by one-third.

Example: After a 1-hour work period at 80°F, a worker has a pulse rate of 120 beats per minute. The worker must shorten the next work period by one-third, resulting in a work period of 40 minutes until the next break.

2.3.2 HYPOTHERMIA

Hypothermia can result from abnormal cooling of the core body temperature. It is caused by exposure to a cold environment and wind-chill. Wetness or water immersion can also play a significant role.

Typical warning signs of hypothermia include fatigue, weakness, lack of coordination, apathy, and drowsiness. A confused state is a key symptom of hypothermia. Shivering and pallor are usually absent, and the face may appear puffy and pink. Body temperatures below 90°F require immediate treatment to restore temperature to normal.

Current medical practice recommends slow re-warming as treatment for hypothermia, followed by professional medical care. This can be accomplished by moving the person into a sheltered area and wrapping with blankets in a warm room. In emergency situations, where body temperature falls below 90°F and a heated shelter is not available, use a sleeping bag, blankets, and body heat from another individual to help restore normal body temperature.

2.4 OTHER PHYSICAL HAZARDS

2.4.1 SLIPS/FALLS

As with all field work sites, caution will be exercised to prevent slips on rain-slick surfaces, stepping on sharp objects, etc. Personnel will maintain good housekeeping procedures and keep the work area clear of debris and/or equipment.

Excavations greater than 4-ft deep pose a hazard of falls and sidewall collapse. Personnel will not be allowed to enter excavations greater than 4-ft deep without proper shoring with egress equipment or proper sideslope shoring.

2.4.2 MACHINERY/MOVING PARTS

The drilling equipment may be equipped with various winches, motors, booms, and other machines. These present a general physical hazard from moving parts. Personnel will stand clear of machinery at all times unless specific instructions are given by the drill rig operator or other person in authority. Steel-toed shoes or boots will be worn at all times when on the Site. When possible, appropriate guards will be in place during equipment use.

During relocation of drums containing investigative-derived waste by a subcontractor, the subcontractor will verify that all lids are secure and any straps used for lifting the drums are also adequately secure. Personnel will be aware of any pinch points when using straps to move drums and when securing lids on open top drums using a ring. Personnel will also be aware of the swing radius when moving drums using straps and stand well outside the swing radius. Personnel will make eye contact with the equipment operator prior to advancing within the swing radius or potential blind spots of the equipment.

2.4.3 CONFINED SPACES

Confined space entry is not anticipated for this project. Personnel will not enter any confined space without certified training and specific approval of the Project Manager, Task Manager, Corporate H&S Manager, and Port project representative.

2.4.4 NOISE

Appropriate hearing protection (ear muffs or ear plugs with a noise reduction rating of at least 20 decibals (acoustic; dBA) will be used if individuals work near high-noise-generating equipment (> 85 dBA). Determination of the need for hearing protection will be made by the Project H&S Coordinator.

3.0 PROTECTIVE EQUIPMENT AND AIR MONITORING

3.1 PROTECTIVE EQUIPMENT

Work for this project will be conducted in Level D protection. Level C protection is presented as a contingency only and represents a modified protection level, incorporating respiratory protection only where required by Site conditions. Situations requiring Levels A or B protection are not anticipated for this project; should they occur, work will stop and the HASP will be amended, as appropriate, prior to resuming work.

Workers performing general Site activities where skin contact with highly contaminated materials is unlikely and inhalation risks are not expected will wear coveralls, eye protection, gloves (whenever handling samples), and safety boots. Level D protection will consist of the following:

- Hard hats
- Safety glasses
- Steel-toed, chemical-resistant boots
- Nitrile, neoprene, or equivalent inner and outer gloves

Workers performing Site activities where heavily contaminated materials are detected will wear chemical-resistant gloves (nitrile, neoprene, or other appropriate outer and inner gloves) and coated Tyvek or other chemical-resistant suits. Workers will use face shields or goggles, as necessary, to avoid splashes.

When performing activities in which inhalation of chemical vapors and dusts is a concern, workers will wear half-mask or full-face air-purifying respirators with combination particulate and organic vapor protection cartridges. Cartridges should be changed, at a minimum, on a daily basis. They should be changed more frequently if chemical vapors are detected inside the respirator or other symptoms of breakthrough are noted (e.g., irritation, dizziness, breathing difficulty).

3.2 AIR MONITORING

Direct-reading instruments give immediate, real time readings of contaminant levels. Reliable direct-reading instruments, such as the combustible gas indicator, photoionization detector (PID), flame ionization detector, dust meter, and colorimetric tubes, are available for situations commonly encountered at hazardous and contaminated substance sites. The appropriate type of monitoring equipment depends on the suspected type and concentration of chemical contaminants. The primary limitation of direct-reading instruments is that most do not quantify specific chemical compounds.

Air monitoring for VOCs and dust will be conducted during drilling or other intrusive activities. A PID will be used to monitor for VOCs and air monitoring for dust will be conducted using a SKC

HAZ-DUST 1 (or equivalent) particulate meter (Attachment B-1). The instruments will be calibrated prior to each day's activity according to manufacturer's instructions. Calibration will be recorded in the health and safety logbook or field notes. Readings will be entered into the logbook at a minimum of 30-minute intervals.

Attachment B-1 identifies the air monitoring strategy to be used during field investigations.

4.0 SAFETY EQUIPMENT LIST

The following safety equipment must be available on site:

- First aid kit
- Mobile telephone
- Steel-toed safety boots
- Chemical-resistant coveralls and gloves
- Safety glasses or splash guard
- Hard hat
- Air monitoring instruments
- Safety vest
- Half-face or full face respirator with cartridges.

5.0 EXCLUSION AREAS

If migration of chemicals from the work area is a possibility, or as otherwise required by regulations or client specifications, Site control will be maintained by establishing clearly identified work zones. These will include the exclusion zone, contaminant reduction zone, and support zone, as discussed below.

5.1 EXCLUSION ZONE

Exclusion zones will be established around each contaminated substance activity location. Only persons with appropriate training and authorization from the Project H&S Coordinator will enter this perimeter while work is being conducted.

5.2 CONTAMINATION REDUCTION ZONE

A contamination reduction zone will consist of a decontamination station that must be used to exit the exclusion zone. The station will have the brushes and wash fluids necessary to decontaminate personnel and equipment leaving the exclusion zone. Care will be taken to prevent the spread of contamination from this area.

5.3 SUPPORT ZONE

A support zone will be established outside the contamination reduction area to stage clean equipment, don protective clothing, take rest breaks, etc.

6.0 MINIMIZATION OF CONTAMINATION

To make the work zone procedure function effectively, the amount of equipment and number of personnel allowed in contaminated areas must be minimized. In addition, the amounts of sample collected should not exceed what is needed for laboratory analysis and record samples. Do not kneel on contaminated ground, stir up unnecessary dust, or perform any practice that increases the probability of hand-to-mouth transfer of contaminated materials. Eating, drinking, chewing gum, or using smokeless tobacco, are forbidden in the exclusion zone. Smoking is prohibited everywhere on the Site.

7.0 DECONTAMINATION

Decontamination is necessary to limit the migration of contaminants between sampling intervals, from the work zone(s) onto the Site, or from the Site into the surrounding environment. Equipment decontamination procedures are presented in Section 2.9 of the Sampling and Analysis Plan (SAP; Appendix A of this Work Plan) and personnel decontamination are discussed in the following sections, and the following types of equipment will be available to perform these activities:

- Boot and glove wash bucket and rinse bucket
- Scrub brushes – long handled
- Spray rinse applicator
- Plastic garbage bags
- 5-gallon container with soap solution.

Proper decontamination (decon) procedures will be employed to ensure that contaminated materials do not contact individuals and are not spread from the Site. These procedures will also ensure that contaminated materials generated during Site operations and during decontamination are managed appropriately. All nondisposable equipment will be decontaminated in the contamination reduction zone.

Personnel working in exclusion zones will perform a limited decontamination in the contamination reduction zone prior to changing respirator cartridges (if worn), taking rest breaks, drinking liquids, etc. They will decontaminate fully before eating lunch or leaving the Site. The following describes the procedures for decon activities:

1. In the contamination reduction zone, wash and rinse outer gloves and boots in portable buckets.
2. Inspect protective outer suit, if worn, for severe contamination, rips, or tears.
3. If suit is highly contaminated or damaged, full decontamination will be performed.
4. Remove outer gloves. Inspect and discard if ripped or damaged.

8.0 DISPOSAL OF CONTAMINATED MATERIALS

All disposable sampling equipment and personal protective equipment will be rinsed to remove gross contamination and placed inside of a 10 mil polyethylene bag or other appropriate containers. These disposable supplies and containers will be removed from the Site by the field personnel and disposed of in a normal refuse container (dumpster) and/or solid waste landfill, unless visibly contaminated with hazardous substances. In such cases, the Task Manager will determine the need for special handling and disposal, according to applicable regulations. Waste water generated during decontamination will be handled as described in Section 2.10 of the SAP (Appendix A of this Work Plan).

9.0 SITE SECURITY AND CONTROL

Site security and control will be the responsibility of the Project H&S Coordinator. The "buddy system" will be used when working in designated hazardous areas. Any security or control problems will be reported to the client or appropriate authorities.

10.0 SPILL CONTAINMENT

Sources of bulk chemicals subject to spillage are not expected to be used in this project. Accordingly, a spill containment plan is not required for this project.

11.0 EMERGENCY RESPONSE PLAN

The Emergency Response Plan outlines the steps necessary for appropriate response to emergency situations. The following paragraphs summarize the key Emergency Response Plan procedures for this project.

11.1 PLAN CONTENT AND REVIEW

The principal hazards addressed by the Emergency Response Plan include the following: fire or explosion, medical emergencies, uncontrolled contaminant release, and situations such as the presence of chemicals above exposure guidelines or inadequate protective equipment for the hazards present. In order to help anticipate potential emergency situations, field personnel should always exercise caution and look for signs of potentially hazardous situations, including the following as examples:

- Visible or odorous chemical contaminants
- Drums or other containers
- General physical hazards (e.g., traffic, cranes, moving equipment, ships, sharp or hot surfaces, slippery or uneven surfaces)
- Possible sources of radiation
- Live electrical wires or equipment; underwater pipelines or cables; and poisonous or dangerous animals.

These and other potential problems should be anticipated and steps taken to avert problems before they occur. All personnel will certify (Attachment B-3) that they are familiar with the contents of this HASP and acknowledge their agreement to comply with the provisions of this HASP.

The Emergency Response Plan will be reviewed during the onsite health and safety briefing so that all personnel will know what their duties are should an emergency occur.

Additionally, Site personnel must know who to notify in the event of Emergency Response Plan implementation. The following information will be readily available at the Site in a location known to all workers:

- Emergency Telephone Numbers: see list in Attachment B-2
- Route to Nearest Hospital: see directions and map in Attachment B-2
- Site Location: see the description of the Site location in Section 1.4 of this HASP.

11.2 PLAN IMPLEMENTATION

The Project H&S Coordinator will act as the lead individual in the event of an emergency situation and will evaluate the situation. This individual will determine the need to implement the emergency procedures, in concert with other resource personnel including client representatives and the

Corporate H&S Manager. Other onsite field personnel will assist the H&S Coordinator, as required, during the emergency.

If the Emergency Response Plan is implemented, the Project H&S Coordinator or designees are responsible for alerting all personnel at the affected area by use of a signal device (such as a hand-held air horn), visual, or shouted instructions, as appropriate.

Emergency evacuation routes and safe assembly areas will be identified and discussed in the onsite health and safety briefing, as appropriate. The buddy system will be employed during evacuation to ensure safe escape, and the Project H&S Coordinator will be responsible for roll-call to account for all personnel.

In the event of an emergency situation requiring implementation of the Emergency Response Plan (e.g., fire or explosion, serious injury, tank leak or other material spill, presence of chemicals above exposure guidelines, inadequate personnel protection equipment for the hazards present), cease all work immediately. Offer whatever assistance is required, but do not enter work areas without proper protective equipment. Workers not needed for immediate assistance will decontaminate per normal procedures (if possible) and leave the work area, pending approval by the Project H&S Coordinator for re-start of work. The following general emergency response safety procedures should be followed.

11.2.1 FIRE

Landau Associates' personnel will attempt to control only very small fires. If an explosion appears likely, evacuate the area immediately. If a fire occurs that cannot be readily controlled, then immediate intervention by the local fire department or other appropriate agency is imperative and the following procedures shall be implemented in the order presented: .

- Call 911
- Call Port Security
- Call Port project manager
- Notify Landau Associates project manager.

The Landau Associates project manager will notify Landau Associates Corporate H&S Manager as soon as possible after an emergency situation has been identified.

11.2.2 MEDICAL EMERGENCY

If a worker leaves the Site to seek medical attention, another worker should accompany the patient. When in doubt about the severity of an accident or exposure, always seek medical attention as a conservative approach. Notify the Project Manager of the outcome of the medical evaluation as soon as possible. An onsite first aid kit will be available for use to treat minor cuts and bruises.

If a worker is seriously injured or becomes ill or unconscious, immediately call 911 and then notify other personnel in the order presented below:

- Port Security
- Port project manager
- Landau Associates project manager.

The Landau Associates project manager will notify Landau Associates Corporate H&S Manager as soon as possible after an emergency situation has been identified.

Do not attempt to assist an unconscious worker in an untested confined space without applying confined space entry procedures or without using proper respiratory protection, such as a self-contained breathing apparatus.

In the event that a seriously injured person is also heavily contaminated, use clean plastic sheeting to prevent contamination of the inside of the emergency vehicle. Less severely injured individuals may have their protective clothing carefully removed or cut off before transport to the hospital. If it is deemed appropriate to transport the victim to the hospital, follow the route map on Attachment B-2.

11.2.3 RELEASE OF CONTAMINANTS TO THE ENVIRONMENT

If a significant release of contaminants to the environment occurs, the Port is responsible for notifying the appropriate federal, state, and local agencies. If the release consists of hazardous contaminants, immediately contact the Port project manager and he/she will be responsible for notifying the agencies listed in Attachment B-2. If the release consists of a petroleum product, immediately notify Port Security and then the Port project manager. After Port personnel have been notified, contact the Landau Associates project manager. The Landau Associates project manager will notify Landau Associates Corporate H&S Manager as soon as possible after an emergency situation has been identified.

11.3 PLAN DOCUMENTATION AND REVIEW

The Landau Associates project manager and Corporate H&S Manager will critique the emergency response action following the event. The results of the critique will be used to improve future Emergency Response Plans and actions.

12.0 MEDICAL SURVEILLANCE

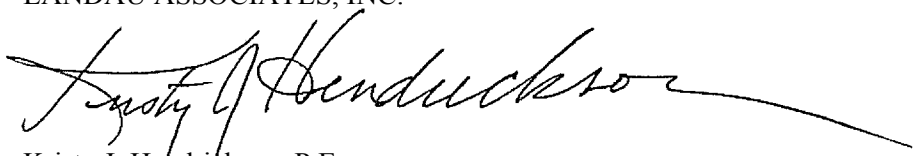
A medical surveillance program has been instituted for Landau Associates and will also be in effect for Subcontractor employees having exposures to hazardous substances. For Landau Associates, exams are given before employment; annually, thereafter; and upon termination. Content of exams is determined by the Occupational Medicine physician, in compliance with applicable regulations, and is detailed in the Landau Associates' General Health and Safety Program.

Each team member will have undergone a physical examination as noted above in order to verify that he/she is physically able to use protective equipment, work in hot environments, and not be predisposed to occupationally induced disease. Additional exams may be needed to evaluate specific exposures or unexplainable illness.

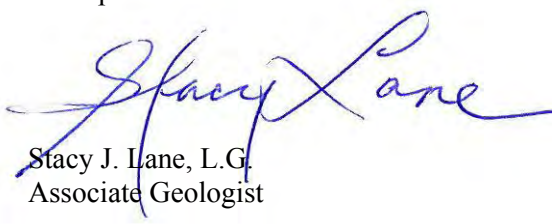
* * * * * * * * * * *

This document has been prepared under the supervision and direction of the following key staff:

LANDAU ASSOCIATES, INC.



Kristy J. Hendrickson, P.E.
Principal



Stacy J. Lane, L.G.
Associate Geologist

KJH/SJL/kes

TABLE B-1
HUMAN HEALTH INFORMATION FOR CONTAMINANTS OF CONCERN

Contaminant	TWA	IDLH	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
Vinyl Chloride	1 ppm	Unknown	Inhalation, ingestion, dermal contact	Weakness, abdominal pain (carcinogen)	PID
Diesel-range petroleum hydrocarbons	100 ppm	500 ppm	Absorption, ingestion, inhalation	Irritation of eyes, nose, throat; dizziness, nausea; chemical pneumonia	PID
Chromium	0.5 mg/m^3	250 mg/m^3	Inhalation, ingestion, dermal contact	Irritated eyes and skin	Dust Meter
Zinc (Zinc Oxide)	5 mg/m^3 (fume) 15 mg/m^3 (total dust) 5 mg/m^3 (resp dust)	500 mg/m^3	inhalation	Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function	Dust Meter
Carcinogenic Polycyclic Aromatic Hydrocarbons	0.2 mg/m^3	10 mg/m^3	Inhalation, ingestion, dermal and eye contact	Nausea, vomiting, low blood pressure, abdominal pain, convulsions, and coma (carcinogen)	Dust Meter
Cyanide	5 mg/m^3	50 mg/m^3	Inhalation, ingestion, dermal and eye contact	Asphyxia, weakness, headache, nausea, vomiting, increased hear rate and depth of respiration, gasping, thyroid failure, blood changes	Dust Meter
Copper	1 mg/m^3	100 mg/m^3	Inhalation, skin or eye contact, ingestion	Irritated eyes, respiratory system; cough dysprea; wheezing	Dust Meter
Arsenic	0.002 mg/m^3	5.0 mg/m^3	Inhalation, eye contact, dermal contact	Skin and mucous membrane irritation; respiration irritation (potential occupational carcinogen)	Dust Meter
Mercury	0.05 mg/m^3	10 mg/m^3	Inhalation eye contact, dermal contact	Irritated eyes, skin; cough; chest pains	Dust Meter
Lead	0.05 mg/m^3	100 mg/m^3	Inhalation, ingestion, dermal contact	Weakness, lassitude, facial pallor, kidney disease	Dust Meter
PCBs	0.2 mg/m^3	10 mg/m^3	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritated eyes; chloracne; liver damage; reproductive effects	Dust Meter

TWA = Time-weighted average.
IDLH = Immediately dangerous to life and health [National Institute for Occupational Safety and Health (NIOSH)].

Notes: Benzo(a)pyrene is listed as an indicator for polycyclic aromatic hydrocarbons (PAHs).

ATTACHMENT B-1
AIR MONITORING STRATEGY

EXPOSURE	METHOD	MONITORING DESCRIPTION	ACTION LEVEL (a)	ACTION
Total Volatile Organics	Photoionization Detector (PID)	Periodically, or when odors are noted	<25 parts per million (ppm) 25-75 ppm >75 ppm	Level D Protection Level C Protection Shut Down; Contact Corp. Health & Safety Officer; Implement Engineering Controls
Particulate Contaminants	Dust Meter	Handling samples/ Continuously	<0.001 milligrams per cubic meter ($mg/m^{3)}$ >0.002 mg/m^3	Level D Protection Implement Engineering Controls; Upgrade to Level C in Interim

(a) For ambient air monitoring.

ATTACHMENT B-2

EMERGENCY INFORMATION

HOSPITAL - **St. Joseph's Hospital**
1717 South J Street
Tacoma, Washington 98405

Information: (253) 426-4101

Directions			Distance
		Total Est. Time: 10 minutes **Total Est. Distance:** 4.74 miles	
START	1:	Start out going SOUTH on N FRONTAGE RD / WA-509 S toward E MARSHALL AVE. Continue to follow WA-509 S.	3.9 miles
	2:	Stay STRAIGHT to go onto S 21ST ST.	0.2 miles
	3:	Turn RIGHT onto TACOMA AVE S.	0.1 miles
	4:	Turn LEFT onto S 19TH ST.	0.2 miles
	5:	Turn RIGHT onto S J ST.	0.1 miles
END	6:	End at **1717 S J St** Tacoma, WA 98405-4933, US	

TELEPHONE - Cellular telephones to be carried by each team on.

EMERGENCY (Fire, Police, Ambulance) -**911**

EMERGENCY ROUTES - Map (see above)

EMERGENCY CONTACTS -

Port of Tacoma:	(253) 383-5841
Security – Main No.	(253) 383-9472
Security – Alternate No.	(253) 926-6844
Project Manager – Scott Hooton	(253) 383-9428
Landau Associates:	
Project Manager – Kris Hendrickson	(425) 778-0907, cell (206) 910-1378
Corporate H&S Manager – Chris Kimmel	(425) 778-0907, cell (206) 786-3801
Other:	
Poison Control Center	(206) 526-2121
National Response Center	(800) 424-8802
WA Div. of Emergency Management	(800) 258-5990

In the event of an emergency on land, call for help as soon as possible.

Dial 911 and give the following information:

- WHERE the emergency is - use cross streets or landmarks
- PHONE NUMBER you are calling from
- WHAT HAPPENED - type of injury
- HOW MANY persons need help
- WHAT is being done for the victim(s)
- YOU HANG UP LAST - let the person you called hang up first.

ATTACHMENT B-3
CERTIFICATION

All field members are required to read and familiarize themselves with the contents of this Health & Safety Plan and acknowledge their agreement to comply with the provisions of the plan through the entry of a signature and date on the section below.

By my signature, I certify that:

- I have read
- I understand
- I will comply with this Site Health and Safety Plan for the Former Kaiser Aluminum Property Remedial Investigation environmental investigations.

Printed Name	Signature	Date	Affiliation

Personnel health and safety briefing conducted by:

_____	_____	_____
Name	Signature	Date

Plan prepared by:

_____/_____	_____/_____	_____/_____
Name	Signature	Date

Plan reviewed by:

_____/_____	_____/_____	_____/_____
Name	Signature	Date

APPENDIX C

Draft Environmental Covenant

After Recording Return
Original Signed Covenant to:
Marv Coleman
Toxics Cleanup Program
Department of Ecology
300 Desmond Drive
Lacey, WA 98503-1274

Environmental Covenant

Grantor: Port of Tacoma
Grantee: State of Washington, Department of Ecology
Brief Legal Description: Southwest quarter and west half of southwest quarter of southeast quarter, Section 36, Township 21 North, Range 3 East of Willamette Meridian
Tax Parcel Nos.: 03-21-36-3-013; 03-21-36-3-033; 03-21-36-3-034; 03-21-36-3-037
Cross Reference: None

RECITALS

a. This document is an environmental (restrictive) covenant (hereafter "Covenant") executed pursuant to the Model Toxics Control Act ("MTCA"), chapter 70.105D RCW and Uniform Environmental Covenants Act ("UECA"), chapter 64.70 RCW.

b. This Restrictive Covenant applies to (i) a portion of Pierce County tax parcel number 03-21-36-3-013; (ii) a portion of Pierce County tax parcel number 03-21-36-3-033; (iii) a portion of Pierce County tax parcel number 03-21-36-3-034; and (iv) a portion of Pierce County tax parcel number 03-21-36-3-037. All tax parcels are part of a site commonly known as the Kaiser site, WAD No. 001882984; the Kaiser site is legally described in Exhibit "A" and has Ecology Facility Site I.D # 38. The portions of each parcel to which this Restrictive Covenant attaches are depicted in Exhibit "B" and are collectively referred to hereinafter as the "Property".

c. The Property is the subject of remedial action under MTCA. This Covenant is required because residual contamination remains on the Property after completion of remedial actions. Specifically, the following principle contaminants remain on the Property:

Medium	Principle Contaminants Present
Soil and/or Groundwater	Diesel- and oil-range petroleum hydrocarbons, cyanide, fluoride, metals, and/or carcinogenic polycyclic aromatic hydrocarbons (cPAHs)

d. It is the purpose of this Covenant to restrict certain activities and uses of the Property to protect human health and the environment and the integrity of remedial actions conducted at the

site. Records describing the extent of residual contamination and remedial actions conducted are available through the Washington State Department of Ecology. This includes the following documents: Remedial Investigation and Feasibility Study and Cleanup Action Plan.

e. This Covenant grants the Washington State Department of Ecology, as holder of this Covenant, certain rights specified in this Covenant. The right of the Washington State Department of Ecology as a holder is not an ownership interest under MTCA, Chapter 70.105D RCW or the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") 42 USC Chapter 103.

f. This Covenant supersedes and replaces the existing environmental (restrictive) covenant, which is recorded with Pierce County as instrument #9504250307.

COVENANT

Port of Tacoma, as Grantor and fee simple owner of the Property hereby grants to the Washington State Department of Ecology, and its successors and assignees (hereafter "Ecology"), the following covenants. Furthermore, it is the intent of the Grantor that such covenants shall supersede any prior interests the GRANTOR has in the property and run with the land and be binding on all current and future owners of any portion of, or interest in, the Property.

Section 1. General Restrictions and Requirements.

The following general restrictions and requirements shall apply to the Property:

a. Interference with Remedial Action. The Grantor shall not engage in any activity on the Property that may impact or interfere with the remedial action and any operation, maintenance, inspection or monitoring of that remedial action without prior written approval from Ecology.

b. Protection of Human Health and the Environment. The Grantor shall not engage in any activity on the Property that may threaten continued protection of human health or the environment without prior written approval from Ecology. This includes, but is not limited to, any activity that results in the release of residual contamination that was contained as a part of the remedial action or that exacerbates or creates a new exposure to residual contamination remaining on the Property.

c. Continued Compliance Required. Grantor shall not convey any interest in any portion of the Property without providing for the continued adequate and complete operation, maintenance and monitoring of remedial actions and continued compliance with this Covenant.

d. Leases. Grantor shall restrict any lease for any portion of the Property to uses and activities consistent with this Covenant and notify all lessees of the restrictions on the use of the Property.

Section 2. Specific Prohibitions and Requirements.

In addition to the general restrictions in Section 1 of this Covenant, the following additional specific restrictions and requirements shall apply to the Property.

a. Land use.

Industrial Land Use: The remedial action for the Property is based on a cleanup designed for industrial land use. As such, the Property shall be used in perpetuity only for industrial uses as that term is defined in the rules promulgated under Chapter 70.105D RCW. Prohibited uses on the Property include, but are not limited, to residential uses, childcare facilities, K-12 public or private schools, parks, grazing of animals, growing of food crops, and non-industrial commercial uses.

b. Containment of soil.

The remedial action for the Property is based on removal of waste and contaminated soil, containing contaminated soil in two areas, and monitoring groundwater to confirm that contaminated groundwater is not migrating off of the Property. Contaminated soil in the Former Log Yard Area and the Wet Scrubber Sludge Area is capped with clean soil. Exhibit B shows the approximate locations of these two capped areas. The primary purpose of the caps is to contain contamination and mitigate risk of direct human contact with contaminated soils. As such, the following restrictions shall apply within the areas illustrated in Exhibit B:

i) With the exception of activities carried out consistent with Section 2(b)(ii), any activity on the Property that will compromise the integrity of the caps including: drilling; digging; piercing the cap with sampling device, post, stake or similar device; grading; excavation; installation of underground utilities; removal of the cap; or, application of loads in excess of the cap load bearing capacity, is prohibited without prior written approval by Ecology. The Grantor shall report to Ecology within forty-eight (48) hours of the discovery of any damage to the cap. Unless an alternative plan has been approved by Ecology in writing, the Grantor shall promptly repair the damage and submit a report documenting this work to Ecology within thirty (30) days of completing the repairs.

ii) Routine activities involving limited subsurface disturbance of the capped areas, such as utility trenching or other maintenance actions and construction activities, shall restore the protective cap upon conclusion of the activity. Intrusive activities in the capped areas that involve worker contact with contaminated soil and/or groundwater shall be conducted by individuals that have the appropriate training and certifications for working on hazardous waste sites, in conformance with the July 1, 2016 Site-specific Materials Management Plan and a Site-specific health and safety plan. The Grantor shall coordinate with Ecology regarding required notifications, approvals, and reporting.

c. Cap inspection

The Grantor covenants and agrees that it shall inspect the cap in the Former Log Yard Area in compliance with the requirements of the Cleanup Action Plan.

d. Groundwater Use.

The groundwater beneath the Property remains contaminated and shall not be extracted for any purpose other than temporary construction dewatering, investigation, monitoring or remediation. Drilling of a well for any water supply purpose is strictly prohibited. Groundwater extracted from the Property for any purpose shall be considered potentially contaminated and any discharge of this water shall be done in accordance with state and federal law. Notwithstanding the foregoing, the groundwater use restrictions in this section apply only to the

use of groundwater beneath the Property in the near surface unconfined aquifer(s) and do not apply to the use of groundwater residing in the confined aquifer(s) at depth that exhibit artesian conditions.

e. Monitoring.

Several groundwater monitoring wells are located on the Property to monitor the performance of the remedial action. The Grantor shall maintain clear access to these wells and protect them from damage. The Grantor shall report to Ecology within forty-eight (48) hours of the discovery of any damage to any monitoring device. Unless Ecology approves of an alternative plan in writing, the Grantor shall promptly repair the damage and submit a report documenting this work to Ecology within thirty (30) days of completing the repairs.

Section 3. Access.

a. The Grantor shall maintain clear access to all remedial action components necessary to construct, operate, inspect, monitor and maintain the remedial action.

b. The Grantor freely and voluntarily grants Ecology and its authorized representatives, upon reasonable notice, the right to enter the Property at reasonable times to evaluate the effectiveness of this Covenant and associated remedial actions, and enforce compliance with this Covenant and those actions, including the right to take samples, inspect any remedial actions conducted on the Property, and to inspect records related to the remedial action.

c. No right of access or use by a third party to any portion of the Property is conveyed by this instrument.

Section 4. Notice Requirements.

a. Conveyance of Any Interest. The Grantor, when conveying any interest in any part of the Property, including but not limited to title, easement, leases, and security or other interests, must:

i. Notify Ecology at least thirty (30) days in advance of the conveyance.

ii. Include in the conveying document a notice in substantially the following form, as well as a complete copy of this Covenant:

NOTICE: THIS PROPERTY IS SUBJECT TO AN ENVIRONMENTAL COVENANT GRANTED TO THE WASHINGTON STATE DEPARTMENT OF ECOLOGY ON [_____] AND RECORDED WITH THE PIERCE COUNTY AUDITOR UNDER RECORDING NUMBER [_____]. USES AND ACTIVITIES ON THIS PROPERTY MUST COMPLY WITH THAT COVENANT, A COMPLETE COPY OF WHICH IS ATTACHED TO THIS DOCUMENT.

iii. Unless otherwise agreed to in writing by Ecology, provide Ecology with a complete copy of the executed document within thirty (30) days of the date of execution of such document.

b. Reporting Violations. Should the Grantor become aware of any violation of this Covenant, Grantor shall promptly report such violation to Ecology.

c. Emergencies. For any emergency or significant change in site conditions due to Acts of Nature (for example, flood or fire) resulting in a violation of this Covenant, the Grantor is authorized to respond to such an event in accordance with state and federal law. The Grantor must notify Ecology of the event and response actions planned or taken as soon as practical but no later than within 24 hours of the discovery of the event.

d. Notification procedure. Any required written notice, approval, or communication shall be personally delivered or sent by first class mail to the following persons. Any change in this contact information shall be submitted in writing to all parties to this Covenant.

Scott Hooton Port of Tacoma PO Box 1837 Tacoma, WA 98401-1837 (253) 383-9428	Environmental Covenants Coordinator Washington State Department of Ecology Toxics Cleanup Program P.O. Box 47600 Olympia, WA 98504 – 7600 (360) 407-6000

As an alternative to providing written notice and change in contact information by mail, these documents may be provided electronically in a format agreed upon at the time of submittal.

Section 5. Modification or Termination.

a. Grantor must provide written notice and obtain approval from Ecology at least sixty (60) days in advance of any proposed activity or use of the Property in a manner that is inconsistent with this Covenant. For any proposal that is inconsistent with this Covenant and permanently modifies an activity or use restriction at the site:

i. Ecology must issue a public notice and provide an opportunity for the public to comment on the proposal; and

ii. If Ecology approves of the proposal, the Covenant must be amended to reflect the change before the activity or use can proceed.

b. If the conditions at the Property requiring a Covenant have changed or no longer exist, then the Grantor may submit a request to Ecology that this Covenant be amended or terminated. Any amendment or termination of this Covenant must follow the procedures in Chapter 64.70 RCW and Chapter 70.105D RCW and any rules promulgated under these chapters.

Section 6. Enforcement and Construction.

a. This Covenant is being freely and voluntarily granted by the Grantor.

b. Grantor shall provide Ecology with an original signed Covenant and proof of recording within ten (10) days of execution of this Covenant and proof of recording to any others required by RCW 64.70.070.

c. Ecology shall be entitled to enforce the terms of this Covenant by resort to specific performance or legal process. All remedies available in this Covenant shall be in addition to any and all remedies at law or in equity, including Chapter 70.105D RCW and Chapter 64.70 RCW. Enforcement of the terms of this Covenant shall be at the discretion of Ecology, and any

forbearance, delay or omission to exercise its rights under this Covenant in the event of a breach of any term of this Covenant is not a waiver by Ecology of that term or of any subsequent breach of that term, or any other term in this Covenant, or of any rights of Ecology under this Covenant.

d. The Grantor shall be responsible for all costs associated with implementation of this Covenant. Further, the Grantor, upon request by Ecology, shall be obligated to pay for Ecology's costs to process a request for any modification or termination of this Covenant and any approval required by this Covenant.

e. This Covenant shall be liberally construed to meet the intent of the Model Toxics Control Act, chapter 70.105D RCW and Uniform Environmental Covenants Act, chapter 64.70 RCW.

f. The provisions of this Covenant shall be severable. If any provision in this Covenant or its application to any person or circumstance is held invalid, the remainder of this Covenant or its application to any person or circumstance is not affected and shall continue in full force and effect as though such void provision had not been contained herein.

g. A heading used at the beginning of any section or paragraph or exhibit of this Covenant may be used to aid in the interpretation of that section or paragraph or exhibit but does not override the specific requirements in that section or paragraph.

The undersigned Grantor warrants it holds the title to the Property and has authority to execute this Covenant.

EXECUTED this _____ day of _____, 20___.

PORT OF TACOMA

_____

by: John Wolfe

Title: Chief Executive Officer

Dated: _____

GRANTOR PORT OF TACOMA ACKNOWLEDGMENT

STATE OF WASHINGTON
COUNTY OF PIERCE

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

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

The Department of Ecology hereby accepts the status as GRANTEE and HOLDER of the above Environmental Covenant.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

_____
by: James Pendowski

Title: Program Manager, Toxics Cleanup Program

Dated: _____

STATE ACKNOWLEDGMENT

STATE OF _____

COUNTY OF _____

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

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

Exhibit A

LEGAL DESCRIPTION

Tax Parcel A

That certain property situated in the southwest quarter of the southeast quarter and the southwest quarter of Section 36, Township 21 North, Range 3 East of the W.M., as shown on a certain Pierce County Record of Survey drawing recorded under Auditor's No. 8512030273 in Pierce County, Washington, lying southwesterly of the southerly right of way line of Taylor Way, more particularly described as follows:

Beginning at a point on the south line of said Section 36, being the southeast corner of the southwest quarter (the south quarter corner) of said Section 36; thence north 89°00'20" west, 163.91 feet along the south line of said Section 36; thence north 00°02'09" east, 416.30 feet along the east line of Bonneville Power Administration Substation Site (BPA) property recorded under Auditor's No. 1378605; thence south 63°32'10" west 211.50 feet along the northeasterly line of said BPA's property; thence continuing north 89°57'51" west, 1172.22 feet along the north line of said BPA's property to the northwest corner of said BPA property, said point being the northeast corner of a tract of land conveyed to the Port of Tacoma, recorded under Auditor's No. 1919462; thence continuing north 89°57'51" west 189.18 feet along the north line of Port of Tacoma property; thence north 47°16'01" west 829.39 feet along the northeasterly property line of the Port of Tacoma, recorded under Auditor's No. 1919462 to the east line of a tract of land conveyed to the Port of Tacoma, recorded under Auditor's No. 8110260223; thence north 01°14'50" east, 757.30 feet parallel with the west line of the northwest quarter of the southwest quarter of said Section 36, to the southwest corner of a tract of land conveyed to Kaiser Aluminum and Chemical Corporation recorded under Auditor's Nos. 8110260224 and 1440041; thence north 00°0'0" east 411.54 feet along the west line of said Kaiser Aluminum's property, Auditor's No. 8110260224 to the northwest corner of said tract of land; thence north 90°00'00" east, 1319.70 feet along the north line of said property, to the southerly right of way line of Taylor Way; thence south 49°19'39" east, 678.23 feet along the southerly right of way line of said Taylor Way, to a brass plug monument at the intersection of the southerly right of way line of Taylor Way with the northerly line of the south half of the south half of the northeast quarter of the southwest quarter of said Section 36, as described in auditor's no. 8110260224; thence continuing south 49°19'39" east, 1549.37 feet along the southerly right of way line of said Taylor Way to the east line of the west half of the southwest quarter of the southeast quarter of said Section 36; thence south 00°43'04" west, 651.47 feet along the east line of the west half of said subdivision to the south line of Section 36; thence north 89°42'41" west, 647.71 feet along the south line of said Section 36 to the south quarter corner of said Section 36, Township 21 North, Range 3 East of the W.M., and the point of beginning.

Tax Parcel B

A non-exclusive easement for the purpose of placement, operation and maintenance of a drainage pipe as granted by instrument recorded under recording number 9309220180.

Situate in the City of Tacoma, County of Pierce, State of Washington.

Exhibit B

PROPERTY MAP

Note
1. This area is capped with clean soil. Activities that may disturb the cap are subject to the restrictions described in Section 2 of the Environmental Covenant.
2. The Former Log Yard Area cap shall be inspected and repaired as described in Section 2 of the Environmental Covenant.
3. Groundwater monitoring shall be conducted in this area as described in the Cleanup Action Plan.
4. The Kaiser Property is restricted to industrial land use. Property groundwater use is restricted as described in the Environmental Covenant.
5. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Legend
Site Boundary

0 240 480
Scale in Feet

Data Source: Jacobs Engineering; Pierce County Assessor; Google Earth Pro 2010

LANDAU ASSOCIATES

Port of Tacoma Tacoma, Washington	**Kaiser Site Plan**	Exhibit B

G:\Projects\118034010\011\Exhibit B Kaiser Site Plan Modified.mxd 8/4/2015 NAD 1983 StatePlane Washington South FIPS 4602 Feet

APPENDIX D

Materials Management Plan

Materials Management Plan
Port of Tacoma Former Kaiser Aluminum Property
Tacoma, Washington

July 1, 2016

Prepared for

Port of Tacoma
Tacoma, Washington

LANDAU ASSOCIATES
130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

TABLE OF CONTENTS

FIGURES

TABLES

1.0 INTRODUCTION

The purpose of this Materials Management Plan (Plan) is to outline the approach and procedures for managing potentially contaminated soil, waste material, or groundwater encountered during construction activities at the Port of Tacoma (Port) former Kaiser Aluminum property (Site), which is approximately 96 acres of the Blair Hylebos Peninsula in Tacoma, Washington(Figure 1).

Kaiser Aluminum operated an aluminum smelter and manufacturing plant at the Site for over 60 years. Between 2003 and 2010, the Port demolished the smelter complex and placed a 2- to 6-foot (ft)-thick layer of structural fill on approximately 80 of the 96 acres. Areas of likely contamination have been investigated and known contamination has been cleaned up. These areas include the Wet Scrubber Sludge Area (WSSA); the Spent Potlining (SPL) Area; the Rod Mill Area Closed Landfill; the Former Rectifier Yard Area; the Former Log Yard Area; the Rod Mill Former Demister Oil Area; and the Rod Mill Former Stormwater Ditch, South and East Sides. The investigations and cleanup actions are documented in previous reports (e.g., Ecology 2015, Landau Associates 2012, 2013, 2014a,b).

The Site Cleanup Action Plan (Ecology 2015) and Environmental Covenant (a draft of which is attached as Appendix C to the Cleanup Action Plan) restrict activities on the Site, such as activities that will compromise the integrity of the Former Log Yard Area and WSSA caps, and restrict land use to industrial. If construction or development activities are proposed in the Former Log Yard Area or WSSA, the Port must be notified and requirements of the Environmental Covenant must be followed. The Port will coordinate with Ecology regarding required notifications, approvals, and reporting.

This Plan was developed by Landau Associates for use by the Port, Port tenants, and their contractors for routine activities involving limited subsurface disturbance (e.g., utility trenching), and will be provided to all contractors and subcontractors. For larger, non-routine construction projects at the Site involving subsurface disturbance, the Port shall submit for the Washington State Department of Ecology's (Ecology's) review and approval a plan for the management of contaminated material that may be generated in the course of the project. Ecology's approval of such a plan shall not necessarily constitute a significant change to the Site Cleanup Action Plan (Ecology 2015). For instance, mass grading, paving, utility installation and support building construction to convert the Site to terminal use would not constitute a significant change to the Site Cleanup Action Plan so long as the grading and building foundation work is done within the clean fill layer and the utility installation complies with the Material Management Plan.

For the purposes of this document, the organization conducting the work (i.e., the Port or Port tenant) will be termed the "Developer." This document addresses recognition of potential contamination and characterization of potential contamination, as well as issues related to material handling and disposal.

2.0 RECOGNIZING POTENTIALLY CONTAMINATED MATERIALS IN THE FIELD

Contaminated soil and groundwater have been identified at the Site. Although identified contamination has been cleaned up or contained beneath a cap, it is possible that future redevelopment or construction activities at the Site could result in discovery of unanticipated contamination. In the event that potentially contaminated materials are encountered during construction, this Plan should be followed to properly manage those materials.

It is important that field personnel understand how to recognize potentially contaminated material at the Site. For the purposes of this plan, clean material can be distinguished from potentially contaminated material using physical observations. Physical observations include visual and olfactory indications. Previous Site investigations have identified carcinogenic polycyclic aromatic hydrocarbons (cPAHs), diesel- and oil-range total petroleum hydrocarbons, cyanide, and metals at concentrations exceeding the cleanup criteria at the Site. Field personnel should be familiar with the physical appearance of the common soil types present throughout the Site so that potentially contaminated materials can be recognized. The following soil types are common at the Site:

- **Unit A, Fill:** consisting of hydraulically dredged sand and silt; silt, sand, and gravel materials imported from off site; and Blair Waterway dredged silt and sand, and generally located from 0 to at least 15 ft below ground surface (BGS). Groundwater is present in this fill material across most of the Site (Landau Associates 2011). The base of Unit A is at or slightly below the mean high water level in the Hylebos and Blair Waterways (Landau Associates 1987).
- **Unit B, Mudflat Deposit:** consisting of sandy to clayey silt with minor amounts of peat, woody debris, and shell fragments, located throughout the Site, generally below Unit A.

Contamination has previously been associated with the following materials and conditions at the Site:

- **Black Carbon Waste:** includes anode and cathode fragments, petroleum coke fragments, coal, coal tar pitch, duct dust, and wet scrubber sludge. These materials are dark gray to black and range from sand-sized to cobble- or boulder-sized. These materials have elevated concentrations of cPAHs. Known areas where spent pot lining was present have been cleaned up and spent pot lining is not expected to be present in other areas of the Site; however, because it is difficult to differentiate between spent pot lining and other black carbon waste based on field observations, cyanide should be considered as potentially present in black carbon waste. Black carbon waste is typically found within the fill layer. If materials that appear to be black carbon waste are encountered, the materials should be analyzed for cyanide and the steps outlined in Section 3.0 followed.
- **Aluminum Refining Waste:** soil-like material that exhibits unnatural or bright colors (e.g., greenish-gray, white). Greenish-gray to white material that is silt- to sand-sized and has a moderate chemical odor is likely synthetic cryolite and may contain elevated levels of fluoride. White silt- to sand-sized material may also be aluminum oxide (alumina) which is

non-hazardous and inert. If greenish-gray to white materials are encountered, the materials should be analyzed for fluoride and the steps outlined in Section 3.0 followed.

- **Concrete and Other Demolition Waste:** includes concrete, refractory brick, and metal fragments. Size ranges from gravel-sized fragments to cobble- and boulder-sized rubble. It may be found in conjunction with aluminum refining waste and black carbon waste. In some areas, concrete foundations for former buildings and structures may be present within or under fill soil; unless visually stained, concrete foundations may be considered inert waste.
- **Petroleum Hydrocarbons:** petroleum hydrocarbon products, such as gasoline, diesel, and motor oil. Contamination may be present in soil or groundwater and typically exhibits one or more of the following characteristics: iridescent sheen, black and greasy appearance, petroleum odor, and dark staining in soil. Creosote-treated railroad ties have been found in areas where rail spurs were covered with fill soil. Polychlorinated biphenyls (PCBs) have previously been found in soil in the Former Rectifier Yard Area.
- **Wood Waste and Slag:** located beneath 4 to 8 ft of a clean soil cap in the Former Log Yard Area. The Asarco slag is a waste byproduct of smelting copper from arsenic- and lead-bearing ores. The slag is generally dark brown in color, can vary in size from sand- to gravel-sized material to a large mass, and is similar in appearance to volcanic rock (EPA 2000). The slag and associated wood waste and soil may contain elevated concentrations of arsenic, copper, zinc, and lead.
- **Underground storage tanks (USTs):** undocumented USTs may be present in the vicinity of former buildings, and may contain heating oil or other petroleum products.

If these materials or comparable conditions are observed during construction activities, the Developer representative shall be notified and this plan implemented.

3.0 SUMMARY OF MANAGING UNANTICIPATED CONTAMINATED MATERIAL

Areas of contamination have been investigated and known contamination has been addressed. However, if potentially contaminated materials are encountered, the following sequence will be implemented:

1. Potentially contaminated materials will be identified by the construction contractor through physical observations (see Section 2.0).
2. The construction contractor will notify the appropriate Developer personnel.
3. The affected material may be stockpiled and tested to determine waste profiling at the direction of the Developer.
4. Samples will be collected for laboratory testing. Results will be compared to the soil and groundwater screening levels presented in Table 1 and Table 2. All results will be reported to the Developer in a timely manner.
5. Soil may be left in place or reused on site if analytical results do not exceed soil screening levels (Table 1).
6. Soil, waste material, and/or water that are determined to be contaminated will be profiled by a Developer representative for disposal at an appropriate waste disposal/treatment facility.
7. Once the waste profile is accepted by the selected waste disposal/treatment facility, the soil, waste material, and/or groundwater will be transported to the selected facility for treatment or disposal. The facility will be notified in advance of the approximate quantity and type of material being transported.
8. Once the unanticipated contaminated material is removed, the area will be re-inspected for potentially contaminated materials.
9. If work is being conducted by a tenant rather than the Port, the tenant will notify the Port when contaminated soil, waste material, and/or water with concentrations above the Site cleanup levels are discovered (Table 1 and Table 2). The tenant will also notify the Port when the unanticipated contaminated material has been removed.

All excavation and associated activities that place workers in contact with unanticipated contaminated material will be conducted by workers that have proper Occupational Safety and Health Administration (OSHA) and Washington Industrial Safety and Health Act (WISHA) training and certification for working at a hazardous waste site. All work conducted by the contractor related to the excavation and handling of unanticipated contaminated materials will be conducted under a contractor-prepared health and safety plan.

4.0 MATERIAL SCREENING AND CHARACTERIZATION

This section describes the procedures that will be used to field screen potentially contaminated materials and characterize unanticipated contaminated materials for disposal purposes.

4.1 FIELD SCREENING OF UNANTICIPATED CONTAMINATED MATERIALS

The following field screening methods will generally be used to evaluate potentially contaminated materials:

- Petroleum sheen testing
- Chemical vapor screening with a photoionization detector (PID) or similar equipment
- Comparison of material to documented contaminated materials previously encountered at the Site, as listed in Section 2.0.

Sheen testing will be conducted on soil that exhibits evidence of petroleum hydrocarbons. The sheen test is conducted by placing a representative sample of the soil in a clear glass jar with tap water. The jar will be agitated and amount of sheen (light, medium, or heavy) will be observed and recorded. Materials exhibiting petroleum sheen will be considered potentially contaminated.

Screening with the PID (or equivalent) will be conducted on materials exhibiting a petroleum or chemical odor to determine if volatile organic compounds (VOCs) are present. PID screening is conducted by placing a representative sample of the soil in a sealed plastic bag. The bag and soil will be agitated, allowed to stand for 5 minutes, and then a headspace reading will be taken of vapor in the bag using the PID. A sustained reading above background or ambient conditions will be used as a general indication of the presence of VOCs. The PID will be capable of detecting most common aromatic and aliphatic hydrocarbon compounds.

Materials exhibiting potential contamination characteristics (as presented in Section 2.0), such as unnatural colored soil or debris, will be considered potentially contaminated material. The material will be considered unanticipated contaminated material if the results of laboratory testing exceed the screening criteria on Table 1 or Table 2.

Soil screening will typically be conducted in areas of potential contamination and will generally guide the collection of samples for analytical testing. Should potentially contaminated soil be excavated, the screening will generally be conducted for approximately every 20 loose cubic yards of excavated soil from the area. The frequency of field screening may be more or less, as needed, depending on the conditions encountered and whether there are varying soil types and levels of impact.

4.2 WASTE CHARACTERIZATION

Soil and water samples will be collected, as necessary, to determine the disposition of unanticipated contaminated material.

Characterization samples will be tested consistent with the type of potential contamination observed in the field (e.g., motor oil-range hydrocarbons, cPAHs, cyanide, fluoride, metals) and potentially associated contaminants identified in Section 2.0. The testing protocol will be consistent with the requirements of the destination waste disposal/treatment facility.

4.2.1 SOIL SAMPLE COLLECTION PROCEDURES

Soil samples will be collected from potentially contaminated material. A shallow hole will be hand-dug at each sample location using decontaminated hand implements, including stainless-steel spoons and steel shovels, picks, and similar equipment. The sidewall surface of the hand-dug hole sidewalls will be scraped to expose a fresh surface for sample collection. Soil will be collected using a decontaminated stainless-steel spoon, placed in a decontaminated stainless-steel bowl, homogenized, and transferred to the appropriate sample container. Material greater than about ¼ inch will be removed from the sample prior to placing the soil in the sample container.

4.2.2 WATER SAMPLE COLLECTION PROCEDURES

Water samples will be collected, as needed, to characterize potentially contaminated water encountered during construction activities (e.g., surface water or groundwater within an excavation). Water samples will be collected into the appropriate laboratory-supplied sample containers. Samples collected for metals analyses will be field filtered. Samples will be chilled to 4°C immediately after collecting the sample. Clean gloves will be worn when collecting each sample.

4.2.3 SAMPLE TRANSPORTATION AND HANDLING

The transportation and handling of samples will be accomplished in a manner that protects the integrity of the sample. Samples will be kept in coolers on ice until delivery to the analytical laboratory. Samples will be logged on a chain-of-custody (COC) form. The COC form will accompany each shipment of samples to the laboratory.

5.0 DECONTAMINATION PROCEDURES

The following sections describe decontamination procedures for reusable sampling utensils and heavy construction equipment.

5.1 SAMPLING EQUIPMENT DECONTAMINATION

Reusable sampling utensils will be decontaminated before collecting each sample to avoid cross-contamination between samples. Decontaminated sampling utensils will be handled in a manner that minimizes contact with potentially contaminated surfaces. Between sampling events, all nondedicated equipment will be stored in a manner (e.g., in a plastic bag) that protects them from inadvertent contamination.

Decontamination of sampling equipment will consist of the following steps:

- Spray or scrub soiled equipment
- Wash with an Alconox (or equivalent) soap-water solution
- Rinse with tap water
- Rinse with de-ionized or distilled water.

If sampling equipment becomes coated (e.g., with oil), the equipment may require application of a cleaning solvent (typically hexane, sprayed from a bottle) and subsequent wipe-down as an additional decontamination step.

5.2 HEAVY EQUIPMENT DECONTAMINATION

Heavy equipment used for sampling, excavating, or hauling contaminated soil will be decontaminated by the contractor, using dry decontamination procedures. Dry decontamination procedures consist of using a shovel or brush to wipe equipment to remove soil, and ensuring that soil removed is disposed with contaminated soil. If heavy equipment becomes coated (e.g., with oil), the contractor will establish a decontamination area and use a high-pressure water washer, or suitable equivalent methodology, to complete decontamination. The decontamination area will consist of a designated area large enough for equipment (e.g., dump trucks, excavators, etc.) to drive on. The decontamination area will be bermed and lined to prevent runoff. Use of a tire wash to prevent track-out of solids is a stormwater best management practice for construction and earthmoving work; heavy equipment will pass through a tire wash station prior to leaving the Site. The condition and usability of the decontamination area will be monitored as needed. The contractor will be responsible for keeping the decontamination area intact and functioning. Water from the decontamination process will be collected and managed as required by the Specifications applicable to a specific future construction and/or development project.

6.0 WASTE MANAGEMENT

This section provides information about how unanticipated contaminated soil and waste materials will be handled.

6.1 PLAN FOR INSTRUCTING WORKERS

Excavation supervisors and workers will be provided with training and other information from this Plan about the nature of hazardous substances that are potentially present in the soil they are excavating, and how to identify potentially contaminated soil (Section 2.0). These personnel will have the authority to stop excavation operations and request direction and assistance in evaluating materials that appear to be potentially contaminated.

6.2 EXCAVATION, LOADING, HAULING, AND TRANSPORT METHODS

Guidelines and general information about the handling of excavated materials are provided in this section.

6.2.1 EXCAVATION

Excavation will be conducted with the appropriate excavating equipment. Dewatering, draining, or absorption of any free water may become necessary. Dewatering methods include varying types of site groundwater handling that lower the groundwater table and remove water from the excavation (e.g., dewatering by excavation sump pump).

6.2.2 LOADING

Soil will be directly loaded into trucks for transport to export destination sites to the extent practicable. The moisture and consistency of soil will be monitored to ensure that materials loaded are in a condition suitable to prevent spills during transit to stockpile locations or other destination areas. Whether the soil is contaminated or not, the truck will pass through a tire-wash station prior to leaving the Site to prevent track-out of solids.

6.2.3 TRANSPORT

Soil transport to offsite locations will be monitored to ensure that the cargo is fully contained and protected in transit, and in compliance with local, state, and federal transportation requirements. In general, truck and trailer combinations will be used.

6.3 SOIL STOCKPILES

Contaminated soil may be stockpiled for temporary storage prior to loading for disposal. Stockpile locations and layouts will be determined when contaminated soil is identified. The stockpile area will be lined to prevent infiltration of water to the underlying soil, and bermed to prevent surface water runon/runoff. Unanticipated contaminated soil stockpiles will be kept separate from any other stockpiled soil or debris. The contractor will maintain the stockpile area(s) and will cover stockpile(s) to protect the soil from precipitation on an as-needed basis. Lists and inventory of stockpile materials will be documented by the contractor. Soil stockpiles will be removed and disposed or reused based on the results of analytical testing. Stockpiles of unanticipated contaminated soil will be removed from the Site within 90 days of receipt of analytical results.

6.4 DISPOSAL FACILITIES

Specific disposal facilities will be identified by the Developer for the acceptance of contaminated soil and water potentially generated by a project. Soil can either be disposed at a solid waste landfill or at an inert waste landfill, depending on the nature of contamination and chemical concentrations. Disposal of solid waste in a Pierce County facility is regulated by Tacoma-Pierce County Health Department; their Waste Disposal Authorization Process must be completed prior to disposal of materials. Black carbon material that contains cyanide will be disposed as spent pot liner at a hazardous waste landfill. Criteria for disposal of affected Site soil should be determined for the specific disposal facilities identified to receive contaminated Site materials.

Profiling, manifesting, and testing requirements are generally similar for all solid waste facilities. Sufficient generator information and representative sample analytical data are needed to properly characterize and profile the material. Each facility's permit has site-specific restrictions on the types of waste that can be accepted, which is addressed in the profiling process. Bills of lading are used to document non-dangerous waste disposal. Hazardous waste manifests are used to transport and document dangerous waste disposal.

7.0 REPORTING

If unanticipated contamination is encountered during construction activities, the findings, resulting actions implemented, and remaining Site conditions will be reported to Ecology. If the Port is conducting the project, the Port will determine the appropriate method of reporting in consultation with Ecology. If the project is being conducted by a tenant, the tenant and the Port will consult with Ecology to determine the appropriate reporting method.

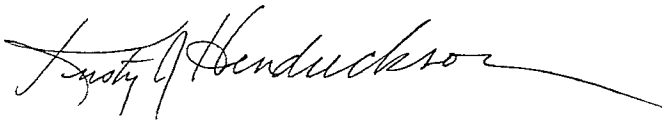
8.0 USE OF THIS PLAN

This Materials Management Plan has been prepared for the exclusive use of the Port of Tacoma and applicable regulatory agencies for specific application to the Port of Tacoma former Kaiser Aluminum property. This Plan was developed for the Port as a general plan for potential future development; third party use of information, conclusions, and recommendations provided herein shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

Rachel Morgan, E.I.T.
Senior Staff Engineer



Kristy Hendrickson, P.E.
Principal

RMM/KJH/kes

9.0 REFERENCES

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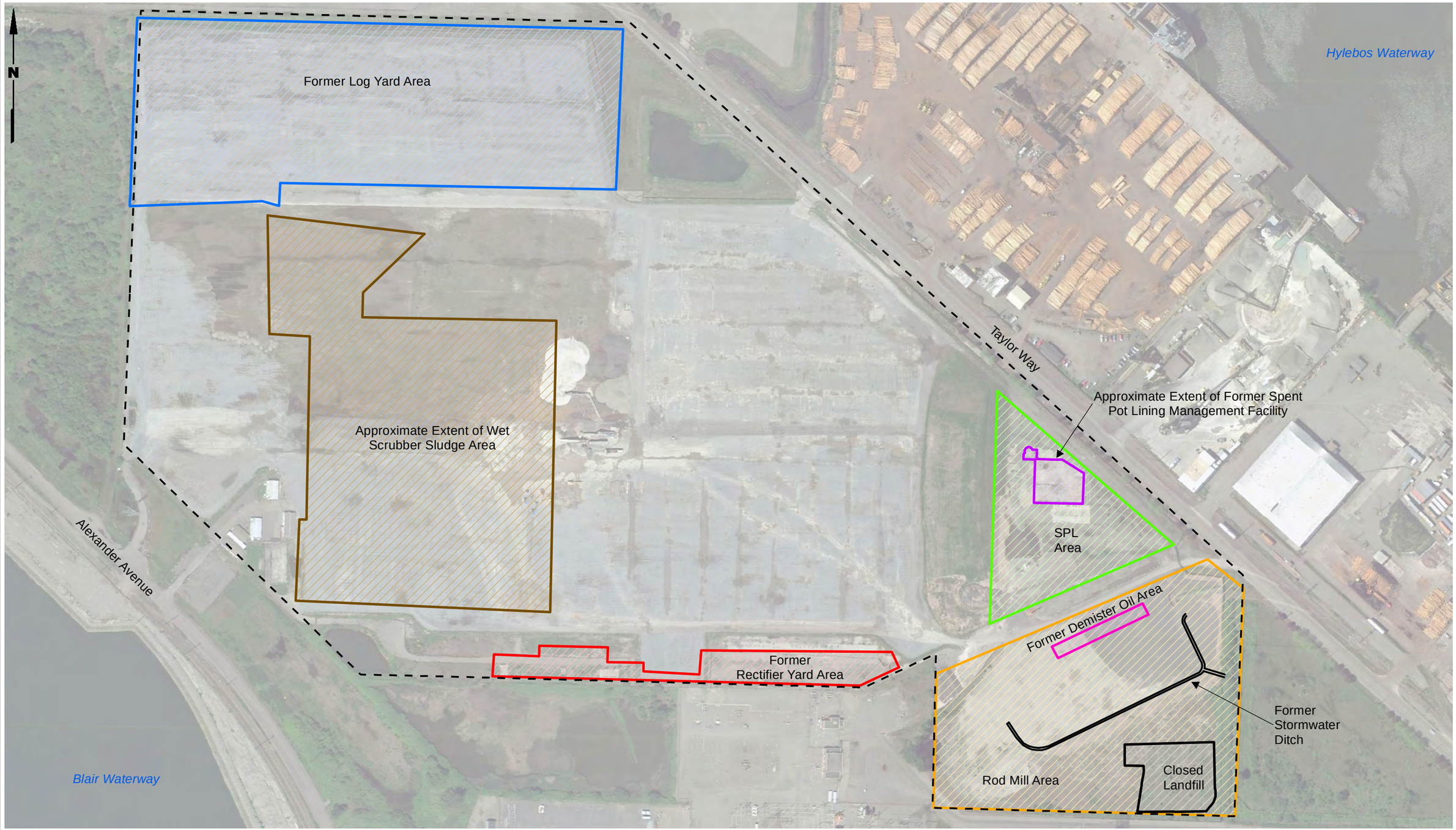

G:\Projects\118\0340\10\011\Figure 1 Kaiser Site Plan 2010.mxd 6/22/2015 NAD 1983 StatePlane Washington South FIPS 4602 Feet

Legend

Site Boundary

0 240 480

Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Jacobs Engineering; Pierce County Assessor; Google Earth Pro 2010

LANDAU ASSOCIATES

Port of Tacoma Tacoma, Washington	**Kaiser Site Plan**	Figure 1

TABLE 1
SOIL SCREENING LEVELS FOR DETECTED CONSTITUENTS
KAISER MATERIALS MANAGEMENT PLAN
TACOMA, WASHINGTON

Constituent	MTCA Method C Screening Level
METALS (mg/kg)	
Arsenic	20
Copper	36
Chromium (a)	1,000,000
Lead	1,000
Zinc	100
PAHs (µg/kg)	
Benzo(a)pyrene	350
Benzo(a)anthracene	130
Benzo(b)fluoranthene	440
Benzo(k)fluoranthene	440
Chrysene	140
Dibenzo(a,h)anthracene	640
Indeno(1,2,3-cd)pyrene	1,200
Total cPAH - benzo(a)pyrene TEQ (b)	2,000
PCBs (mg/kg)	
Total PCBs	2.0
PETROLEUM HYDROCARBONS (mg/kg)	
Diesel-Range Organics	2,000
Oil-Range Organics	2,000
Mineral Oil-Range Organics	4,000
CONVENTIONALS (mg/kg)	
Cyanide	3,200

mg/kg = milligrams per kilogram
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyls
TEQ = toxicity equivalency quotient
MTCA = Model Toxics Control Act

(a) Cleanup levels are for Chromium III.
(b) A TEQ will be calculated for each sample containing carcinogenic PAHs above reporting limits and compared to the benzo(a)pyrene screening level in accordance with 173-340-708(8)(e).

TABLE 2
GROUNDWATER WATER SCREENING LEVELS FOR DETECTED CONSTITUENTS
KAISER MATERIALS MANAGEMENT PLAN
TACOMA, WASHINGTON

Constituent	MTCA Method B Screening Level
VOLATILES (µg/L)	
1,1-Dichloroethane	--
1,2,4-Trimethylbenzene	--
1,3,5-Trimethylbenzene	--
2-Butanone	--
4-Isopropyltoluene	--
4-Methyl-2-Pentanone (MIBK)	--
Acetone	--
Benzene	23
Carbon Disulfide	--
Chloroform	283
Ethylbenzene	2,100
Isopropylbenzene	--
m,p-Xylene	--
Methylene Chloride	590
Naphthalene	4,900
n-Butylbenzene	--
n-Propylbenzene	--
o-Xylene	--
sec-Butylbenzene	--
Toluene	15,000
Total xylene	--
Vinyl Chloride	2.4
PAHs (µg/L)	
1-Methylnaphthalene	--
2-Methylnaphthalene	--
Acenaphthene	640
Acenaphthylene	--
Anthracene	26,000
Benzo(g,h,i)perylene	--
Dibenzofuran	--
Fluoranthene	90
Fluorene	3,500
Naphthalene	4,900
Phenanthrene	--
Pyrene	2,600
cPAHs (µg/L)	
Benzo(a)pyrene	0.018
Benzo(a)anthracene	0.020
Benzo(b)fluoranthene	0.018
Benzo(k)fluoranthene	0.036
Chrysene	0.019
Dibenzo(a,h)anthracene	0.018
Indeno(1,2,3-cd)pyrene	0.018
TEQ (a)	0.030

TABLE 2
GROUNDWATER WATER SCREENING LEVELS FOR DETECTED CONSTITUENTS
KAISER MATERIALS MANAGEMENT PLAN
TACOMA, WASHINGTON

Constituent	MTCA Method B Screening Level
PCBs (µg/L)	
Aroclor 1016	0.020
Aroclor 1242	--
Aroclor 1248	--
Aroclor 1254	0.020
Aroclor 1260	--
Aroclor 1221	--
Aroclor 1232	--
Total PCBs	0.020
TOTAL METALS (µg/L)	
Arsenic	8.0
Cadmium	8.8
Chromium (total)	50
Chromium III	240,000
Chromium VI	50
Copper	20
Lead	10
Mercury	0.15
Zinc	160
PETROLEUM HYDROCARBONS (mg/L)	
Diesel Range	0.5
Motor Oil Range	0.5
CONVENTIONALS (mg/L)	
Total Cyanide	16
WAD Cyanide (b)	0.01

µg/L = micrograms per liter
mg/L = milligrams per liter
-- Indicates no screening level criteria available.
PAH = polycyclic aromatic hydrocarbons
cPAH = carcinogenic PAH
PCB = polychlorinated biphenyl
TEQ = toxiccity equivalency quotient
MTCA = Model Toxics Control Act

(a) A TEQ would be completed for each sample containing carcinogenic PAHs above reporting limits and compared to the benzo(a)pyrene screening level in accordance with WAC 173-340-708(8)(e). However, federal criteria are established for individual cPAHs.
(b) National Recommended Water Quality Criteria is expressed as free cyanide.