Reichhold / SSA Containers Inc. Cleanup Action Plan

December 2008

DEPARTMENT OF ECOLOGY
State of Washington

DEPARTMENT OF ECOLOGY
State of Washington

Reichhold / SSA Containers Inc. Cleanup Action Plan

FINAL

December 2008

Executive Summary

This document is a "cleanup action plan" or "CAP" for the Reichhold/SSA Containers Inc. site located in Commencement Bay (3320 Lincoln Avenue, Tacoma, WA). Under state environmental law (Model Toxics Control Act, Chapter 173-340 WAC), a cleanup action plan is the document in which a final cleanup decision is made for a contaminated site. This plan provides details on the site history, the nature and extent of the contamination, cleanup standards and site cleanup details, including costs and justification.

Reichhold Inc. formerly owned a 52-acre property comprising most of the contaminated site. Reichhold used the land for chemical manufacturing. From 1956-1990, Reichhold produced chemical and chemical-related products including pentachlorophenol, urea-formaldehyde resins, calcium, chloride solution, treated fiber products and a formaldehyde catalyst. In July of 2006, SSA Containers Inc., which is a subsidiary of SSA Marine, purchased the Reichhold property. SSA Containers Inc. intends to use this land as a shipping / container facility. Land ownership of the shipping container facility will eventually be transferred to the Puyallup Tribe of Indians.

Because of Reichhold's chemical manufacturing operations, the site became significantly contaminated with the wood preservative pentachlorophenol (PCP), as well as other hazardous substances. Pentachlorophenol (PCP) is a white organic solid with needle-like crystals and a phenolic odor. The greatest use of pentachlorophenol is as a wood preservative (fungicide). Though once widely used as an herbicide, it was banned in 1987 for these and other uses, as well as for any over-the-counter sales. The USEPA has determined that pentachlorophenol is a probable human carcinogen, and may cause damage to the central nervous system.

Over time, releases of pure crystalline PCP to the site soils contaminated the shallow water table. This in turn resulted in ntamination of what is known as the "intermediate" site aquifer. Site soils are chiefly comprised of dredge spoils (fine medium sand). In 1986-87, a significant off-property "plume" of PCP contaminated ground water was detected. The movement of this plume may have in part been influenced by seawater fluctuations and pumping within a former graving dock west of the site and along the Blair Waterway.

Over the last 20 years, Reichhold and SSA Containers have worked with the USEPA and the Washington State Department of Ecology on various site cleanup activities. A site ground water "pump and treat" system captured and intercepted the off-site ground water PCP plume. A shallow interceptor drain (SID) captures shallow ground water along the site periphery. Lastly, a significant amount of contaminated soil has been removed and disposed of off-site in permitted landfills or treated on-site in treatment cells. Because of all the historical cleanup activity, this site is now in the final stages of cleanup. This cleanup action plan provides details for two media: soil and ground water. Here is a brief synopsis of the final site cleanup action:

- Soil: contaminated soil (e.g. contaminated with PCP) from several site areas (e.g. "PCP plant") will be excavated and removed.

- Ground water: PCP concentrations have declined significantly. Consequently, ground water "pump and treat" will be discontinued. The proposed remedy is "monitored natural attenuation" or "MNA". In other words, the site ground water will be monitored to ensure that concentrations will continue to decline and not impact off site areas (i.e. the Blair Waterway).

This cleanup action plan represents the culmination of over 20 years of work by Reichhold, SSA Containers Inc., Ecology and EPA. Several environmental consulting firms have also worked on this site, including CH2M Hill and Floyd|Snider. ology sincerely appreciates the work done by all on this site.

DEPARTMENT OF
ECOLOGY
State of Washington

Note to the Reader

This document has two parts. This first part of this document is the "cleanup action plan" or "CAP" (pp. 1-60). The "CAP" provides details on how this site will be cleaned-up. The second part of this document is: Attachment B – Compliance Monitoring Contingency Plan (CMCP). This plan provides details on the site ground water monitoring requirements. Specifically, monitored natural attenuation or "MNA" is the proposed ground water remedial action. As part of the MNA action, you must demonstrate, by ground water monitoring, that natural attenuation is occurring. Details on future ground water compliance monitoring requirements are provided in the "CMCP".

Table of Contents

List of Tables

List of Figures

List of Abbreviations and Acronyms

Acronym/Abbreviation	Definition
ARAR	Applicable or relevant and appropriate requirement
BGS	Below ground surface
BPA	Butylphenol Process Area
CAMU	Corrective Action Management Unit
CAP	Cleanup Action Plan
CDA	Construction Debris Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CLARC	Cleanup levels and risk calculations
CMCP	Compliance Monitoring and Contingency Plan
COC	Chemical of concern
CRS	Catalyst Reclaim Sludge
CWA	Clean Water Act
DCAP	Draft Cleanup Action Plan
DWM	Dangerous Waste Management
FFS	Focused Feasibility Study
FRI	Focused Remedial Investigation
HCL	Hydrochloric Acid
KM	Kaplan Meier
LDR	Land Disposal Regulation
MNA	Monitored natural attenuation
MTCA	Model Toxics Control Act
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NPDES	National Pollutant Discharge Elimination System
NWAPA	Northwest Air Pollution Authority
ODEQ	Oregon Department of Environmental Quality
OSHA	Occupational Safety and Health Act
PCB	Polychlorinated biphenyl
PCP	Pentachlorophenol
PCOC	Potential chemical of concern
POTW	Publicly-owned Treatment Works
PPA	Pentachlorophenol Plant Area
PSCAA	Puget Sound Clean Air Authority
RAO	Remedial action objective
RBC	Risk-based calculation
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington

1.0 Introduction

This Cleanup Action Plan (CAP) sets cleanup standards and describes a cleanup action for the Reichhold / SSA Containers site (the "site"). This site was the former location of a chemical manufacturing plant located at 3320 Lincoln Avenue in Tacoma, Washington (Figure 1, p. 3).

The Washington State Department of Ecology (Ecology) is responsible for the cleanup action selection and completion of the CAP. The selected cleanup action fulfills the requirements of the Model Toxics Control Act (MTCA) RCW 70.105D. The objectives of this document are to satisfy the MTCA requirements set forth in WAC 173-340-380(1). This CAP has information on the site:

- history,
- nature and extent of contamination,
- cleanup standards,
- proposed remedial actions, including alternatives considered and justification for the selected remedial actions, and
- implementation schedule and next steps.

This CAP is one in a series of documents used by Ecology to monitor the progress of site investigation and cleanup. A summary of site investigations and the site's regulatory history are provided in Section 2.0. The CAP will be finalized pending incorporation of public comment.

1.2 APPLICABILITY

This CAP is applicable only to the Reichhold / SSA Containers Inc. site in Tacoma, Washington. The proposed site remedial actions meet the WAC 173-340-360 requirements. Site cleanup standards and remedial actions were derived under Ecology oversight using MTCA authority. Ecology's decisions for this site do not set precedent for other sites.

1.3 OWNERSHIP REVIEW AND OBLIGATIONS

On July 27, 2006 ("closing date"), SSA Containers, Inc. (SSA) purchased a 52-acre property comprising most of the site from Reichhold, Inc. SSA has assumed all cleanup responsibilities[1] including all obligations not completed as of the closing date. Effective on the closing date, Ecology approved Reichhold's request for transfer of the existing Dangerous Waste Management Permit and the minor Class 1 permit modification to SSA. The Agreed Orders were reissued to reflect SSA's ownership of the site and acceptance of the associated obligations. Section 2.3 presents the regulatory status and history of the site. Since SSA purchased the site, it has worked with Ecology to continue site cleanup and monitoring, as specified in the Agreed Orders. This CAP describes the evaluations and recommendations for final site cleanup action.

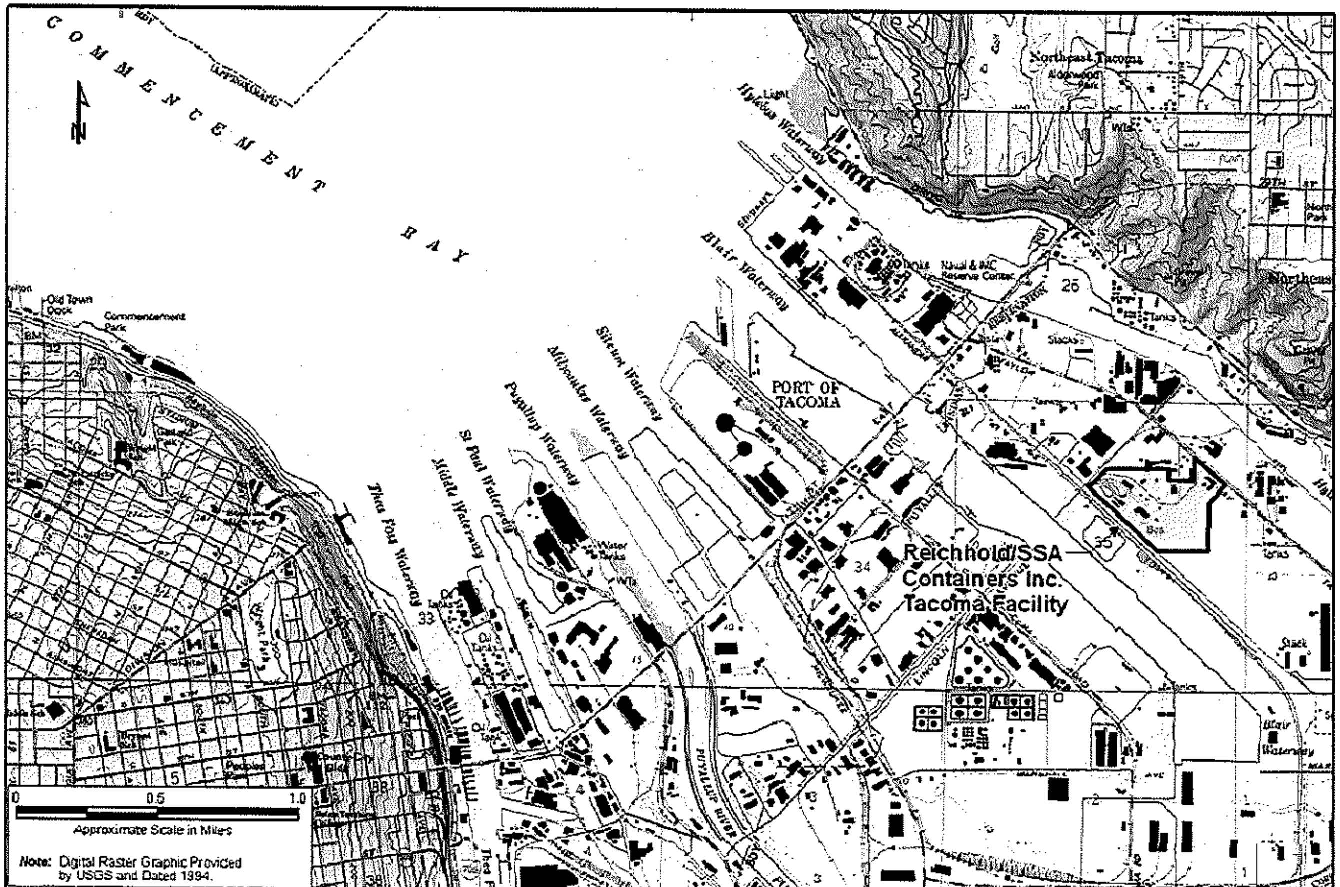
---

[1] Ecology Agreed Order Nos. 1577 and 1578.

1.4 GOALS FOR COMPLETION OF REMEDIAL ACTIONS AND FUTURE SITE USE

It is anticipated that this site will be developed for marine industrial use as a portion of the planned Puyallup Tribal Terminal. In early 2008, SSA and the Puyallup Tribe reached agreement on transfer of land ownership. Specifically, following completion of cleanup actions and site development, it is anticipated this site will be transferred into long-term tribal ownership. The site development will be coordinated with implementation of final cleanup actions and will allow for long-term environmental monitoring. This cleanup action plan provides details on all of the soil and ground water remedial alternatives that were considered as well as future monitoring requirements.

Figure 1: Site Vicinity Map.



	Cleanup Action Plan **Reichhold/SSA Containers Facility** **Tacoma, Washington**	**Figure 1 – Site Vicinity Map.**

2.0 Site Description and History

2.0 Site Description and History

This ~ 52-acre site, which is now owned by SSA Containers, Inc. and formerly owned by Reichhold Inc., is located in the Commencement Bay industrial area of Tacoma, Washington. The site is located between the Hylebos and Blair Waterways (Figure 2, p. 5). The site is located on relatively flat terrain with generally less than 5 feet of topographic relief. This site is located in an area that was constructed in the early 1950s. The then-existing salt marsh was filled with dredge spoils from adjacent waterways (CH2M HILL 2006). The site is currently zoned for industrial use. SSA operates the existing site groundwater treatment system and soil treatment cells. Portions of the site are subleased on a month-to-month basis for industrial use.

In the future, this land will be used as a marine cargo facility, as specified in the Port of Tacoma's Master Plan for the East Blair Terminal. SSA plans to redevelop the site into a paved industrial site for marine cargo handling, consistent with neighboring uses and designated zoning. The site redevelopment action is anticipated to occur in 2010-2011 upon receipt of applicable land use and development permits.

2.1 PHYSICAL SETTING

2.1.1 Geology

The site is located within the Tacoma tideflats, an area of unconsolidated sediment from the Puyallup River Valley, which extends from Commencement Bay to the south flank of Mount Rainier, more than 45 miles to the east. Sediment deposited at the mouth of the Puyallup River built a large estuarine delta into Commencement Bay. The delta consisted of a tidal flat that merged landward with complex tidal marshes and sinuous tidal channels that in turn merged with the Puyallup River Valley floor.

2.1.2 Hydrogeology

The site is underlain by three aquifers and two confining layers or "aquitards". These three aquifers, which are brackish and non-potable, are referred to as the shallow, intermediate, and deep aquifers. The two aquitards are referred to as the upper and lower aquitards. The Tacoma tideflats are a regional groundwater discharge area. Groundwater flows from recharge areas (higher elevations) toward discharge areas along Commencement Bay and adjacent waterways, e.g. the Blair Waterway. Because of this situation, the vertical groundwater gradient direction is typically upward from the deep aquifer to the intermediate aquifer.

The shallow aquifer consists of fine to medium sand and silty sand that is primarily dredge spoils from the Hylebos and Blair Waterways deposited in the 1950s. The shallow aquifer is unconfined and ranges in saturated thickness from 0 to 10 feet above the upper aquitard.

Figure 2: Site Map.

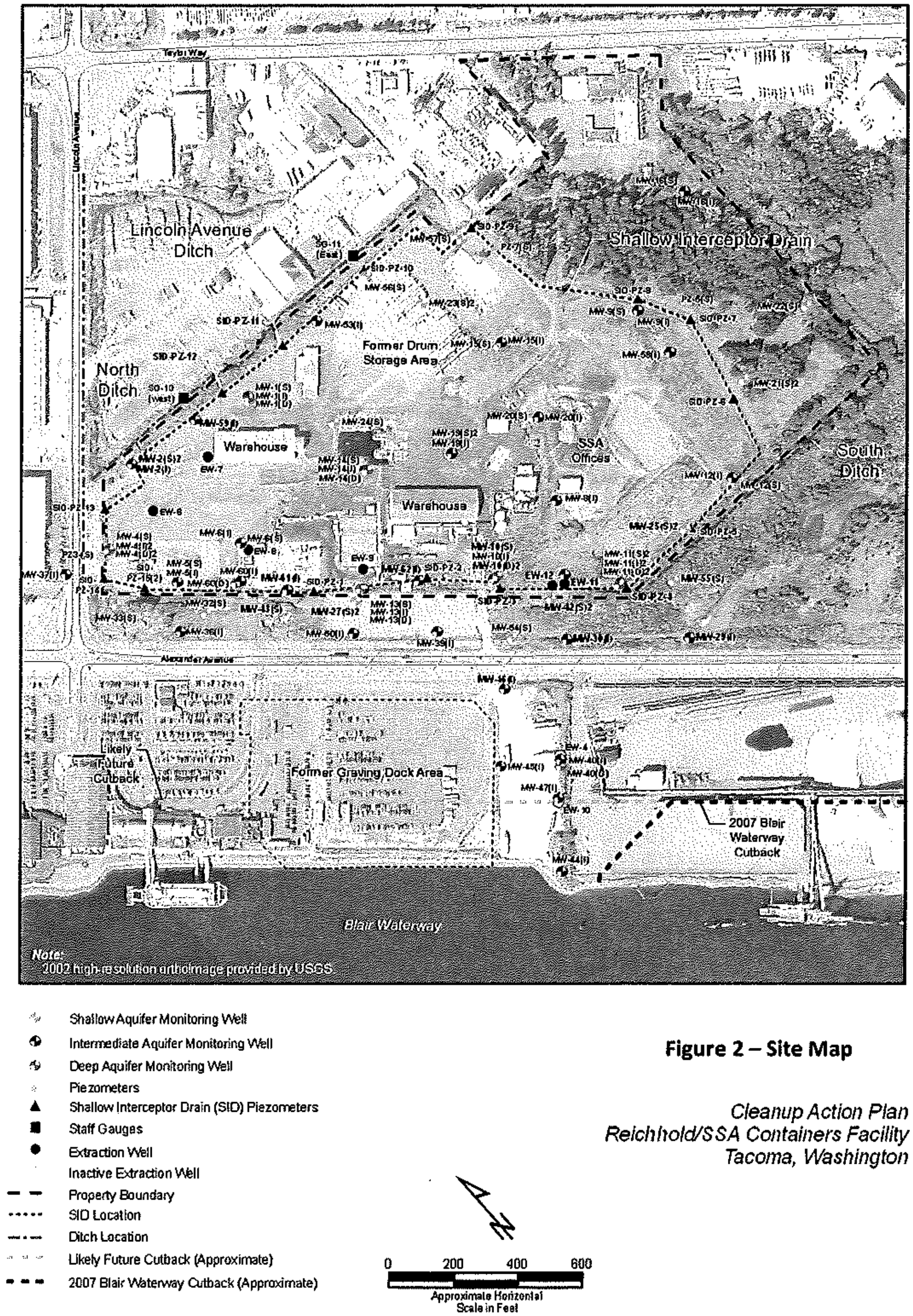


Figure 2 – Site Map

Cleanup Action Plan
Reichhold/SSA Containers Facility
Tacoma, Washington

Groundwater flow within the shallow water table aquifer is generally radial from the interior of the site toward the Shallow Interceptor Drain (SID) and drainage ditches at the perimeter of the site. This "SID" system was installed in 1989 to capture shallow ground water from the perimeter of the manufacturing arm of the site.

The upper aquitard is comprised of the uppermost native formation, which is considered to represent the former ground surface of the salt marsh that existed prior to dredge spoil filling. The unit ranges from 1 to 20 feet thick and consists primarily of silt, organic silt, and clayey silt, with zones of peat.

The intermediate aquifer consists primarily of fine to medium sand and silty sand, with zones of interbedded sand, silty sand, and silt. The intermediate aquifer ranges in thickness from 4 to approximately 31.5 feet. Groundwater elevation data indicate that the intermediate aquifer groundwater generally flows from east to west across the eastern portion of the site, toward the Blair Waterway and Commencement Bay. The intermediate aquifer is also tidally influenced (Blair Waterway), which results in gradient reversals. However, the overall or net groundwater flow direction is toward the waterway. Transient reversals in the groundwater flow direction do not prevent groundwater discharge to the waterway. Current site groundwater flow patterns are also influenced by the groundwater extraction system. Historically, the general site groundwater flow pattern across was west toward the Blair Waterway and becoming more southwesterly in the off-site area, closer to the Blair Waterway.

The lower aquitard separates the site intermediate and deep aquifers. This unit consists of silt, organic silt, and clayey silt, with occasional very fine sandy silt and peat interbeds and zones of organic material. The lower aquitard ranges in thickness from approximately 5.5 to 18 feet.

The deep aquifer consists primarily of alternating fine to medium sand and silty sand, with occasional silt interbeds. The total thickness of the deep aquifer is not known; however, regional studies indicate that the sand might reach a thickness of 80 feet or more near the site (Walters and Kimmel 1968). Groundwater flow in the Deep aquifer occurs under confined conditions, with the potentiometric surface approximately 20 to 30 feet above the top of the unit. Groundwater flow in the Deep aquifer is generally to the southwest toward the Blair Waterway. The deep aquifer is tidally influenced and experiences transient, localized reversals in the groundwater flow direction. The net groundwater flow direction in the deep aquifer is toward the Blair Waterway.

Underlying the three uppermost aquifers is up to 400 feet of generally fine-grained marine sediments. These fine-grained sediments provide a low-permeability base that separates the three uppermost aquifers beneath the site from the underlying deep regional aquifer, a glacially derived unit of alternating layers of fine- and coarse-grained materials (Walters and Kimmel 1968).

2.1.3 Surface Water

Three ditches border the site property boundary: North, South and Lincoln Avenue (Figure 2, p. 5). The North ditch runs along the northern SSA site boundary and carries stormwater runoff from SSA and other adjacent properties to the Lincoln Avenue ditch. The Lincoln Ave ditch runs along the western site boundary. The Lincoln Ave. ditch receives runoff from several industrial and urban properties northeast of the site. Lincoln Ave. stormwater then enters a concrete culvert adjacent to the site that conveys stormwater runoff to the Blair Waterway. The South ditch is located along a portion of the southeast site boundary. The North and South ditches flow only when precipitation runoff or high groundwater levels cause inflow into them, and typically either go dry or cease to flow and become stagnant during dry summer conditions.

In 2007, the Port of Tacoma widened a portion of the Blair Waterway. This widening or cutback will extend further north to accommodate development of the Puyallup Tribal Terminal. This new cutback will decrease the distance from the site to the Blair Waterway by ~ 200 feet, which means the site property boundary is now 600 feet from the Blair Waterway.

2.2 HISTORIC USE AND INTERIM ACTIONS

Reichhold operated a manufacturing plant on its property that produced chemical and chemical-related products including pentachlorophenol, urea-formaldehyde resins, calcium chloride solution, treated fiber products and a formaldehyde catalyst between 1956 and 1990. Reichhold worked with Ecology and the U.S. Environmental Protection Agency (USEPA) Region 10 beginning in 1986 to investigate, begin remediation, and permit the property for further cleanup action (CH2M HILL 2006). Reichhold has conducted Resource Conservation and Recovery Act (RCRA) corrective actions, including a "facility assessment" and a "facility investigation".

2.3 REGULATORY STATUS AND HISTORY

Effective July 30, 2004, the regulatory guidelines for implementing site corrective action include a Dangerous Waste Management Permit (No. WAD009252891; the "DWM" Permit). This DWM permit was granted by Ecology to Reichhold, as specified in Agreed Orders 1577 and 1578. The DWM permit and associated Agreed Orders replaced the RCRA "Storage and Corrective Action" permit issued by USEPA Region 10. This permit had been in effect since December 4, 1988. USEPA delegated authority for final RCRA corrective actions to Washington State in 1997.

To facilitate transfer of the DWM Permit from Reichhold, SSA entered into an Ecology Agreed Order (No. 1577). To satisfy corrective action under WAC 173-303-646, a Focused Remedial Investigation (FRI) and FFS are required.

Reichhold completed the final FRI in April 2006. Ecology the FRI on July 26, 2006. SSA submitted the FFS work plan to Ecology in March 2007 and it was approved by Ecology on June 21, 2007. The submission of the final FFS in June 2008 is the second deliverable described in the attachment.

Through the DWM Permit, Ecology and SSA have also entered into Agreed Order No. 1578. Under the requirements of this order, a "grandfathered" site Corrective Action Management Unit (CAMU) was established. This site CAMU is actually an "interim action" that was used as part of the overall site cleanup action. A "grandfathered" CAMU is an area designated by Ecology for implementing "corrective action" requirements (WAC 173-303-64620). A CAMU may only be used for the management of "remediation" or cleanup wastes (e.g. contaminated soil). SSA operates the CAMU as approved by Ecology and in accordance with the WAC 173-340 (MTCA) requirements.

By facilitating a final cleanup under MTCA, Chapter 17.105D RCW, the CAMU helps to satisfy the corrective action requirements (WAC 173-303-64620). In accordance with the requirements of WAC 173-340-430(3)(b), the creation of the CAMU can be incorporated into a final site remedial action and does not foreclose reasonable alternatives for any additional site corrective action.

In the 1988 RCRA Storage and Corrective Action permit issued to Reichhold by USEPA, interim actions included source area cleanup, containment, and treatment of groundwater. Cleanup actions included:

- 1996 - excavation of impacted soil from, the former pentachlorophenol plant area (PPA).
- 1996 - excavation of impacted soil from the north extension area.
- Excavation of impacted soil from the off-site drum storage area and the septic tank and leach field.
- 2002- excavation of over 23,000 cubic yards of impacted soil from the construction debris area (CDA).
- 2002 - excavation of impacted soil from the PPA.

Excavated soil was either placed in the soil treatment cells for on-site biological treatment or disposed of off-site at an approved facility.

When Reichhold owned the bulk of the site, it also implemented several remedial actions. These actions significantly reduced chemicals of concern (COCs) in both soil and ground water. SSA continues to operate the ground water pump and treat (hydraulic containment) system for shallow and intermediate groundwater. The ground water pump and treat is composed of three components:

- The SID was installed in 1989 around the perimeter of the manufacturing portion of the site to intercept and collect shallow aquifer groundwater.
- The site ground water treatment system (intermediate aquifer) was also installed in 1989 to remediate areas of on and off-property groundwater contamination (west to the Blair Waterway). The current extraction well system consists of six active site extraction wells.
- Water that is captured by the SID and the groundwater extraction system is pumped to an on-site water treatment system. This treatment system uses photolysis[2] technology in combination with direct oxidation to remove dissolved-phase ground water PCP and other chlorinated phenols. This treatment system has been operational since 1990. The treatment system was upgraded in 1992 to meet the capacity (i.e. more gpm) of the extraction systems.

Treated ground water is discharged to the Blair Waterway under the conditions of National Pollutant Discharge Elimination System Waste Discharge Permit No. WA0040771 (NPDES Permit). The current NPDES permit was issued to Reichhold on May 11, 2004 and took effect July 1, 2004. The NPDES Permit was modified to reflect SSA's ownership of the site on July 12, 2006 and expires June 30, 2009. In

---

[2] Enhanced oxidation using photodissociation of hydrogen peroxide to hydroxyl radicals and subsequent oxidation of PCP molecules to hydrochloric acid, carbon dioxide, and water.

addition to governing discharge of treated groundwater through Outfall RC-1, the NPDES Permit also governs discharge of stormwater to Lincoln Avenue ditch through Outfall RC-2.

SSA complies with its requirements under the NPDES Permit including:

- discharge limitations and monitoring requirements for wastewater and stormwater,
- reporting requirements (including monthly discharge monitoring reports),
- operations and maintenance requirements,
- treatment residual requirements,
- stormwater source control requirements,
- annual outfall inspections, and
- semi-annual toxicity testing at Outfall RC-1.

3.0 Nature and Extent of Contamination / Cleanup Standards

3.1 NATURE AND EXTENT OF CONTAMINATION

The following subsections provide details on the nature and extent of site contamination for groundwater, soil, and soil treatment cells (WAC 173-340-700).

3.1.1 Groundwater

Pentachlorophenol (PCP) and breakdown products (other chlorinated phenols) are the key ground water contaminants associated with the site. Chlorinated solvents (i.e. trichloroethylene or "TCE") and associated breakdown products (e.g. vinyl chloride) were also detected, although at lower concentrations. A significant ground water "plume" of dissolved-phase PCP was discovered in 1986-87. This plume had migrated off-property and west to the Blair Waterway. The source of this plume appeared to be the "Construction Debris Area (CDA)". In this area, wooden pallets with bags of pure crystalline PCP were buried in shallow soils. This in turn resulted in shallow aquifer contamination, which in turn resulted in significant contamination of the intermediate aquifer. The movement of the historical off property PCP plume may have also been influenced by seawater fluctuations within a former graving dock west of the site and adjacent to the Blair Waterway.

Since 1986, the site has undergone significant investigation, monitoring, and remediation, including hydraulic control and treatment of groundwater. This includes several corrective actions that have removed contaminated soil source areas. Groundwater COCs, their fate and transport, exposure pathways, and receptors are well understood. Also, as established in this CAP, site groundwater "remediation levels" (WAC 173-340-200) were derived for "source" areas (e.g. the PCP plant). These remediation levels are considered protective of off-site receptors (Blair Waterway).

As part of the FFS work, the sampling results for the last 5 years (Mar-03 to Feb-08) for all ground water COCs were compared to cleanup and remediation levels. Aside from one substance, all site groundwater COCs are now less than the remediation levels. The one exception was the detection of 2,3,4,6-tetrachlorophenol @ 2,800 ug/L (ppb) in monitoring well MW-14(S) on two occasions. This concentration is greater than remediation levels. MW-14(S) is located immediately south of the PPA and hundreds of feet from the perimeter ditches. Concentrations of 2,3,4,6-tetrachlorophenol in samples from perimeter monitoring wells located closer to the ditches (near the off-property conditional point of compliance) are all less than surface water criteria. Thus, this seems to indicate that remnant chlorinated phenols (e.g. 2,3,4,6-tetrachloropehnol) are not likely to migrate off property and impact surface water (Blair Waterway).

Natural attenuation processes and soil removal actions have significantly reduced ground water COC concentrations. As a result, the site ground water is now in compliance, i.e. concentrations are now less than remediation levels. Concentration vs. time plots of various ground water COCs (1985-2008) are provided in the FFS, Appendix C. Because of the site cleanup and natural attenuation, it is anticipated that site ground water COC concentrations will continue to decline over time.

3.1.2 Soil

The FFS evaluated six site soil areas of concern: SWMU 6 Resin Tank Farm (RTF), SWMU 10 Hydrochloric Acid (HCL) Pond Area, SWMU 11 Catalyst Reclaim Sludge (CRS) Area, SWMU 24 (PPA), SWMU 25 Butylphenol Process Area (BPA), and SDA-9 Area. The FFS evaluation concluded that all areas, except the RTF and CRS area, would potentially require further action. The areas investigated and sample locations are shown on Figure 3, p. 13.

Each of the site areas requiring further action are described in the next subsections. Section 5.0 provides details on the proposed remedial actions (including the development and evaluation of all remedial alternatives) for these soil areas of concern.

3.1.2.1 SWMU 10—Hydrochloric Acid Pond Area

The HCL pond area was a stormwater and acid neutralization pond for hydrochloric acid that was produced as a byproduct of the pentachlorophenol process. This area was "unlined". Soil samples collected from this area during the pre-closure and focused soil investigation were analyzed for inorganic chemicals, pesticides, polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs) and volatile organic compounds (VOCs). The soil sample results indicate that 3 substances exceed cleanup levels: 2,4-dichlorophenol, tetrachloroethene, and trichloroethene.

With respect to 2,4-dichlorophenol, one sample had a concentration (52.7 mg/kg) higher than the 34 mg/kg cleanup level. In order to get a "better perspective" on the impacts of one sample exceeding standards, the MTCA statistical guidance was used to evaluate sample results. Based on the statistical analysis, the remnant soil 2,4-dichlorophenol concentrations do not exceed cleanup levels established in this CAP, per the MTCA WAC 173-340-740 (7)(d) and (e) criteria:

- The upper one-sided 95 percent upper confidence limit (UCL) on the true mean soil concentration shall be less than the soil cleanup level,
- No single sample concentration shall be greater than two times the soil cleanup level, and
- Less than 10 percent of the sample concentrations shall exceed the soil cleanup level.

The standard mean and 95 percent UCL were calculated using a USEPA statistical package known as "ProUCL[3]" (version 4.0). Due to the multiple detection limits in the data set, the Kaplan Meier (KM) mean and standard deviation were used. In addition to meeting the first criterion, the sample results meet the last two criteria. Therefore, the sampling and statistical analysis confirm that the HCL Pond area soil complies with MTCA cleanup standards for 2,4-dichlorophenol. For the remaining COCs, the HCL pond area was identified for further action (Section 5.0).

---

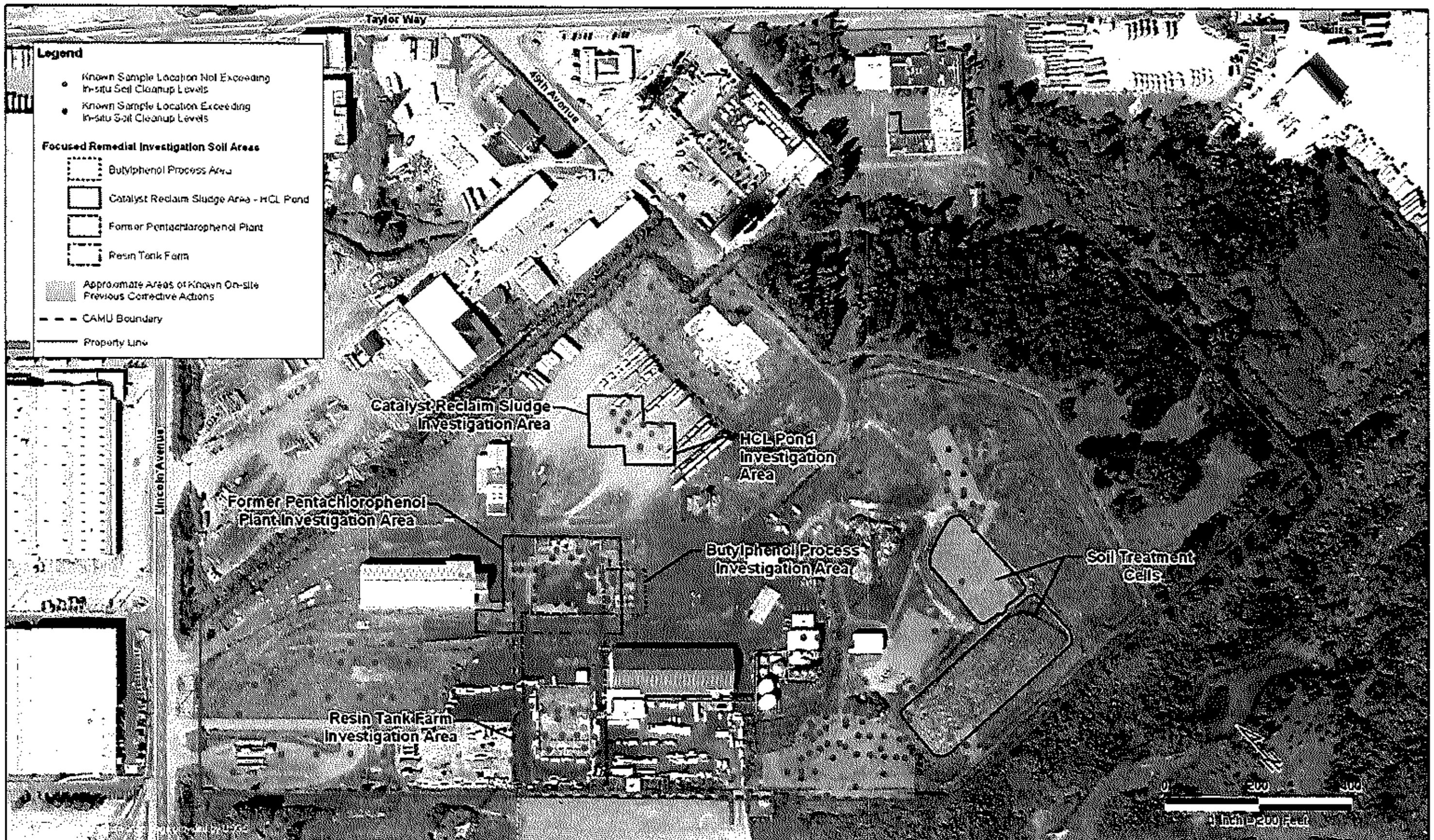
[3] "ProUCL" is a statistical software program developed by Lockheed Martin Environmental Services for USEPA. This statistical package offers a variety of tools and techniques for calculating the 95% upper confidence limit (UCL95) on the mean.

3.1.2.2 SWMU 24—Pentachlorophenol Plant Area (PPA)

The PPA was the main site pentachlorophenol (PCP) production area. Soil samples collected from this area during the preclosure, focused and supplemental soil investigations were analyzed for inorganic chemicals, pesticides, PCBs, SVOCs and VOCs. Sample results indicate that pentachlorophenol, 2,4-dichlorophenol, 2-chlorophenol, Aroclor 1248 and trichloroethene exceed cleanup levels established in this CAP.

Several previous remedial action excavations removed approximately 6,000 cubic yards of soil from the PPA area. During the latest PPA area excavation (2002), noxious odors were encountered while removing the contaminated soil. The odors were detected as the excavation neared the aquitard at depths of approximately 7- 8 feet.

Figure 3: Soil Sample and Corrective Action Locations.



	Cleanup Action Plan **Reichhold/SSA Containers Facility** **Tacoma, Washington**	Figure 3

PPA soil samples with COCs that exceed cleanup levels are shown in Figure 4, p. 15. These samples include PP1108.0A and PP1109.0A, which are co-located and are near the 2002 PPA excavation. The approximate footprints of the previous excavations are shown on Figure 4, p. 15. It is likely that these samples were used as confirmation samples to determine the extent of the excavation. However, due to extreme odors encountered during excavation, the area was backfilled prior to complete removal of all contaminated soil.

A supplemental soil investigation was conducted in November 2007. The objective of this investigation was to reassess the nature and extent of soil areas with "free product" or non-aqueous phase liquids (NAPLs). This free chemical product was thought to be the source of the odors during the 2002 excavation. The delineation of the contaminated soil provided a clearer estimate of the limits and volume of final remedial action necessary in this area. The results of this investigation are provided in the Supplemental Soil Investigation Report (Floyd|Snider 2008) and the FFS. The PPA area has been identified for further action (Section 5.0).

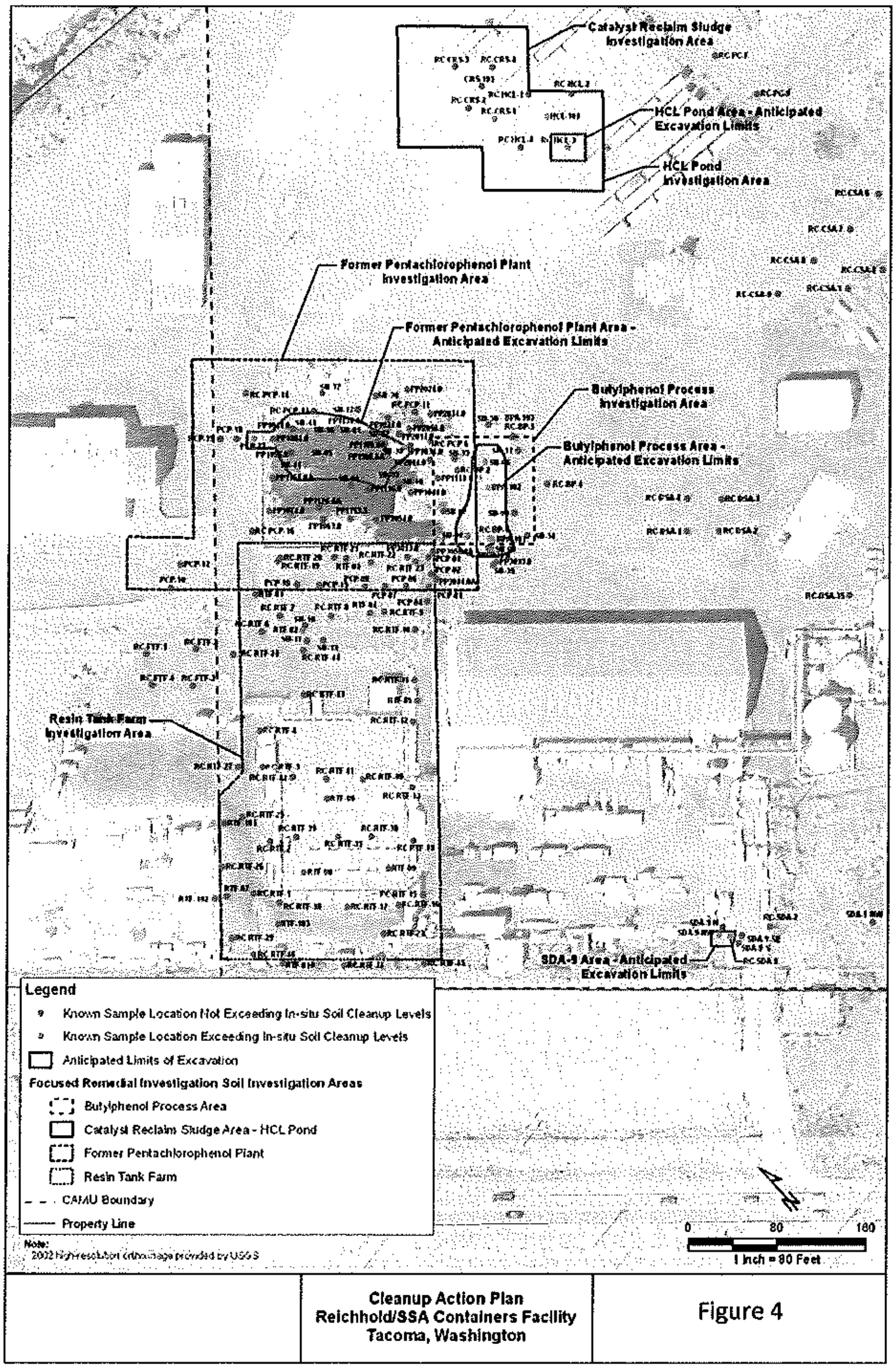
3.1.2.3 SWMU 25—Butylphenol Process Area (BPA)

The BPA formerly contained equipment that used to produce a variety of chemicals. A key "landmark" for this area was a distillation column. One of the chemical product lines produced in the BPA included the reclamation and distillation of Dowtherm™, which resulted in "still bottoms" containing PCBs. Other product lines processed through the same equipment used chlorophenols as raw materials. It is assumed that these processes were a source of soil contamination.

During the November 2007 Supplemental Soil Investigation, Geoprobe (direct push) soil borings were used to assess the nature and extent of contamination. This information was then used to estimate how much soil would need to be excavated from this area (Supplemental Soil Investigation Report, Floyd|Snider 2008).

Samples collected during the preclosure, focused and supplemental soil investigations were analyzed for inorganic chemicals, pesticides, PCBs, SVOCs, and/or VOCs. Sample results indicate that 2,4,6-trichlorophenol and 2,4-dichlorophenol exceed cleanup levels established in this CAP. The BPA has been identified for further action (Section 5.0).

Figure 4: Soil Areas of Concern.



3.1.2.4 SDA-9 Area

The SDA-9 area is an area to the northwest of the Construction Debris Area (CDA). It was previously identified as a location that required excavation due to exceedances of PCBs (Aroclor 1248). The excavation for this area was planned for construction in the late 1990s; however, this did not occur, as there were concerns about affecting existing utility lines. It has now been determined that the excavating soil in the SDA-9 area will not affect existing utilities.

Soil samples collected during both the 1986 preclosure Investigation and the 1994 soils characterization investigation were analyzed for inorganic chemicals, pesticides, PCBs, SVOCs, and VOCs. Sample results indicate that Aroclor 1248 exceeds cleanup levels established in this CAP. The SDA-9 has been identified for further action (Section 5.0).

3.1.3 Soil Treatment Cells

The soil treatment cells contain contaminated soil (from previous excavations) that is being treated with a biological amendment (Daramend™). The Daramend™ technology uses a solid-phase organic amendment that is applied and tilled into the top 24-inch "horizon" of soil. This horizon is then tilled and irrigated between May and October. The Daramend™ technology enhances and promotes natural bioremediation rates by adjusting "natural" soil conditions, i.e. enhance natural bacterial colonies and stimulate biodegradation of organic compounds. The technology irreversibly mineralizes soil aromatic hydrocarbons and chlorinated phenols. Additionally, rainwater infiltration leaches contamination from soil to deeper horizons within the cells, as evidenced by chlorophenol content in the cell leachate.

Each soil horizon typically takes 1 to 2 years to remediate to treatment levels, depending upon initial soil contaminant (e.g. PCP) concentrations. As the technology becomes more refined, the period for the treatment of each horizon has been reduced. Each horizon consists of approximately 5,000 cubic yards of soil for both cells. It is estimated that there are between 6,000 and 10,000 cubic yards remaining and the remaining soil will be treated by 2011. This is consistent with the timeline for anticipated site development.

3.2 DEVELOPMENT OF CLEANUP STANDARDS

Details on how to derive cleanup standards are provided in WAC 173-340-700(3). When you derive cleanup levels, you must:

1. Determine cleanup levels (CULs). Cleanup levels are concentrations of hazardous substances (i.e. COC) that are protective of both human health and the environment.

2. Determine the point of compliance or the location where the cleanup levels must be met.

3. Comply with all other applicable state and federal laws ("ARARs"; Table 1, p. 19).

Since this site is zoned industrial, MTCA Method C soil cleanup levels are established in this CAP. As for ground water, the site ground water is non-potable or unfit for human consumption (WAC 173-340-720(2)(d)). Consequently, surface water cleanup levels were used for the shallow and intermediate ground water that discharges to the Blair Waterway.

3.2.0 Ground Water Point of Compliance (POC)

For the shallow water table aquifer, the point of compliance (POC) established in this CAP is the perimeter ditches. For the intermediate aquifer, the POC established in this CAP is where ground water discharges to surface water (Blair Waterway). The conceptual site model that was used to develop cleanup standards is shown in Figure 5, p. 18.

Figure 5: Conceptual Site Model.

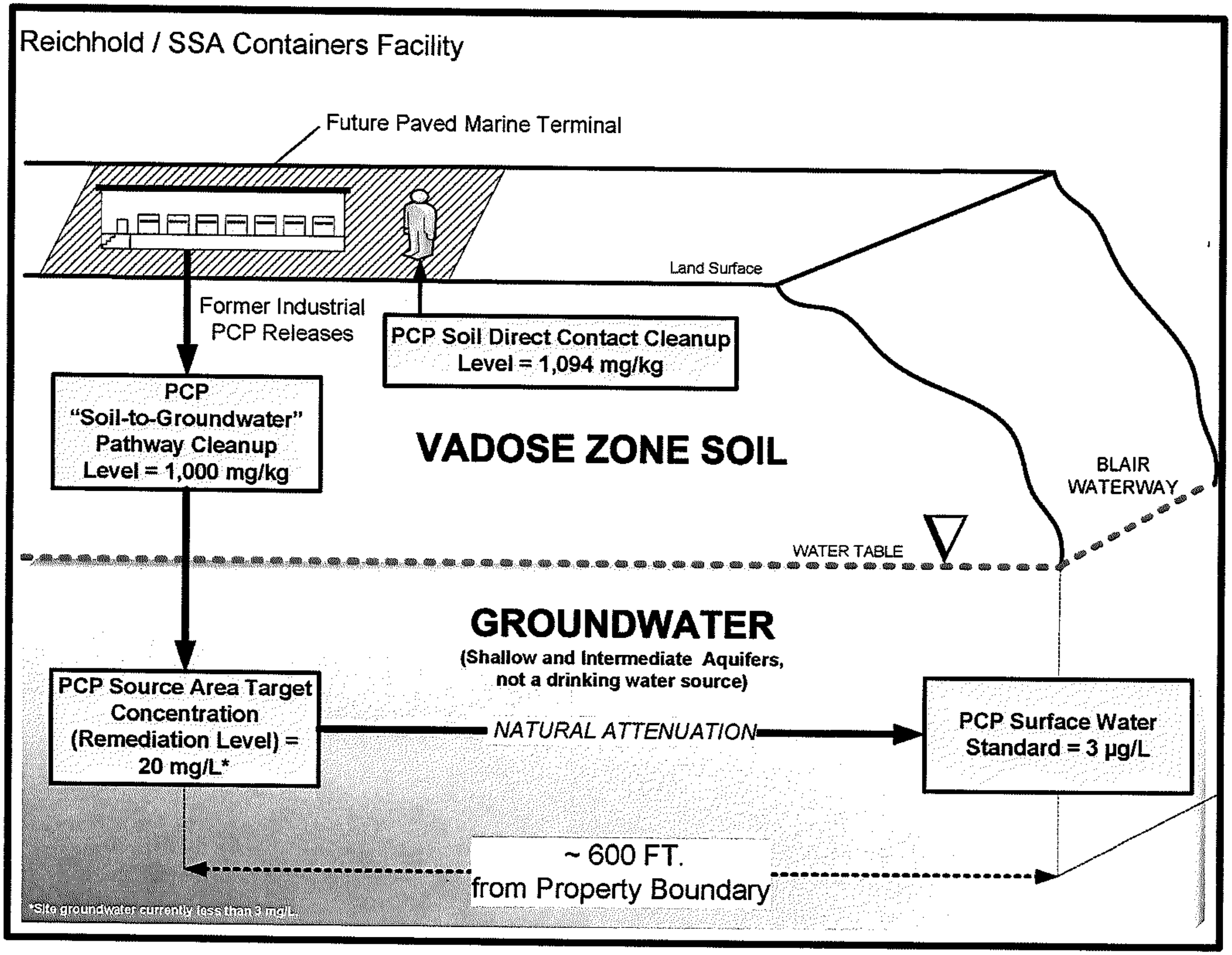


Table 1: Applicable or Relevant and Appropriate Requirements (ARARs).

	Standard, Requirement, or Limitation	Description	Applicability
Hazardous Substance-specific ARARs	*General Requirements*		
	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and National Oil and Hazardous Substances Pollution Contingency Plan (42 USC 9601 et seq and 40 CFR 300)	Establishes federal administrative processes and standards to identify, investigate, and clean up facilities where hazardous substances are located.	Although the Facility is regulated as a RCRA site with the Washington State Department of Ecology (Ecology) taking the lead on cleanup, the Facility is located within the area designated as the Commencement Bay Nearshore/Tideflats Superfund site in the USEPA Superfund CERCLA Information System (CERCLIS) database. Ecology is regulating the cleanup of this Facility under MTCA and will conduct the cleanup in compliance with Resource Conservation and Recovery Act (RCRA), CERCLA, and National Contingency Plan.
	Resource Conservation and Recovery Act (RCRA) (40 CFR 239 through 282)	RCRA, an amendment to the Solid Waste Disposal Act, was enacted in 1976 to address the huge volumes of municipal and industrial solid waste generated nationwide. RCRA has been amended and revised since; however, the goals remain: • to protect human health and the environment from the potential hazards of waste disposal, • to conserve energy and natural resources, • to reduce the amount of waste generated, and • to ensure that wastes are managed in an environmentally sound manner. CERCLA is a related statute that deals with cleaning up inactive and abandoned hazardous waste sites. RCRA, on the other hand, deals with hazardous wastes that are destined for treatment, disposal or recycling and the facilities that treat, store or dispose of such wastes. In Washington, most RCRA requirements are displaced by equivalent or more stringent requirements under the Hazardous Waste Management Act and Dangerous Waste Regulations which stand in lieu of RCRA as part of a RCRA-authorized state hazardous waste program.	This is a RCRA Facility addressed by Washington State under a RCRA-authorized state law (the Hazardous Waste Management Act) for implementation of final corrective actions.
	Surface Water Requirements		
	Model Toxics Control Act (MTCA) (WAC 173-340)	Establishes Washington State administrative processes and standards to identify, investigate, and clean up facilities where hazardous substances are located.	Facility is regulated under MTCA and must meet MTCA cleanup requirements.
	Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A)	The Surface Water Standards establish water quality standards for surface waters of Washington State. Water quality standards require that toxic substances shall not be introduced beyond the mixing zone above levels that have the potential to adversely affect characteristic water users, cause acute or chronic toxicity to the most sensitive biota, or adversely affect public health.	Applicable at the Blair Waterway and ditches that discharge into the Blair Waterway.
	Clean Water Act (CWA) (33 USC 1251 et seq.)	Section 401 of the CWA requires the establishment of guidelines and standards to control the direct or indirect discharge of pollutants to the waters of the United States. Section 402 establishes the National Pollutant Discharge Elimination System (NPDES), which provides for the issuance of permits to regulate discharges to navigable waters.	Section 401 is applicable. Requirements under Section 402 are discussed under Action-specific ARARs for NPDES issues related to construction.
	National Recommended Water Quality Standards 40 CFR 131	These water quality standards define the water quality goals of the water body by designating the use or uses to be made of the water and by setting criteria necessary to protect the uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water, and serve the purposes of the CWA.	Washington State Water Quality Standards have been revised and resubmitted to USEPA for approval.
	Washington Water Pollution Control Law RCW 90.48; WAC 173-220	Washington State has been delegated authority to issue NPDES permits. CWA Section 301, 302, and 303 require states to adopt water quality standards. The Washington Water Pollution Control Law and regulations address this requirement.	Substantive requirements are applicable for NPDES requirements and stormwater management under Action-specific ARARs.
	Groundwater Requirements		
	Model Toxics Control Act (MTCA) (WAC 173-340)	Establishes Washington State administrative processes and standards to identify, investigate, and clean up facilities where hazardous substances are located.	MTCA applies to cleanups of hazardous substances released to the environment and such cleanups must meet MTCA standards. Cleanup levels must consider beneficial use of groundwater, which is impact to surface water.

Table 1: ARARs (cont.)

	Standard, Requirement, or Limitation	Description	Applicability
Hazardous Substance-specific ARARs (cont'd)	***Groundwater Requirements (cont'd)***		
	Drinking Water Standards—Maximum Contaminant Levels (WAC 246-290-310)	Establishes standards for contaminant levels in drinking water for water system purveyors.	No drinking water supplies are impacted by the Facility; therefore, these standards are not applicable.
	Water Quality Standards for Ground Waters of the State of Washington (WAC 173-200)	Implements the Water Pollution Control Act and the Water Resources Act of 1971 (90.54 RCW).	Not applicable at sites operating under consent decree with USEPA or Ecology.
	Soil Requirements		
	Model Toxics Control Act (MTCA) (WAC 173-340)	Establishes Washington State administrative processes and standards to identify, investigate, and clean up facilities where hazardous substances are located.	MTCA applies to cleanups of hazardous substances released to the environment and such cleanups must meet MTCA standards. The standards include requirements for alternative selection, cleanup standards, monitored natural attenuation, and restoration time frame.
Location-specific ARARs	***Shoreline, Wetlands, and Other Critical Areas***		
	Washington Shoreline Management Act (RCW 90.58; WAC 173-14) Tacoma Municipal Code Chapter 13.10—Shoreline Management	The Washington Shoreline Management Act, authorized under the federal Coastal Zone management Act, establishes requirements for substantial development occurring within the waters of Washington State or within 200 feet of a shoreline.	Not applicable, the Facility is more than 200 feet from the shoreline.
	Tacoma Municipal Code Chapter 13.11—Critical Areas Preservation	Critical areas include critical aquifer recharge areas, fish and wildlife habitat conservation areas, flood hazard areas, geologically hazardous areas, stream corridors, wetlands, and any buffer zones. The criteria and standards provided in this chapter are intended to secure the public health, safety, and welfare by: • protecting members of the public and public resources form damage or injury due to slope failures, erosion, landslides, and seismic or volcanic hazards, • maintaining a healthy functioning ecosystem, • preventing impacts to streams, fish and wildlife habitats, and water quality, • providing open space and aesthetic value, • providing migratory pathways for fish and birds, and • giving special consideration to conservation efforts.	Substantive requirements may be applicable based on specific actions and locations. MTCA remedial actions are exempt from the procedural requirements of this law, but must comply with the substantive requirements.
	Executive Order 11990, Protection of Wetlands (40 CFR 6, Appendix A)	Executive Order 11990 Section 7 requires measures to minimize the destruction, loss, or degradation of wetlands. Requires no net loss of remaining wetlands.	Only applicable if alternatives impact wetlands.
	Flood Plain Management 40 CFR 6, Appendix A: 10 CFR 1022	In 100-year flood plains, actions must be taken to reduce the risk of flood loss, minimize the impact of floods on human safety, and restore and preserve the natural beneficial values of flood plains.	Substantive requirements may be applicable based on specific actions and locations. MTCA remedial actions are exempt from the procedural requirements of this law, but must comply with the substantive requirements.
	Washington Floodplain Management Plan RCW 68.16; WAC 173-158	An advisory standard pertaining to wetlands management that suggests local governments, with technical assistance from Ecology, institute a program that can identify and map critical wetland areas located within base floodplains.	
	Tribal and Cultural Protections		
	Native American Graves Protection and Repatriation Act (25 USC 3001 through 3113; 43 CFR Part 10) and Washington's Indian Graves and Records Law (RCW 27.44)	These statutes prohibit the destruction or removal of Native American cultural items and require written notification of inadvertent discovery to the appropriate agencies and Native American tribe. These programs are applicable to the remedial action if cultural items are found. The activities must cease in the area of the discovery, a reasonable effort must be made to protect the items discovered, and notice must be provided.	Because of the Facility's industrial history, Native American protections are likely not an issue; however, the National Historic Preservation Act is applicable.

Table 1: ARARs (cont.)

	Standard, Requirement, or Limitation	Description	Applicability
Location-Specific ARARs (cont'd)	***Tribal and Cultural Protections (cont'd)***		
	Archaeological Resources protection Act (16 USC 470aa et seq.; 43 CFR part 7)	This program sets forth requirements that are triggered when archaeological resources are discovered. These requirements only apply if archaeological items are discovered during implementation of the selected remedy.	Because of the Facility's industrial history, Native American protections are likely not an issue; however, the National Historic Preservation Act is applicable.
	National Historic Preservation Act (16 USC 470 et seq.; 36 CFR parts 60, 63, and 800)	This program sets forth a national policy of historic preservation and provides a process that must be followed to ensure that impacts of actions on archaeological, historic, and other cultural resources are protected.	
Action-specific ARARs	***Evaluate Environmental Impacts***		
	State Environmental Policy Act (SEPA) RCW 43.21C; WAC 197-11	Establishes the state's policy for protection and preservation of the natural environment.	Applicable. SEPA and MTCA are integrated processes per WAC 197-11-250 through 197-11-268
	Disposal of Excavated Material		
	Resource Conservation and Recovery Act (RCRA) (42 USC 6921-6949a; 40 CFR Part 268, Subtitles C and D)	Establishes requirements for the identification, handling, and disposal of hazardous and non-hazardous waste.	Facility is a RCRA Facility (permitted under the state Hazardous Waste Management Act). Facility is regulated under MTCA and must meet MTCA standards.
	Dangerous Waste Regulations (RCW 70.105; WAC 173-303)	Establishes regulations that are the state equivalent of RCRA requirements (and largely stand in lieu of RCRA) for determining whether a solid waste is a state dangerous waste. This regulation also provides requirements for the management of dangerous wastes.	Only applicable if waste is generated from selected alternative.
	Solid Waste Disposal Act (42 USC Sec. 325103259, 6901-6991; 40 CFR 257,258) Federal Land Disposal Requirements (40 CFR part 268)	Protects health and the environment and promotes conservation of valuable material and energy resources.	
	Minimum Functional Standards for Solid Waste Handling (WAC 173-304)	Sets minimum functional standards for the proper handling of all solid waste materials originating from residences, commercial, agricultural, and industrial operations and other sources.	
	Solid Waste Handling Standards (WAC 173-350)	Regulates upland beneficial reuse of sediments.	Only applicable if sediments are reused in uplands areas, on- or off-site.
	Wastewater/Stormwater Discharge		
	Washington Water Pollution Control Law RCW 90.48; WAC 173-216, WAC 173-220	Washington State has been delegated authority to issue NPDES permits. CWA Sections 301, 302, and 303 require states to adopt water quality standards and implement an NPDES permitting process. The Washington Water Pollution Control Law and regulations address this requirement.	State version of CWA NPDES. Any construction or regrading activity will require compliance with NPDES.
	National Pollutant Discharge Elimination System (NPDES) (CWA Part 402)	Regulates discharges to off-site activities for pretreatment standards.	Any discharges from the Facility to a POTW or other water body (Blair Waterway) will be required to comply with pretreatment standards and permitted through the public utility.
	Tacoma Wastewater Treatment Requirements (Tacoma City Ordinance Chapter 12.08) and Shoreline Management (Chapter 13.10.130 for discharges to surface water in Port Industrial Area)	Provides requirements for discharge to the POTW.	Applicable through NPDES permit.

Table 1: ARARs (cont.)

	Standard, Requirement, or Limitation	Description	Applicability
Action-specific ARARs (cont'd)	***Worker Safety***		
	Health and Safety for Hazardous Waste Operations and Emergency Response (WAC 296-62; and Health and Safety 29 CAR 1901.120	The Health and Safety for Hazardous Waste Operations and Emergency Management (HAZWOPER) regulate health and safety operations for hazardous waste sites. The health and safety regulations describe federal requirements for health and safety training for workers at hazardous waste sites.	Any cleanup work will require compliance with OSHA and WISHA.
	Occupational Safety and Health Act (OSHA), 29 USC 653, 655, 657; Occupational Safety and Health Standards 29 CFR 1910	Employee health and safety regulations for construction activities and general construction standards as well as regulations for fire protection, materials handling, hazardous materials, personal protective equipment, and general environmental controls. Hazardous waste site work requires employees to be trained prior to participation in site activities, medical monitoring, monitoring to protect employees from excessive exposure to hazardous substances and decontamination of personnel and equipment.	Any cleanup work will require compliance with OSHA and WISHA.
	Washington Industrial Safety and Health Act (WISHA) RCW 49.17 Washington Industrial Safety and Health Regulations WAC 296-62; WAC 296-155	Adopts the OSHA standards that govern the conditions of employment in all work places. The regulations encourage efforts to reduce safety and health hazards in the work place and set standards for safe work practices for dangerous areas such as trenches, excavations, and hazardous waste sites.	Any cleanup work will require compliance with OSHA and WISHA.
	Air Quality Controls		
	Federal, State, and Local Air Quality Protection Programs State Implementation of ambient air quality standards NWAPA ambient and emission standards Regional Standards for fugitive dust emissions, and toxic air pollutants.	Regulations promulgated under the federal Clean Air Act (42 USC 7401) and the Washington State Clean Air Act (RCW 70.94) governs the release of airborne contaminants from point and non-point sources. Local air pollution control authorities such as the Puget Sound Clean Air Authority (PSCAA) have also set forth regulations for implementing these air quality requirements. These requirements may be applicable to the Facility for the purposes of dust control should the selected remedial alternatives require excavation activities. Both PSCAA (under Regulation III) and WAC 173-460 establish ambient source impact levels for arsenic.	The selected alternative will require compliance with air quality regulations and best management practices for dust control.
	Miscellaneous		
	Noise Control Act of 1974 (RCW 70.107; WAC 173-60)	Establishes maximum noise levels.	The selective alternative will need to comply with local and state noise pollution requirements. Construction and other activities will need to be limited to normal working hours.
	Grading Activities under Tacoma Municipal Code (Chapters 13.11 and 13.12)	Establishes restrictions of upland grading activities.	Substantive compliance required to minimize stormwater and other related impacts. MTCA remedial actions are exempt from the procedural requirements of this law, but must comply with the substantive requirements.

ARAR	Applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	CERCLA Information System
CWA	Clean Water Act
MTCA	Model Toxics Control Act
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NWAPA	Northwest Air Pollution Authority
OSHA	Occupational Safety and Health Act
POTW	Publicly-owned Treatment Works
PSCAA	Puget Sound Clean Air Authority
RCRA	Resource Conservation and Recovery Act
SEPA	State Environmental Policy Act
WISHA	Washington Industrial Safety and Health Act

3.2.1 Chemicals of Concern (COCs)

Chemicals of concern (COCs) are those "hazardous substances" that pose the greatest risk to human-health and the environment. During the FFS, the COC list was filtered to reflect current site conditions. Soil COCs were refined by reviewing analytical results for soil that has yet to be excavated and removed, i.e. existing or current site soils. For both soil and ground water, known breakdown products (e.g. PCP to 2,4,5-trichlorophenol) were kept as COCs for purposes of this CAP, regardless of detection frequency or concentration. For ground water, analytical data from Mar-03 to Feb-08 was used to refine the COC list. The following criteria were used to eliminate COCs:

<u>Soil</u>:

- If the COC was detected in less than 10 percent of the total number of samples and the value when detected was less than one-tenth of the cleanup level,
- The maximum level of detection was less than one-hundredth of the cleanup level, or
- The substance was a metal other than molybdenum.

For this CAP, the refined soil COC list now includes these 10 substances:

- 2-Chlorophenol,
- 2,3,4,6-Tetrachlorophenol,
- 2,4-Dichlorophenol,
- 2,4,5-Trichlorophenol,
- 2,4,6-Trichlorophenol,
- Pentachlorophenol,
- Tetrachloroethene,
- Trichloroethene,
- Molybdenum, and
- Aroclor 1248.

Ground Water

For ground water, several chemicals were eliminated as COCs for various reasons (Sections 4.21, 4.2.2, FFS Tables 4.4, and 4.5). Hazardous substances that did not exceed surface water criteria between 2003 and 2008 were eliminated as COCs. COCs that were retained for one aquifer were retained for both aquifers.

The refined ground water COC list now includes these 8 substances:

- 2-Chlorophenol,
- 2,3,4,6-Tetrachlorophenol,
- 2,4-Dichlorophenol,
- 2,4,6-Trichlorophenol,
- Pentachlorophenol,
- Tetrachloroethene,
- Trichloroethene, and
- Vinyl chloride

3.2.2 Cleanup Level Development

Site Groundwater

Site groundwater is non-potable (WAC 173-340-720(2)). Therefore, surface water cleanup levels were used for ground water that discharges to off-site ditches and the Blair Waterway. A conditional off-property point of compliance (POC) was also used. This conditional POC is where shallow and submarine ground water discharges to the Blair Waterway surface water (WAC 173-340-720(8)(d)(ii)). As part of the FFS, site ground water "remediation levels" (RELs) were derived. These REL values are established in this CAP as RELs for the cleanup action. These RELs protect the nearby ditches (North ditch, South ditch, and Lincoln Avenue ditch) and the Blair Waterway. Details on how the site ground water RELs were derived are as follows:

1. **Evaluate exposure pathways and receptors (WAC 173-340-708):** site ground water is migrating either radially to the off-property ditches (shallow aquifer) or west to the Blair Waterway (intermediate aquifer). This ground water discharge may impact sediments and aquatic life. Terrestrial ecological receptors were not evaluated because this site qualifies for the terrestrial ecological risk exclusion provision (WAC 173-340-7491). Human exposure to surface water and COCs may occur with fish consumption (commercial fishing), incidental ingestion (e.g. swimming) or by construction activity (e.g. the former off-site graving dock). However, the Blair Waterway is an industrial/commercial shipping channel and is restricted from recreational swimming.

2. **Derive surface water cleanup levels that are protective of potential human and ecological receptors:** the most stringent cleanup criteria for human, ecological receptors, MTCA Method B surface water criteria and "ARARs" (applicable state or federal law) was used (WAC 173-340-730, see also Table 1, p. 19).

3. **Calculate ground water source area "remediation levels":** an EPA ground water fate and transport model (BIOSCREEN) was used to assess ground water concentrations that are protective of surface water. For this cleanup action, these concentrations are referred to as "remediation levels[4]" (RELs). Specifically, the BIOSCREEN model was used to evaluate the fate and transport of remnant dissolved-phase PCP, and all other PCOCs, as ground water flows west to the Blair Waterway and the off-property ditches. This modeling process resulted in the derivation of ground water "RELs". A ground water REL is a "source area" (e.g. property) concentration that will not exceed surface water standards at the point of discharge to the surface water (600 ft. west of the property at the Blair Waterway or at the perimeter ditches). In other words, site ground water RELs account for the natural attenuation that occurs between the property and the Blair Waterway. Ground water RELs are provided in Table 4, p. 35. A detailed discussion of the BIOSCREEN modeling process is included in Section 4.0 and Appendix A of the FFS.

Soil

For vadose zone soil (soil above the water table), cleanup levels were determined for direct human contact (soil ingestion), leaching to groundwater, and potential ecological exposure. Because the site meets the criteria of an industrial site (WAC 173-340-745), MTCA Method C soil ingestion (direct contact) cleanup levels are established in this CAP. For the soil-leaching-to-ground water pathway, the 3-phase partitioning "model" was used (MTCA Eq. 747-1). The lowest cleanup level of the two exposure pathways (leaching to ground water and soil ingestion) is established as the cleanup level.

Site soil cleanup levels are also established through this CAP as updated "treatment levels" for soil within the on-site engineered soil treatment cells. Soil cleanup levels are presented in Table 2, p. 26. The current and proposed soil treatment cell levels are further discussed in Section 6.0.

---

4 "Remediation level (REL)" is a "target" soil, sediment, ground water or air hazardous substance concentration that is used for designating when different cleanup actions will be used (e.g., active treatment versus natural attenuation). If you exceed a REL, then you typically must implement a different cleanup action. MTCA cleanup actions are commonly based on RELs.

Table 2: Surface Water Cleanup Levels and Ground Water Remediation Levels (RELs).

CAS Number	Hazardous Substance	2008 FFS Surface Water Cleanup Level µg/L	Ground Water Remediation Levels (RELs) Shallow µg/L	Intermediate (1) µg/L
Volatile Organic Compounds				
75-34-3	1,1-Dichloroethane	8.6E+04	2.6E+04	2.6E+04
67-64-1	Acetone	3.1E+06	1.7E+06	1.7E+06
71-43-2	Benzene	2.3E+01	1.8E+03	9.2E+04
100-41-4	Ethylbenzene	2.1E+03	5.0E+04	5.0E+04
75-09-2	Methylene Chloride	5.9E+02	9.0E+02	4.2E+03
127-18-4	**Tetrachloroethene**	**3.9E-01**	**7.0E+02**	**1.5E+05**
108-88-3	Toluene	1.5E+04	4.0E+05	4.0E+05
156-60-5	Trans-1,2-dichloroethene	1.0E+04	3.4E+04	4.8E+04
79-01-6	**Trichloroethene**	**1.5E+00**	**1.0E+02**	**2.4E+04**
75-01-4	**Vinyl Chloride**	**2.4E+00**	**2.7E+02**	**1.9E+04**
Semivolatile Organic Compounds				
95-57-8	**2-Chlorophenol**	**9.7E+01**	**1.2E+04**	**2.0E+04**
91-57-6	2-Methylnaphthalene	2.1E+01	2.0E+04	2.0E+04
95-48-7	2-Methylphenol	7.2E+03	5.0E+05	5.0E+05
58-90-2	**2,3,4,6-Tetrachlorophenol**	**5.5E+01**	**2.8E+03**	**2.0E+04**
120-83-2	**2,4-Dichlorophenol**	**1.9E+02**	**2.10E+03**	**2.0E+04**
88-06-2	**2,4,6-Trichlorophenol**	**2.4E+00**	**1.3E+04**	**2.0E+04**
106-44-5	4-Methylphenol	7.6E+02	1.2E+02	1.2E+02
83-32-9	Acenaphthene	6.4E+02	4.0E+02	4.0E+02
65-85-0	Benzoic Acid	6.5E+05	6.5E+05	6.5E+05
117-81-7	Bis(2-ethylhexyl)phthalate	2.2E+00	3.4E+02	3.4E+02
91-20-3	Naphthalene	4.9E+03	4.0E+03	4.0E+03
87-86-5	**Pentachlorophenol**	**3.0E+00**	**2.0E+04**	**2.0E+04**
108-95-2	Phenol	1.1E+06	1.5E+05	1.5E+05
Miscellaneous Compounds				
-	Cyanide (distilled) (2)	7.9E+02	7.9E+02	7.9E+02
-	Cyanide (total) (2)	7.9E+02	7.9E+02	7.9E+02
50-00-0	Formaldehyde	3.5E+05	1.0E+05	1.0E+05
7439-98-7	Molybdenum	1.5E+04	1.5E+04	1.5E+04

Notes: **bold** indicates a groundwater COC. (1) Ground water remediation levels are based the projected 200 ft. cutback for the Blair Waterway. This will reduce the distance from the site property boundary to the Blair from ~ 800 to 600 ft. (2) Ecological benchmark screening level for fish-consuming avian species (FFS, Section 4.1.1.1.).

Table 3: Soil Cleanup Levels.

Hazardous Substance	2008 FFS Soil Cleanup Level (mg/kg) (1)
Volatile Organic Compounds (VOCs)	
1,1,1-Trichloroethane	3.2E+06
2-Butanone	2.1E+06
Acetone	6.9E+03
Benzene	1.7E+01
Benzyl Alcohol	1.1E+06
Carbon Disulfide	3.5E+05
Chlorobenzene	7.0E+04
Chloroform	2.2E+04
Cis-1,3-dichloropropene (2)	7.5E+01
Ethylbenzene	1.0E+03
Methylene Chloride	4.5E+00
Styrene	7.0E+05
Tetrachloroethene	1.9E+01
Toluene	6.3E+03
Trans-1,2-dichloroethene	2.6E+02
Trichloroethene	1.2E+00
Vinyl Chloride	2.2E+00
Xylene (total)	7.0E+05
Semivolatile Organic Compounds (SVOCs)	
1,2,4-Trichlorobenzene	3.5E+04
2-Chlorophenol	4.1E+02
2-Methylnaphthalene	5.2E+03
2-Methylphenol	5.6E+03
2,3,4,5-Tetrachlorophenol (3)	
2,3,4,6-Tetrachlorophenol) (3)	7.4E+01
2,3,5,6-Tetrachlorophenol (3)	
2,4-Dichlorophenol	3.4E+01
2,4,5-Trichlorophenol	3.5E+05
2,4,6-Trichlorophenol	4.5E+02
4-Methylphenol	3.3E+00
Acenaphthene	2.1E+05
Anthracene	1.1E+06
Benzo(a)anthracene	1.8E+02
Benzo(a)pyrene	1.8E+01
Benzo(b)fluoranthene	1.8E+02
Benzo(k)fluoranthene	1.8E+03
Benzoic Acid	1.4E+07
Bis(2-ethylhexyl)phthalate	3.0E+03
Butyl benzyl phthalate	7.0E+05

Table 3: Soil Cleanup Levels. (cont).

Hazardous Substance	2008 FFS Soil Cleanup Level (mg/kg) (1)
Dibenzo(a,h)anthracene	1.8E+01
Dibenzofuran	7.0E+03
Diethylphthalate	2.8E+06
Di-n-butylphthalate	3.5E+05
Di-n-octylphthalate	7.0E+04
Fluoranthene	1.4E+05
Fluorene	1.4E+05
Hexachlorobenzene	8.2E+01
Hexachlorobutadiene	1.7E+03
Hexachloroethane	9.4E+03
Indeno(1,2,3-cd)pyrene	1.8E+02
Naphthalene	4.0E+02
Pentachlorophenol	1.0E+03
Phenol	9.5E+02
Pyrene	1.1E+05
Metals (4)	
Aluminum	1.0E+06
Antimony	1.4E+03
Arsenic	8.8E+01
Barium	7.0E+05
Beryllium	7.0E+03
Chromium	6.0E+03
Cobalt	4.0E+04
Copper	1.3E+05
Iron	6.0E+05
Manganese	4.9E+05
Molybdenum	5.9E+03
Nickel	4.0E+04
Silver	1.8E+04
Vanadium	2.5E+04
Zinc	1.1E+06
Polychlorinated Biphenyls, Miscellaneous Compounds	
4,4'-DDT	3.9E+02
Aroclor 1242	6.6E+01
Aroclor 1248	6.6E+01
Aroclor 1260	6.6E+01
BHC-Beta	7.3E+01

Notes: bold indicates soil COC. (1) Soil cleanup level is based on the lower of two exposure pathways: a) soil ingestion (industrial land use or MTCA Method C) and b) leaching-to-ground water. (2) MTCA Method B value used in 2006 FRI and carried through FFS. (3) Not addressed as a potential substance of concern (2006 FRI). (4) Except for molybdenum, all soil metals cleanup levels are based on natural background concentrations.

3.2.3 Ground Water Off-Property Conditional Point of Compliance

For ground water, an off-property conditional point of compliance (WAC 173-340-720(8)(d)(ii)) is established for this cleanup action. Site ground water is non-potable and this site is "near" but does not abut surface water. This cleanup action will include a site deed restriction that prohibits all future use of site ground water. Additionally, SSA and other intervening property owners between the site and the Blair Waterway (e.g. Puyallup Tribe) have agreed in writing to the use of the off-property conditional point of compliance (Attachment A – Point of Compliance Letter). Additional details on the ground water conditional point of compliance are provided in Section 4.3. If future ground water monitoring results indicate that groundwater concentrations throughout the site have declined to less than cleanup levels (surface water criteria), then the off-property conditional point of compliance may be removed (see also Section 7.0).

3.2.4 Review of Applicable or Relevant and Appropriate (ARAR) requirements

An "ARAR" review was performed to ensure compliance with all local, state and federal laws (Table 1, p. 19):

- RCRA Land Disposal Regulations (LDRs): some site soil contains FO21 listed hazardous waste (1988 RCRA permit that was in force prior to the DWM Permit). Therefore, the site soil is subject to RCRA Land Disposal Regulations (LDRs). Soil cleanup actions were screened to comply with RCRA LDR was well as RCRA ARARs, TSCA regulations, and "CAMU" restrictions.

- NPDES permit: discharge, monitoring, and other requirements were evaluated.

- USEPA Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements: although the site is located within the USEPA Commencement Bay Nearshore/Tideflats Superfund site, it has been "deferred" to the RCRA/HWMA corrective action process for cleanup. Because CERCLA remains applicable, however, the cleanup must be sufficiently protective in order to not require any further action under CERCLA.

4.0 Groundwater Remedial Actions

4 GROUND WATER REMEDIAL ACTION

4.1 Overview

The ground water remedial action selected through this CAP is monitored natural attenuation (MNA[5]). A site ground water "pump and treat" system (hydraulic control) has been operating for some time. Over the last 20 years, ground water dissolved-phase concentrations (PCP) have significantly declined (Figure 6, p. 32). This is particularly true of off-property, downgradient areas (west to the Blair Waterway). As of 2007, source area (PCP plant) ground water PCP concentrations were ~ 3 mg/L (ppm). However, the weight of evidence suggests that as ground water flows west to the Blair Waterway, PCP (and other COCs) are naturally attenuated.

MNA is a common "mainstream" remedy for "legacy" ground water pump and treat systems. Once source control measures are taken and concentrations have declined, it is common to discontinue operation of pump and treat systems. In this case, ground water concentrations have declined and remnant source area soil PCP will be removed.

The groundwater remedial action is designed to prevent COCs from reaching the Blair Waterway and the site ditch system. The groundwater remedial action consists of four elements:

- Discontinuation of hydraulic control and ground water pump and treat,
- Off-property conditional point of compliance (Blair Waterway),
- MNA, and
- Ground water compliance monitoring.

Details on each of these are provided in the following subsections.

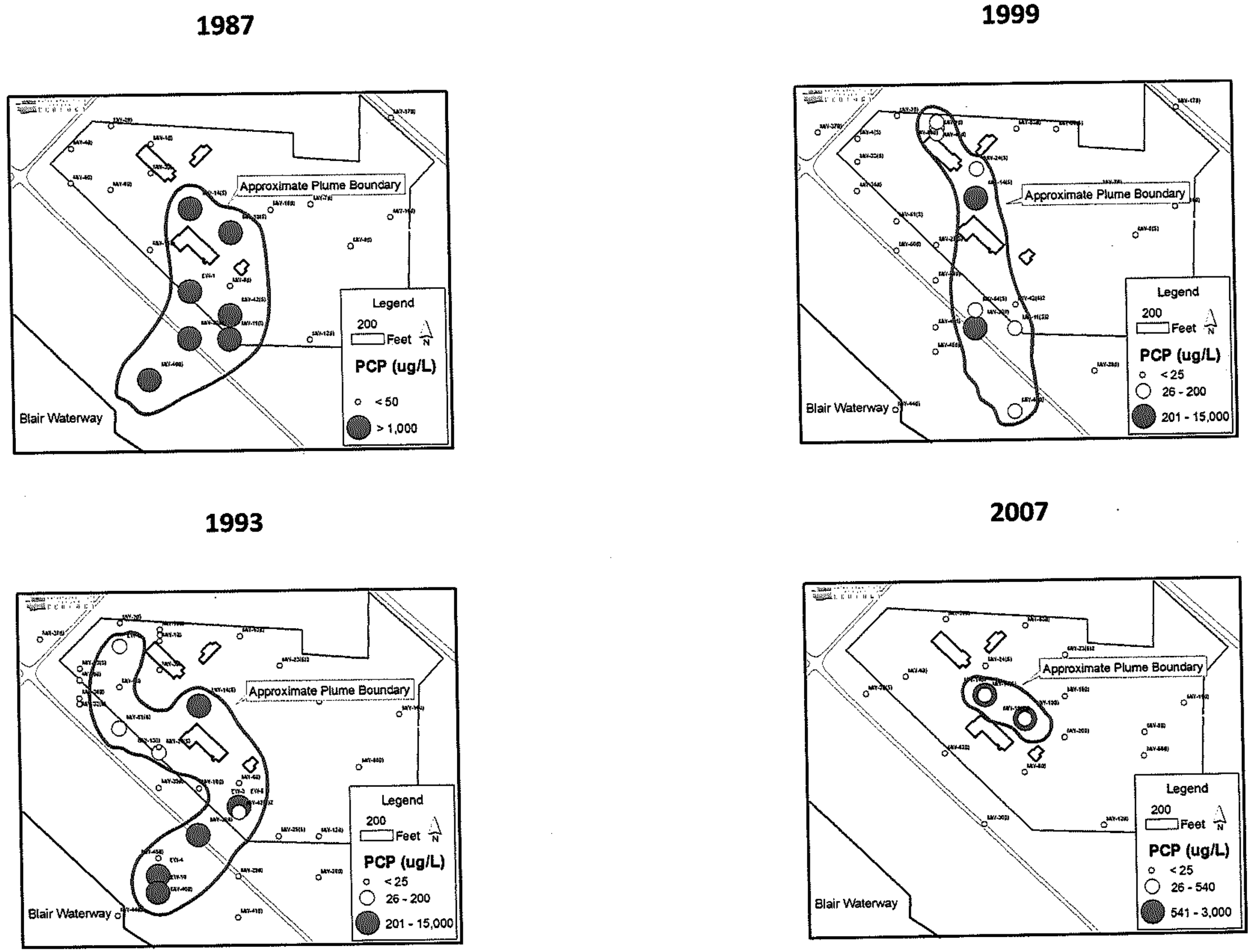
---

[5] The term "MNA" refers to natural processes that reduce contaminant concentrations to "acceptable" levels. MNA involves physical, chemical, and biological processes that act to reduce the mass, toxicity, and mobility of subsurface contamination. Physical, chemical, and biological processes involved in MNA include biodegradation, chemical stabilization, dispersion, sorption, and volatilization (Source: USEPA Brownfields).

4.1.2 Ground Water Compliance Monitoring

The shallow water table groundwater flow pattern is toward site perimeter ditches. Consequently, monitoring wells that are located along North and Lincoln Avenue ditches as well as the southwestern property boundary will be used (Figure 7, p. 34). Monitoring wells that are located along the southern and downgradient site perimeter will be used for the intermediate aquifer compliance-monitoring network. These intermediate aquifer monitoring wells will be located near the PPA and BPA, and in the off property areas downgradient of the former CDA (west to the Blair Waterway). Details on compliance monitoring and well locations are provided in the Attachment B – Compliance Monitoring Contingency Plan (CMCP), p. 62.

Figure 6: Ground Water Dissolved-Phase PCP Concentrations Over Time.



4.1.3 Ground Water Contingency Action

If site ground water concentrations (e.g. of PCP) increase when the pump and treat (hydraulic control) system is discontinued, then there needs to be a "backup" or "contingency" plan. Details on compliance monitoring and well locations are provided in Attachment B – Compliance Monitoring Contingency Plan (CMCP), p. 62. The nature of any contingency action will initially depend on whether or not the ground water treatment system has been decommissioned. If ground water compliance monitoring standards are not being met while the treatment system is operational, then the contingency plan calls for additional monitoring. The "presumptive" contingency action would consist of restarting all or portions of the existing ground water treatment system. Additional actions, (e.g. additional site characterization) may also be implemented.

Figure 7: Compliance Monitoring Well Locations.

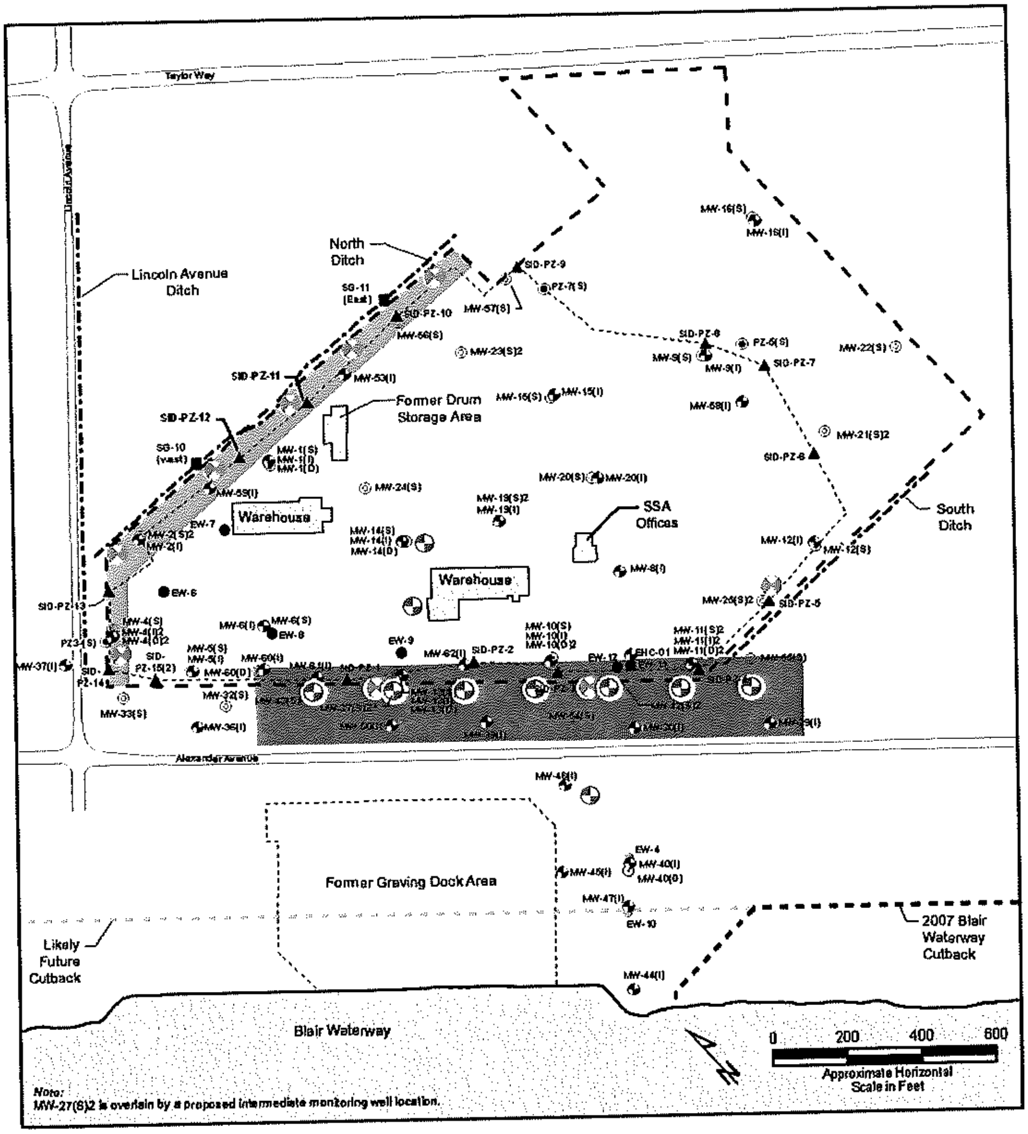


Figure 7

Shallow Aquifer Monitoring Well Network Zone
Intermediate Aquifer Monitoring Well Network Zone
Monitoring Well, Shallow Aquifer (Location Approximate)
Monitoring Well, Intermediate Aquifer (Location Approximate)
Monitoring Well, Shallow Aquifer
Monitoring Well, Intermediate Aquifer
Monitoring Well, Deep Aquifer
Piezometers
Shallow Intercept Drain (SID) Piezometers
Staff Gauges
Extraction Well
Inactive Extraction Well
Property Boundary
SID Location
Ditch Location
2007 Blair Waterway Cutback (Approximate)
Likely Future Cutback (Approximate)

Cleanup Action Plan
Reichhold/SSA Containers Facility
Tacoma, Washington

Table 4: Ground Water Cleanup / Remediation Levels.

Hazardous Substance (1)	2008 FFS Surface Water Cleanup Levels (2)	Remediation Levels (3)		
		On-Site Ground Water		Off-Site Ground Water
		Shallow Aquifer	Intermediate Aquifer	Intermediate Aquifer
	µg/L	µg/L	µg/L	µg/L
Volatile Organic Compounds (VOCs)				
Tetrachloroethene	3.9E-01	7.0E+02	1.5E+05	4.0E+02
Trichloroethene	1.5E+00	1.0E+02	2.4E+04	2.0E+02
Vinyl Chloride	2.4E+00	2.7E+02	1.9E+04	6.5E+03
Semivolatile Organic Compounds (SVOCs)				
2-Chlorophenol	9.7E+01	1.2E+04	2.0E+04	6.8E+03
2,3,4,6-Tetrachlorophenol	5.5E+01	2.8E+03	2.0E+04	1.9E+03
2,4-Dichlorophenol	1.9E+02	2.1E+03	2.0E+04	2.3E+03
2,4,6-Trichlorophenol	2.4E+00	1.3E+04	2.0E+04	5.0E+03
Pentachlorophenol	3.0E+00	2.0E+04	2.0E+04	5.6E+03

Notes: (1) This list reflects 2008 updates and revisions (FFS-Floyd|Snider Team 2008). (2) Cleanup levels applicable at the off-property points of compliance. Applies to shallow and submarine ground water discharges to surface water. (3) Calculated via the USEPA "BIOSCREEN" model.

4.2 GROUNDWATER REMEDIAL ACTION ALTERNATIVES

Remedial technologies that may be used to accomplish remedial action objectives ("RAOs") were identified in the FFS. This process resulted in evaluation of two different cleanup actions or "remedial alternatives":

- MNA with monitoring
- Continued hydraulic control and groundwater treatment

The FFS contains details on the advantages and disadvantages of these two different remedial alternatives. This evaluation resulted in selection of the remedial alternative listed in Section 4.1 (MNA).

4.3 JUSTIFICATION FOR SELECTING THE GROUNDWATER REMEDIAL ACTIONS

This site has undergone significant investigation, monitoring, and remediation, including hydraulic control and ground water treatment. Groundwater COCs, their fate and transport, exposure pathways, and receptors are well understood. Years of monitoring indicate that both the shallow and intermediate aquifers are now in compliance with remediation levels. Ecology does not believe that dissolved-phase groundwater contaminants (e.g. PCP) pose significant risks to "receptors" (i.e. the Blair Waterway, sediments and aquatic life).

However, the MNA cleanup action leaves groundwater contaminated above cleanup levels (surface water criteria) at the site, with continued monitoring and institutional controls required. Based on these considerations, the MNA action is not a "permanent cleanup action" as defined under WAC 173-340-200, since it requires further action at the site. Furthermore, based on the determination that it is not practicable to clean up groundwater to cleanup levels (surface water criteria) throughout the site within a reasonable restoration timeframe (see WAC 173-340-720(8)(c); WAC 173-340-720(8)(d)(d)(ii), referencing WAC 173-340-720(8)(d)((i)), the MNA cleanup action includes an off-property conditional point of compliance at the Blair Waterway. In order for a groundwater remedy to be considered "permanent" under MTCA, it must achieve cleanup levels at the standard point of compliance (i.e., throughout the site) (WAC 173-340-360(c)(i)).

Since the MNA cleanup action is not "permanent" as defined under MTCA, it must be compared against the FFS alternative that provides the greatest degree of permanence. You must do this to determine whether the MNA "action" is "permanent to the maximum extent practicable" (WAC 173-340-360(3)). This is accomplished through a disproportionate cost analysis (DCA) (WAC 173-340-360(3)(e)). If the costs of the most permanent cleanup action are disproportionate to its benefits, then alternative remedies that provide permanent solutions to the maximum extent practicable (i.e., MNA) may be selected. Consequently, a DCA was performed to compare a permanent alternative using a standard point of compliance against the MNA alternative using an off-site point of compliance. The DCA concluded that:

1) A permanent alternative is not practicable, and

2) The preferred alternative (ground water MNA) is "permanent" to the maximum "extent practicable".

In addition, in order to utilize a conditional point of compliance, it must be demonstrated that it is not practicable to achieve cleanup levels (surface water criteria) throughout the site within a reasonable restoration timeframe and that all practicable methods of treatment are being used in site cleanup (WAC 173-340-720(8)(c)). The DCA analysis makes both of these demonstrations with respect to the MNA alternative.

4.3.1 Description of the "Permanent" Alternative

Continued hydraulic control (i.e. pump and treat) is the "permanent" alternative to which the MNA alternative has been compared. The continued hydraulic control alternative includes a standard point of compliance. This alternative includes:

- Ground water pump and treat (shallow and intermediate aquifers) until cleanup levels (surface water criteria) are met at all points "throughout the site".
- Remediation of ground water in the shallow and intermediate aquifers through treatment and natural attenuation
- Implementation of a monitoring program throughout the site to confirm hydraulic control and determine when cleanup levels are met throughout the site.

The following ground water pump and treat (hydraulic control) systems would then remain operational until cleanup levels (surface water criteria) are achieved throughout the site:

- Shallow Interceptor Drain ("SID"): this "SID" system is located around the perimeter of the manufacturing portion of the site. It is used to intercept and collect shallow aquifer groundwater.
- The six on-site and active intermediate aquifer extraction wells.
- The water treatment system that treats organic compounds (enhanced oxidation). This system treats water captured by the SID and the groundwater extraction wells.
- The discharge of treated (NPDES permit) water to the Blair Waterway.

If a "permanent" cleanup alternative with the "standard" point of compliance is used, then cleanup standards (surface water criteria) are achieved "throughout" the site. It is likely that the "permanent" alternative (hydraulic control or pump and treat) will result in additional mass removal (i.e. extraction of ground water contaminants). It is also highly likely that the permanent alternative (pump and treat) will result in attainment of groundwater cleanup levels throughout the site, likely in a shorter timeframe than would be achieved with MNA.

Specifically, for ground water MNA, the estimated "restoration timeframe" (time required to reach ground water cleanup levels throughout the site) is approximately 24-50 years (FFS, Appendix E). However, as stated, active ground water pump and treat may result in a shorter "restoration timeframe". For this cleanup action evaluation and DCA, it was assumed that the restoration timeframe for active pump and treat would be approximately 18-37 years. This timeframe (18-37 yrs) is 75% of the MNA restoration timeframe.

It should be noted that the 75% figure is based on best professional judgment. The actual time to cleanup levels is hard to predict. It is acknowledged and understood that actual ground water systems are highly variable and complex. However, for comparison purposes and the DCA, an effort to quantify costs and benefits must be attempted.

4.3.2 Evaluation of Ground Water Remedial Alternatives Using MTCA Criteria

The continued hydraulic control and ground water treatment alternative and the MNA alternative were compared to the WAC 173-340-360 requirements. WAC 173-340-360(2) specifies four threshold criteria that all cleanup actions must satisfy, and WAC 173-340-360(3) specifies three other criteria that alternatives that meet the threshold requirements must also achieve.

4.3.2.1 MTCA Threshold Criteria

Protection of Human Health and the Environment - Both remedial alternatives prevent migration of contamination into surface water receptors. Institutional controls restricting ground water withdrawal and use will limit exposure via ingestion and dermal contact.

Compliance with Cleanup Standards – Continued ground water treatment (hydraulic control) would prevent off-property migration of contamination. For the MNA alternative, ground water dissolved-phase concentrations (PCP) will naturally attenuate as ground water flows west and discharges to the Blair Waterway. For both alternatives, Cleanup standards will be met at the ground water/surface water interface.

Compliance with Applicable State and Federal Laws – both cleanup actions comply with applicable state and federal laws as shown previously in Section 3.2.4.

Compliance Monitoring – Both alternatives would include compliance monitoring. For the MNA alternative, ground water compliance monitoring will be conducted, per the site Compliance Monitoring and Contingency Plan (CMCP). Continued monitoring will ensure that natural attenuation is occurring and that ground water concentrations will continue to decline over time.

4.3.2.2 Additional MTCA Criteria

This groundwater remedial alternative must also meet the three additional requirements specified in WAC 173-340-360(2):

1. Use permanent solutions to the maximum extent practicable.
2. Provide for a reasonable restoration time frame.
3. Consider public concerns and comments on the CAP.

The restoration timeframe for continuation of ground water pump and treat (hydraulic control) would be approximately 18- 37 years. Public comment will be addressed following issuance and review of the DCAP.

4.3.3 Evaluation of Alternatives and the Maximum Extent Practicable

In accordance with WAC 173-340-360(2), the preferred alternative must use permanent solutions to the maximum extent practicable. A disproportionate cost analysis is used to compare alternatives to determine the alternative which is permanent to the maximum extent practicable.

4.3.3.1 Disproportionate Cost Analysis (DCA)

A MTCA "DCA" was used to compare the costs of continued pump and treat (hydraulic control) vs. natural attenuation. If the costs of any given cleanup action (pump and treat) are disproportionate to its benefits, then alternative remedies (MNA) may be selected (WAC 173-340-360(3)(e)). In the FFS analysis of the ground water remedy, the costs and benefits of operating (long-term) the site ground water treatment system were compared to monitored natural attenuation (MNA). The following were used (WAC 173-340-360(3)(f)):

- Protectiveness
- Permanence
- Cost
- Effectiveness over the long term
- Management of short-term risks
- Technical and administrative implementability
- Consideration of public concerns

Protectiveness

For site ground water, both long-term pump and treat and MNA protect the highest beneficial use of ground water (the surface water in the site ditches and the Blair Waterway). Both would rely on institutional controls to prohibit the withdrawal of ground water for use as drinking water. Thus, in terms of protectiveness, both remedies (MNA and pump and treat) are nearly the same.

Permanence

Permanence measures the degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances. Most of the remnant site ground water contamination has been successfully treated. If site ground water treatment continues into the future, it would likely result in only a small removal of contaminant mass. Specifically, it is anticipated that removal of remnant soil contamination is likely to have more impact on ground water. Consequently, both pump and treat and MNA are thought to be nearly equal in terms of permanence.

Cost

The cost of operating the site ground water treatment, including the cost of construction and the net present value of any long-term costs for the next 24-50 yrs is estimated at approximately $10,900,000 to $20,400,000. Conversely, the cost of the preferred alternative (MNA) for the next 18-37 yrs is estimated at approximately $600,000. In other words, if operation of the site ground water treatment continued until cleanup levels are met "throughout the site", then it would cost approximately 20-30 times more than MNA.

Effectiveness over the Long-term

Both the permanent and preferred alternatives are effective at removing the source of the contamination and preventing migration of the contaminants over the long-term.

Management of Short-term Risks

Risks of continued site ground water pump and treat include exposure of site maintenance workers to contaminated ground water. The wastes from the treatment process are considered hazardous. Additionally, risks to personnel from system operation including leaks, spills, slips, and falls are associated with this alternative.

Conversely, for MNA, there is very little exposure to site ground water. There will be some exposure while field personnel are conducting monitoring and collecting ground water samples; however, this exposure is thought to be relatively nominal.

Technical and Administrative Implementability

The site is scheduled for future development as a marine cargo terminal. The permanent alternative is not compatible with this intended future use and would require significant modifications to the current plans for the site.

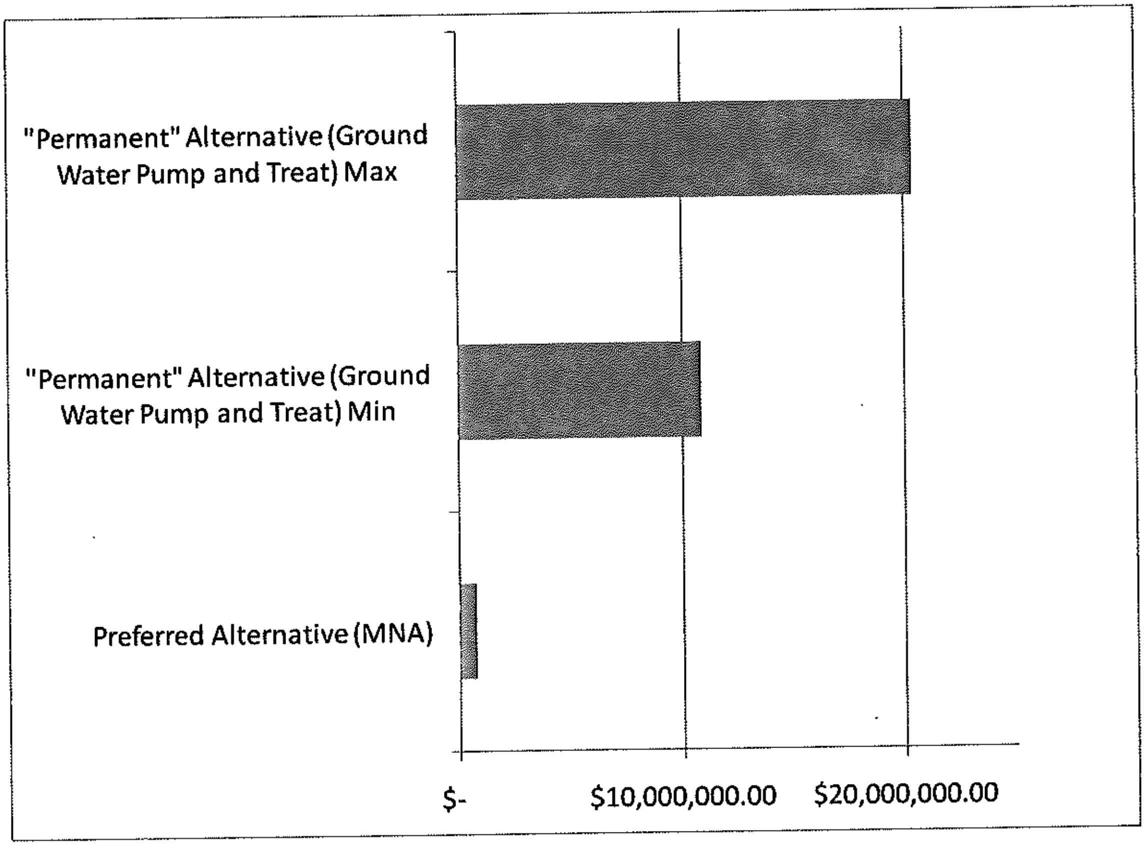
Consideration of Public Concerns

All public questions on this cleanup action will be addressed during public comment.

4.3.3.2 Disproportionate Cost Analysis (DCA)

Based on the DCA, the selected ground water alternative is monitored natural attenuation (MNA). This remedy includes an off-property conditional point of compliance and compliance monitoring. This alternative uses permanent solutions to the maximum extent practicable and provides the same environmental benefit as the permanent alternative without the additional costs. The incremental cost of the "permanent" alternative (continued pump and treat) does not justify the negligible environmental benefits that would be obtained.

Figure 8: Ground Water Remedial Alternatives Costs.



5.0 Soil Remedial Actions

5.1 SOIL REMEDIAL ACTIONS

This section provides details on the remedial actions selected under this CAP for four (4) site areas with remnant soil contamination:

- Hydrochloric (HCL) acid pond,
- Pentachlorophenol (PCP) plant,
- Butylphenol process, and
- SDA-9.

Each cleanup action is based on COCs, site constraints (e.g. utility lines, etc.) and future land use. The proposed remedial action for each area was evaluated based on the WAC 173-340-360 requirements. Based on the selection process identified in the FFS, the following remedial technologies are selected as the remedial actions for the identified soil areas and are described further in the sections below:

- SWMU 10—Hydrochloric Acid Pond: excavation with ex-situ treatment through aeration within the CAMU. Treatment would occur in either a temporary treatment area or the treatment cells. After treatment, the soil would be placed in the CAMU. Alternatively, a contingency action would be excavation and off-site disposal.
- SWMU 24—Pentachlorophenol Plant area: excavation and off-site disposal.
- SWMU 25—Butylphenol process area: excavation and off-site disposal.
- SDA-9 Area: excavation and off-site disposal.

5.1.1 SWMU 10—Hydrochloric Acid (HCL) Pond Area

Analytical data from the preclosure and focused soil investigation, indicate that the HCL Pond Area has concentrations of tetrachloroethene, and trichloroethene that exceed cleanup levels. The HCL pond soil excavation will consist of removing soil above and below the water table. For soil above the water table (vadose zone), the approximate excavation depth shall coincide with the lowest groundwater elevation measured over the last 5 years in two wells (MW-15(S) and MW-23(S)2). At these locations, the vadose zone extends from the surface to an elevation of approximately 5.7 to 5.9 feet, which is approximately 4.3 and 8.3 feet below ground surface (below ground surface). Analytical results indicate that there is essentially a "clean" horizon of soil from 0-3 ft. depth. This horizon can be used as clean fill or placed somewhere else on-site within the CAMU.

For the HCL pond, most of the contamination is located between 3 and 4.5 feet below ground surface. For example, the results of soil sample # HCL-101 indicate that the soil at 6.5 and 8 feet below ground surface is less than cleanup levels. Therefore, the vertical extent of the soil excavation will be 4.5 - 6.5 feet, which results in an estimated soil volume of 50 to 150 cubic yards.

Because the HCL pond area has soil VOCs that tend to rapidly volatilize when exposed to ambient air, the plan is to excavate soil for ex-situ treatment. A vadose zone confirmation-sampling plan will be developed in conjunction with Ecology as part of the remedial action work plans. The confirmation sampling will ensure that once the soil excavation is completed, there will be no remnant soil COCs that exceed cleanup levels. The anticipated limits of excavation are shown on Figure 4, p. 15.

Contaminated soil from the HCL pond area will be re-located to a treatment area within the site "CAMU". Once in the treatment area, it will be frequently aerated and tilled. Stormwater erosion control measures will be implemented to ensure that contaminated does not "leach" or migrate from treatment areas. Once the soil achieves cleanup levels, it will be used on-site as clean fill within the CAMU. Confirmational sampling will be conducted to ensure that treated soil complies with cleanup standards.

5.1.1.1 HCL Pond Area Ex-situ Treatment

In order to promote volatilization and spread the contaminated soil evenly, the soil will be mixed on a routine basis. The mixing will be accomplished by a tiller or backhoe. Best management practices will be implemented to ensure that the contaminated soil is not transported to other site locations.

In order to verify the effectiveness of the removal and ex-situ treatment, samples will be collected during the treatment. The sampling requirements will be defined in the remedial action work plans. This plan will likely include the collection of 4 sets of samples, as described in these 4 steps:

1. Collect the first set of samples from the excavator bucket soil. These samples represent the "baseline" condition. Soil sample analytical results from the Dec-02 sampling event (HCL-101 @ 3-4.5 feet depth) will also be used for the "baseline" condition.

2. Collect a second set of samples from soil that is "laid down" on the liner or in the treatment cells. This set of samples will be used to calculate the VOC mass that is lost solely by excavation, transport, and atmospheric exposure.

3. Collect a third set of samples from soil after it has been exposed to the atmosphere for some pre-determined period. These samples would represent the final conditions of the soil after ex-situ treatment was complete.

4. Collect a fourth set of samples from the excavation bottom and sidewalls to confirm that soil COCs do not remain at concentrations than cleanup levels.

If this "ex-situ" treatment is deemed effective, then it will be used. Conversely, if the treatment is found to be ineffective or if treatment timeframes are not compatible with future site development, then the soil will be disposed of off-site. The HCL pond area soil is not a listed F021 hazardous waste and will not be subject to land disposal requirements (LDRs).

5.1.2 SWMU 24—Pentachlorophenol Plant Area (PPA)

Soil samples PCP-22, PP1108.0A and PP1109.0A were collected from the PPA. These samples contain pentachlorophenol, 2,4-dichlorophenol, 2-chlorophenol, and/or Aroclor 1248 at concentrations that exceed cleanup levels. Sample locations, PP1108.0A and PP1109.0A are co-located near the 2002 PPA excavation. Additionally, several samples from the Nov-07 PCP plant area sampling event (supplemental soil investigation) contain concentrations of 2,3,4,6-tetrachlorophenol, pentachlorophenol, 2,4-dichlorophenol, trichloroethene, and/or Aroclor 1248 that exceed cleanup levels. PCP plant sample locations are shown on Figure 4, p. 15.

PPA soil cleanup levels (except for Aroclor 1248) are based on the soil-leaching-to-groundwater pathway. Remnant COC concentrations do exceed cleanup levels for the leaching pathway. The remnant Aroclor 1248 soil concentrations also exceed the cleanup level for the human soil ingestion (direct contact) exposure pathway. Consequently, the vadose zone soil needs to be either removed or stabilized.

The PPA has been identified for a source removal action in October 2002; however, during the source removal, noxious odors created an unsafe condition, which in turn prevented the excavation from being completed. Consequently, the excavation "pit" was backfilled prior to soil removal. During the removal action, it was originally estimated that approximately 40-100 cubic yards of contaminated soil was left in place within the excavation. Due to the strong odors, soil treatment was identified as a potential cleanup option.

Based on the results of the 2007 supplemental soil Investigation, the volume of contaminated soil that remains in place was re-calculated. It is now estimated that approximately 1,900 - 2,800 cubic yards of contaminated soil remains in place. Consequently, the decision has been made to excavate this remaining soil and disposed of it off-site.

The PPA "vadose zone" (soil above the water table) is based on the lowest ground water elevation over the last 5 years, as measured in two nearby monitoring wells (MW-14(S) and MW-24(S)). For the PPA, the vadose zone extends from the land surface to an elevation of approximately 7 ft., which is approximately 3.5-5.2 feet below ground surface. The majority of the overlying soil is clean fill from the 2002 removal action. Analytical results confirm that soil from 0-4 ft. is "clean" (less than cleanup levels). Consequently, this soil can be excavated and used as clean fill or placed somewhere else within the site CAMU.

For the PPA, the contaminated soil "horizon" is 4-12 feet below land surface, which is at or below the shallow water table. In some locations, contaminated soil extends downward to the top of the underlying aquitard, which is located approximately 6-10 feet below land surface. On the surface of this aquitard is a layer of peat 3 to 6 inches thick. It is assumed that this peat layer is, in theory, acting as a "sponge" and "collecting" contamination (organic chemicals tend to adsorb to organic carbon, e.g. peat). The PPA soil excavation will extend vertically to the top of the upper aquitard and the peat layer will be removed. Efforts will be made to do this as carefully as possible to avoid aquifer "cross-contamination" by breaching the aquitard and allowing contaminants to cross between the shallow and intermediate aquifers. Based on the PPA analytical results, the excavation is expected to extend to approximately 6 - 12 feet below ground surface. The estimated volume of contaminated soil to be excavated is expected to be approximately 1,900 - 2,800 cubic yards. The anticipated limits of the excavation are shown on Figure 4, p. 15.

Due to concerns about noxious odors and air quality concerns, the PPA excavation "pit" will remain open for only a short period. Other "odor control" measures, including foam vapor retardants and careful scheduling and sequencing of the work may also be used. Prior to the excavation, Ecology will define "how deep and how far" the excavation will go. All contaminated PPA soil will be removed to the extent practicable. As a last step, a PPA confirmational soil-sampling plan will be developed as part of the remedial action work plan to ensure that all contaminated soil has been removed. Ecology will aid in the development of this plan and it will be implemented once the soil excavation has been completed.

Contaminated PPA soil is likely to be a listed F021 hazardous waste. Therefore, it will be disposed of at a permitted hazardous waste facility as CAMU-eligible waste. The closest landfill that meets these requirements is the Waste Management facility in Arlington, Oregon. The contaminated soil will be disposed of in accordance with WAC 173-303-646920 and it will be subject to the acceptance and sampling requirements. Additionally, some of the excavated soil may also be designated as Toxic Substances Control Act (TSCA) waste and will be subject to TSCA[6] regulations. This soil will also be disposed of at the Waste Management site in Arlington, Oregon and will be subject to the acceptance and sampling requirements. Lastly, the excavated soil will be segregated based on its chemical characteristics and disposed of appropriately.

5.1.3 SWMU 25—Butylphenol Process Area (BPA)

The BPA has soil with 2,4,6-trichlorophenol and 2,4-dichlorophenol that exceeds cleanup levels. Within the BPA, 3 sample locations exceeded cleanup levels: RC-BP-1, BPA-101, and BPA-102. Additionally, several BPA samples (e.g. SB-06, SB-08, and SB-36) from the Nov-07 supplemental soil investigation had concentrations of 2,4,6-trichlorophenol and/or 2,4-dichlorophenol that exceed cleanup levels. Contaminated soil has been detected from approximately 3-10.3 feet below ground surface. BPA sample locations are shown on Figure 4, p. 15.

The 2007 supplemental soil investigation results were used to clarify and refine the nature and extent of the BPA area contamination. Full characterization of this area has been constrained due to the presence of several large footings and remnant concrete site structures. These remnant structures will be removed prior to soil excavation. This will allow for additional site investigation (if deemed necessary).

When the BPA soils are excavated, there is the potential to encounter noxious odors from remnant soil contamination. The BPA is close to the PPA and similar conditions are likely at both areas. The excavation will consist of removing contaminated vadose zone soil as well as "hot spot" removal of saturated zone soil.

The extent of the BPA vadose zone s based on the lowest ground water elevation over the last 5 years, as measured in one nearby well (MW-19(S)). Within the BPA, the vadose zone extends from land surface to an elevation of approximately 6 feet. This is approximately 5.3 feet below ground surface. Analytical results from soil samples collected from within the BPA confirm that there is a horizon of

---

[6] The Toxic Substances Control Act of 1976 (15 U.S.C. §2601 et seq. (1976) -- otherwise known as TSCA (pronounced TAHS-ka) -- was enacted by Congress to give EPA the ability to track the 75,000 industrial chemicals currently produced or imported into the United States. EPA repeatedly screens these chemicals and can require reporting or testing of those that may pose an environmental or human-health hazard. EPA can ban the manufacture and import of those chemicals that pose an unreasonable risk.

"clean" soil from land surface to a depth of approximately 3 ft. This soil may be excavated and used as clean fill or placed somewhere else on-site within the CAMU.

For the BPA, the contaminated soil horizon or "target" layer for removal is located approximately 3- 10.3 feet below ground surface. This layer of contaminated soil will be excavated and removed. Confirmation samples will then be collected to ensure that all contaminated soil has been removed to the extent practicable.

In some locations, contaminated soil extends downward to the top of the underlying aquitard, which is located approximately 6-10 feet below land surface. On the surface of this aquitard is a layer of peat 3 to 6 inches thick. It is assumed that this peat layer is, in theory, acting as a "sponge" and "collecting" contamination (organic chemicals tend to adsorb to organic carbon, e.g. peat). The BPA soil excavation will extend vertically to the top of the upper aquitard and the peat layer will be removed. As with the PPA excavation, efforts will be made to do this as carefully as possible to avoid aquifer "cross-contamination".

Based on previous soil analytical results, the excavation is expected to extend vertically to approximately 6- 11 feet below ground surface. The contaminated soil volume is estimated at approximately 1,500 - 1,800 cubic yards. The anticipated limits of the BPA excavation are shown on Figure 4, p. 15.

Due to concerns about noxious odors and air quality concerns, the BPA excavation "pit" will remain open for only a short period. Other "odor control" measures, including foam vapor retardants and careful scheduling and sequencing of the work may also be used. Prior to the excavation, Ecology will define "how deep and how far" to extend the excavation. All contaminated BPA soil will be removed to the extent practicable. Lastly, a BPA confirmational soil-sampling plan will be developed to ensure that all contaminated soil has been removed. Ecology will aid in the development of this plan and it will be implemented once the soil excavation has been completed.

The contaminated BPA soil may be a listed F021 hazardous waste and will therefore be disposed of as CAMU-eligible waste at a permitted hazardous waste facility. The closest landfill that meets these requirements is the Waste Management facility in Arlington, Oregon. The soil will be disposed of in accordance with WAC 173-303-646920 and will be subject to the acceptance and sampling requirements.

5.1.4 SDA-9 Area

Two sampling locations within the SDA-9 exceed cleanup levels for Aroclor 1248. An excavation for this area had been planned in the 1990s, but was not conducted due to presumed utility conflicts. It has now been determined that the existing utility lines in this area will not impact cleanup efforts. As a result, the SD-9 area is now "on the table" for assessment. The area to be addressed has been focused to a limited area, identified as the SDA-9 "area of concern" (Figure 3, p. 13).

For the SDA-9 area, two samples contained concentrations of Aroclor 1248 that exceed cleanup levels. Both of these samples were collected from 0-3 ft. depth. Since the limits have been previously defined and the area is relatively small, the remedy for this area is excavation and off-site disposal[7]. On site or "ex-situ" treatment alternatives are not appropriate for Aroclor 1248.

The SD-9 area excavation will consist of removing contaminated vadose zone soils (or that soil above the water table). Like the BPA and PPA areas, the SDA-9 vadose zone is defined as the lowest ground water elevation over the last 5 years, as measured in one nearby well (MW-10(S)). In the fourth quarter 2006, MW-10S was dry. What this means is that vadose zone extends from land surface to the upper aquitard, or an elevation of approximately 2.1 feet or 10 feet below ground surface (FFS Table 6.1).

Based on previous analytical results, the "target" soil layer for the SDA-9 area is from approximately 0- 3 feet below ground surface. This layer of contaminated soil will be excavated and removed. The estimated volume of contaminated soil is approximately 80-140 cubic yards. The anticipated limits of the excavation are shown on Figure 4, p. 15.

The excavation would be followed by confirmation sampling to verify that all the contaminated soil was removed. Contaminated soil will be taken off-site and transported to an approved landfill. This soil is not a listed F021 hazardous waste and will not be subject to the associated land disposal requirements. However, it is likely that the soil will be designated as "TSCA" waste and will be subject to TSCA regulations. This contaminated soil will be disposed of at the Waste Management facility in Arlington, Oregon and will be subject to the acceptance and sampling requirements.

5.2 SOIL REMEDIAL ACTION ALERNATIVES

Remedial technologies that may be used to accomplish remedial action objectives or "RAOs" were identified in the FFS. Advantages and disadvantages of each remedial technology were evaluated and compared to the 173-340-350(8)(b)criteria. Any remedial technology that did not meet the regulatory "criteria" was deemed "unsuitable" and removed from further analysis. Likewise, those alternatives that "met" the regulatory criteria were deemed "acceptable" and were therefore further evaluated. This process resulted in selection and evaluation of six different cleanup actions or "remedial alternatives":

- No action
- Excavation
- Disposal
- In-situ Treatment
- Ex-situ Treatment
- Engineered Cap and Institutional Controls

The FFS contains details on the advantages and disadvantages of these six different remedial alternatives. This evaluation resulted in the remedial alternatives listed in Section 5.1. In summary, the selected remedial alternative is excavation and removal for off-site disposal for four site areas (PPA, BPA, HCL pond and SDA-9 area).

---

[7] Figure 3.2 of Construction Package No. 13, Agreed Order No. 1578.

5.3 JUSTIFICATION FOR SELECTING THE SOIL REMEDIAL ACTIONS

As required by WAC 173-340-350 (8)(c)(i)(G), the FFS evaluated soil alternatives criteria set forth in WAC 173-340-360. WAC 173-340-360(2) specifies four threshold criteria that all cleanup actions must satisfy and WAC 173-340-360(3) specifies three other criteria that alternatives that meet the threshold requirements must also achieve. Descriptions of how these selected alternatives meet these criteria are described below.

5.3.1 MTCA Threshold Requirements

The soil remedial alternative as described above meets the four MTCA threshold criteria:

- Protect human health and the environment.
- Comply with cleanup standards.
- Comply with applicable state and federal laws.
- Provide for compliance monitoring.

Site cleanup levels were calculated based on two exposure pathways: soil ingestion (direct contact) and the protection of surface water (site perimeter ditches and the Blair Waterway). For soil, compliance monitoring will include confirmation sampling of all excavated areas. If deemed necessary, additional removal would be performed following confirmational sampling to ensure that all contaminated soil has been removed. The proposed remedy (excavation and removal of all contaminated soil) is a "permanent" solution. Therefore, long-term monitoring of the soil is not necessary. The proposed soil remedy also complies with applicable state and federal laws ("ARARs", Section 5.3.4).

5.3.2 Other MTCA Requirements

The proposed soil cleanup action (excavation and off-site disposal) complies with three additional requirements (WAC 173-340-360(3)):

1. Use permanent solutions to the maximum extent practicable.
2. Provide for a reasonable restoration time frame.
3. Consider public concerns and comments on the CAP.

Excavating contaminated site soil meets and complies with the first two criteria. The third criterion will be satisfied during the public comment period.

5.3.3 MTCA Disproportionate Cost Analysis (DCA)

For soil, a MTCA disproportionate costs analysis "DCA" (WAC 173-340-360 (3)(e)) is not necessary. Excavating and removing contaminated soil is considered protective of human health and the environment. It is a permanent solution and it can be done in a "reasonable" restoration timeframe.

5.3.4 Compliance with Applicable or Relevant and Appropriate Requirements

In addition to MTCA requirements, the proposed soil remedy complies with ARARs (Section 3.4.1 of the FFS and Table 1, p. 19).

6.0 Soil Treatment Cell Remedial Actions

6.1 REMEDIAL ACTION FOR SOIL TREATMENT CELLS

One cleanup action is appropriate for the soil treatment cell area. As selected through this CAP, this action is composed of three components. These three components are listed below and are described in further detail in the following sections.

- Continued treatment with CAMU placement.
- Off-site disposal of soil remaining in the treatment cells at time of site development.
- Off-site disposal as a contingency for soil that is unable to be treated using the biological treatment technology.

6.1.1 Treatment with CAMU Placement

Biological treatment of contaminated soil within the site "CAMU" area has been very successful. Treatment typically consists of 1-2 year timeframes for soil horizons that are approximately 18-24 inches thick. It is anticipated that continued biological treatment of CAMU area soil will not impact future site development. Soil treatment will continue into the future. Once treated, it will be removed from the treatment cells and placed in an Ecology-approved area of the CAMU. Once there, it will subject to verification sampling to ensure that the soil complies with treatment levels. Under this CAP, the soil treatment levels are adjusted to the levels specified in (Table 5, p. 50).

The treatment technology is continually being optimized to achieve effective treatment in the most efficient time frame. One approach being developed is the attempt to minimize leachate production while concurrently progressing the date of Daramend™ application to as early as possible.

Currently, the soil treatment cells remain uncovered during the wet season and stormwater infiltrates the soil. Biological treatment activities are generally dormant during the winter months; however, the soil within the treatment cells is also saturated by winter rainfall. As a result, the soil treatment cells remain "wet" until late May. In addition, treated soil cannot be removed until it is dry enough for access by machinery. Consequently, the soil treatment cells may be covered with a tarp during the winter months. This would make it easier to apply the Daramend™ treatment each spring and would reduce leachate generation.

Table 5: Soil Cell "Treatment" Levels.

Hazardous Substance	2008 FFS Soil Cell Treatment Levels (mg/kg) (1)
Volatile Organic Compounds	
1,1,1-Trichloroethane	3.2E+06
2-Butanone	2.1E+06
Acetone	6.9E+03
Benzyl alcohol	1.1E+06
Carbon disulfide	3.5E+05
Chlorobenzene	7.0E+04
Methylene chloride	4.5E+00
Styrene	7.0E+05
Tetrachloroethene	1.9E+01
Toluene	6.3E+03
Trichloroethene	1.2E+00
Semivolatile Organic Compounds	
2-Benzyl 4-chlorophenol	-
2-Chlorophenol	4.1E+02
2-Methylnaphthalene	5.2E+03
2,4-Dichlorophenol	3.4E+01
2,4,5-Trichlorophenol	3.5E+05
2,4,6-trichlorophenol	4.5E+02
4-Methylphenol	3.3E+00
Acenaphthene	2.1E+05
Anthracene	1.1E+06
Benzo(a)anthracene	1.8E+02
Benzo(b)fluoranthene	1.8E+02
Benzo(k)fluoranthene	1.8E+03
Bis(2)ethylhexyl phthalate	3.0E+03
Butyl benzyl phthalate	7.0E+05
Chrysene	1.8E+04
Diethyl phthalate	2.8E+06
Di-n-butyl phthalate	3.5E+05
Di-n-octyl phthalate	7.0E+04
Fluoranthene	1.4E+05
Fluorene	1.4E+05

Table 5 (cont.)

Hazardous Substance	2008 FFS Soil Cell "Treatment" Levels (2) (mg/kg)
Hexachlorobenzene	8.2E+01
Naphthalene	4.0E+02
Parabenzoquinone	-
Pentachlorophenol	1.0E+03
Phenanthrene	-
Phenol	9.5E+02
Pyrene	1.1E+05
Polychlorinated Biphenyls	
Aroclor 1248	6.6E+01
Metals	
Lead (3)	--
Molybdenum	5.9E+03

Notes: (1) This list is based is based on previous verification sampling efforts (CH2M Hill, 2004). (2) Soil cell "treatment" levels are equivalent to cleanup levels. (3) Not identified as a COC.

6.1.2 Off-Site Disposal

Off-site disposal of remaining soil and soil treatment cell infrastructure material (liners, leachate collection system materials) will be conducted once soil treatment cells are decommissioned. The timeframe for treatment cell decommissioning is dependent upon on future site development. Lastly, there will be some remnant soil contamination that must be removed when the treatment system is decommissioned. The actual amount (or volume) of soil to be removed depends on the effectiveness of the treatment system.

It is likely that the residual treatment cell contaminated soil will be classified as a listed F021 hazardous waste. Thus, this contaminated soil will be subject to RCRA LDRs. This contaminated soil will be disposed of as CAMU-eligible waste at a permitted hazardous waste facility located outside of Washington State. All contaminated soil will be disposed of in accordance with WAC 173-303-646920 and will be subject to receiving facility acceptance and sampling requirements.

Public comment on this planned off-site disposal will be conducted.

6.1.3 Off-Site Disposal Contingency

The biological amendment Daramend™ is specifically targeted to certain types of chemicals, particularly SVOCs. However, the Daramend™ treatment may not be effective for soil contaminated with Aroclor 1248. Therefore, contaminated soil that cannot be effectively treated (e.g. soil with Aroclor 1248 above site cleanup levels) will be disposed off-site[8].

If the treatment cell contaminated soil meets RCRA LDRs and all applicable permit requirements, then it will not be classified as F021 listed hazardous waste. Proper measures will be implemented to ensure that the treatment cell soil is properly disposed of, per state and federal regulations (i.e. RCRA, ARARs, TSCA, CAMU restrictions, etc.).

6.2 SOIL TREATMENT CELL REMEDIAL ALTERNATIVES CONSIDERED

For the treatment cell contaminated soil, two remedial alternatives were considered: 1) continued treatment, and 2) excavation and off-site disposal. The current soil treatment technology (Daramend™ biological treatment) has proven to be very effective. It is now estimated that within the next 3 years (approximately 2010-11), all treatment cell contaminated soil will be reduced to "acceptable" or "treatment" levels.

Conversely, if the treatment cell soil cannot be successfully treated within the next few years, then it will need to be excavated and removed for off-site disposal. As discussed, it is anticipated that the Daramend™ treatment will not be effective for Aroclor 1248. If this is the case, then targeted volumes of

---

[8] Off-site disposal would only be implemented if baseline and/or verification sampling identified "zones" or "horizons" of contaminated soil that exceed treatment levels for contaminants that are unable to be biologically treated. If this occurs, then the baseline / verification analytical results would be used to identify hazardous substance types. This information would then be used to select a proper disposal site.

treatment cell contaminated soil would need to be excavated and for off-site disposal. Lastly, the treatment cell liners and leachate collection bedding material would also be analyzed and disposed of properly.

Untreated treatment cell soil may be classified as a listed F021 hazardous waste. Off-site disposal of contaminated treatment cell soil would be subject to RCRA LDRs. These LDR regulations require that the soil be hauled to an appropriately permitted landfill. This landfill must be able to provide appropriate pre-treatment prior to disposal. This contaminated soil will be disposed of as CAMU-eligible waste at a permitted hazardous waste facility. The closest landfill that meets these requirements is the Waste Management facility in Arlington, Oregon. The material will be disposed of in accordance with WAC 173-303-646920 and will be subject to the acceptance and sampling requirements.

Additionally, some of the material may also be designated as TSCA waste and will be subject to TSCA regulations. This material will also be disposed of at the Waste Management facility in Arlington, Oregon and will be subject to the acceptance and sampling requirements. The excavated material will be segregated based on its chemical characteristics and disposed of appropriately.

Lastly, if future site development impedes or inhibits treatment cell operations, then the contaminated soil will need to be removed for off-site disposal.

6.3 JUSTIFICATION FOR SELECTING THE SOIL TREATMENT CELL REMEDIAL ACTIONS

This section provides details on the soil treatment cell remedial alternatives, as required by WAC 173-340-360. All cleanup actions must meet the four threshold criteria specified in WAC 173-340-360(2). All cleanup actions must comply with three additional criteria specified in WAC 173-340-360(3).

6.3.1 MTCA Threshold Criteria

The soil treatment cell remedial alternative meets the four criteria specified in WAC 173-340-360(2):

1. Protect human health and the environment.
2. Comply with cleanup standards.
3. Comply with applicable state and federal laws.
4. Provide for compliance monitoring.

Treatment of contaminated soil meets the above four criteria. In addition, soil that does not meet treatment levels will be removed and disposed of off-site. if necessary per the future site development schedule. This plan is also compatible with the above 4 criteria. Soil treatment levels were derived in accordance with MTCA guidance. These treatment levels are considered protective of human health and the environment for two exposure pathways: direct human contact (soil ingestion) and the protection of surface water (i.e. nearby ditches and the Blair Waterway). Therefore, when treated soil is re-located to the CAMU, it will be "safe" for both human health and the environment. Baseline and verification sampling will ensure that this soil complies with both cleanup standards and state / federal laws.

All off-site disposal of contaminated soil will comply with RCRA ARARs, TSCA regulations, and CAMU requirements. Lastly, treatment cell sampling will be conducted per the established Treatment Cell Sampling Protocols (Soil Cells Sampling and Analysis Plan, Attachment #7 to RCRA Corrective Action Management Unit Summary, March 2004) to ensure that all residual soil contamination has been removed.

6.3.2 Additional MTCA Criteria

All cleanup actions must comply with three additional criteria specified in WAC 173-340-360(3):

1. Use permanent solutions to the maximum extent practicable.
2. Provide for a reasonable restoration timeframe.
3. Consider public concerns comments on the CAP.

The soil treatment cell remedial alternative meets these three additional requirements:

- Permanent solution: this cleanup action eliminates human exposure to contaminated soil and significantly reduces "leaching" of contaminants from soil to ground water. Therefore, it is permanent to the extent practicable.
- "Restoration" timeframe: it is anticipated that the contaminated treatment cell soil will be reduced to "acceptable" (treatment) levels within the next 3 years (by 2011). This is considered a "reasonable" timeframe. In addition, there is a contingency plan for complete removal of all contaminated soil, if deemed necessary.
- All public comments on this Cleanup Action Plan (CAP) will be reviewed and considered.

6.3.3 Soil Treatment Cell Remedial Alternative and Other Applicable or Relevant and Appropriate Requirements

In addition to MTCA requirements, the proposed soil treatment cell remedial alternative complies with other ARARs, based on a comprehensive review of federal, state, and local regulations (Table 1, p. 19).

7.0 Cleanup Action Plan Schedule

7.1 OVERVIEW

It is anticipated that in October of 2008, a draft Consent Decree[9] and associated documents (CAP, CMCP, FFS, and FRI) will be released for public comment. This public comment also satisfies the public comment requirements for off-site disposal of CAMU-eligible wastes (WAC 173-303-646920). Following completion of the public comment process (fall of 2008), it is anticipated SSA will proceed with implementation of the final remedial (cleanup) actions. Final remedial actions will be conducted prior to anticipated site development, which is estimated to occur in 2010-2011.

7.1.1 Scope of Work and Schedule

The Scope of Work (SOW) addresses the design, construction and monitoring of the corrective actions detailed in the CAP. The SOW also requires SSA to submit to Ecology a remedial action work plan, a Compliance Well Installation Work Plan, an Operation and Maintenance (O&M) plan for shutdown of the ground water treatment system, a decommissioning plan and remedial action / closure reports.

Groundwater Remedial Action Tasks

1. Install additional shallow and intermediate aquifer ground water monitoring wells. This work is to be done as part of the ground water remedy (MNA). A work plan for this task will be submitted to Ecology for approval. This plan must provide details on the number and location of the new wells and the logic for all well locations (e.g. the interior of the site, in and around soil remedial action areas). Details on sample collection, analytical methods, target analytes, etc. must also be provided, consistent with the Attachment B – Compliance Monitoring Contingency Plan (CMCP). This work plan must account for future property development issues. Lastly, this plan must account for any variability in ground water flow directions caused by decommissioning of the site ground water treatment system. The monitoring wells will be installed after Ecology approval of the work plan.

2. Implement the compliance monitoring contingency plan (CMCP) (Attachment B). Conduct compliance monitoring and reporting. Verify that monitored natural attenuation (MNA) is occurring.

3. Discontinue all future groundwater treatment, including groundwater extraction from the SID and intermediate aquifer extraction wells. Prepare an operation and maintenance (O&M) plan and submit to Ecology for approval. This plan must provide details on the decommissioning of the site ground water extraction and treatment system. The O&M plan must meet the

---

[9] A consent decree is a formal legal agreement filed in court. The work requirements in the decree and the terms under which it must be done are negotiated and agreed to by the potentially liable person, Ecology and the state Attorney General's office. Before consent decrees can become final, they must undergo a public review and comment period. Among other things, consent decrees protect the potentially liable person from being sued for "contribution" by other persons that incur cleanup expenses at the site while facilitating any contribution claims against the other persons when they are responsible for part of the cleanup costs. Sites cleaned up under a consent decree are also exempt from having to obtain certain state and local permits that could delay the cleanup.

applicable requirements of WAC 173-340-400(c) (e.g. provide details on maintenance of pumps and seals, flush pipes, inspect tanks, etc.). This O&M plan must also provide details on how to collect, store and dispose of soil treatment cell leachate.

4. Decommission "old" site monitoring wells as deemed appropriate given potential use for MNA monitoring. Submit a monitoring well decommissioning work plan for Ecology approval. Provide details on how the monitoring wells will be decommissioned (i.e. in accordance with Chapter 173-160 WAC).

Soil Remedial Action Tasks

5. Prepare a soil removal remedial action work plan for Ecology approval. This work plan must provide details on the excavation and soil removal for four site areas: hydrochloric (HCL) acid pond, pentachlorophenol (PCP) plant, the butylphenol process area, and SDA-9. This plan must also include confirmation and verification soil sampling plans (developed in collaboration with Ecology) to ensure that all contaminated soil has been removed.
6. Develop bid documents and secure a contractor to perform remedial actions.
7. Secure necessary permits for remedial actions.
8. Select appropriate facilities (e.g. Waste Management, Arlington, OR) for transport and disposal of contaminated soil. Coordinate with the Oregon Department of Environmental Quality (ODEQ). Check and make sure that the "receiving facility" (e.g. Waste Management) can accept CAMU-eligible waste, per WAC 173-303-646920.
9. Perform remedial actions in accordance with the remedial action work plan, including confirmational sampling and backfill of excavations.
10. Document remedial actions and performance in a "closure report" and submit for Ecology's approval.

Soil Treatment Cells Remedial Action Tasks

11. Continue to treat soil (treatment cells) with biological amendment. Soil treatment is anticipated to continue into the future until it is no longer feasible, per the pending future site development.
12. Install treatment cell cover (tarp) to reduce leachate accumulation. Describe this task in the O&M plan.
13. Prepare a draft treatment cell closure work plan for Ecology review and approval. This plan must provide details on how the treatment cells will be decommissioned. This plan must also include a soil verification / confirmational sampling plan. This verification soil-sampling plan will be used to ensure that all treatment cell contaminated soil has been removed.
14. Dispose of residual treatment cell soil off-site, as deemed necessary. Select appropriate facilities (e.g. Waste Management, Arlington, OR) for transport and disposal. Coordinate with the Oregon Department of Environmental Quality (ODEQ). Check and make sure that the "receiving facility" (e.g. Waste Management) can accept CAMU-eligible waste, per WAC 173-303-646920.

15. Implement the CAMU closure work plan.
16. Document decommissioning and performance in closure report and submit to Ecology for approval.

Overall site

17. Develop a CAMU closure plan, per the WAC 173-303-646(5)(b)(iv) requirements. Submit this plan for Ecology review and approval.
18. Apply appropriate industrial land use deed restriction and restrictive covenants.

Schedule of Work and Deliverables

19. Complete all tasks and review all deliverables (Table 6, p. 58) within 30 days (Ecology).

Table 6: Deliverables and Schedule.

Task	Description and Timeframe
1. Soil Treatment Cells—Continued Treatment	On-going until property development or completion of treatment
2. Draft Compliance Monitoring Well Installation Work Plan	Within 30 days of the effective date of the consent decree, or enforcement mechanism under RCW 70.105D.050
3. Final Compliance Monitoring Well Installation Work Plan	Within 15 days of Receipt of Ecology's comments on the draft work plan
4. Draft O&M Plan for shutdown of the ground water extraction and treatment system	Within 30 days of the effective date of the consent decree, or enforcement mechanism under RCW 70.105D.050
5. Final O&M Plan for shutdown of the ground water extraction and treatment system	Within 15 days of Receipt of Ecology's comments on the draft O&M Plan
6. Shutdown of the ground water extraction and treatment system	Immediately after Ecology approval of the Final O&M Plan
7. Implementation of the CMCP	Within 30 days following ground water extraction shutdown
8. Draft Remedial Action Work Plan for soil	Within 6 months of the effective date of the consent decree, or enforcement mechanism under RCW 70.105D.050
9. Final Remedial Action Work Plan for soil	Within 30 days of Receipt of Ecology's comments on the draft Remedial Action Work Plan
10. Final Remedial Actions for In-Situ Soil	Within 90 days of Ecology's approval of final Remedial Action Work Plan, or on the approved schedule in the Remedial Action Work Plan that addresses seasonal construction constraints
11. Construction Completion Report for Final Remedial Actions for In-Situ Soil	Within 60 days of receipt of validated data related to the completion of in-situ soil remedial actions.
12. Construction Completion Report for Final Remedial Actions for Soil Treatment Cells	Within 60 days of final decommissioning of the soil treatment cells.
13. Draft CAMU Closure Work Plan	Within 2 years of the effective date of the consent decree, or enforcement mechanism under RCW 70.105D.050
14. Final CAMU Closure Work Plan	Within 30 days of Receipt of Ecology's comments on the Draft CAMU Closure Work Plan
15. CAMU Closure	Within 60 days of Ecology's approval of a CAMU closure work plan, or on the approved schedule in the CAMU closure work plan that addresses completion of operations at the soil treatment cells
16. Draft Ground Water Extraction and Treatment System Decommissioning Work Plan	Within 2 years of the effective date of the consent decree, or enforcement mechanism under RCW 70.105D.050

Task	Description and Timeframe
17. Implement decommissioning Water Extraction and Treatment System	Within 30 days of Ecology's approval of the Final Ground Water Extraction and Treatment System Decommissioning Work Plan, or on the approved schedule in the Decommissioning Work Plan that addresses completion of operations at the soil treatment cells, and schedule for property development.
18. Site development (phased as necessary relative to remediation system decommissioning). (1)	Anticipated timeframe is 2010-2011 and is contingent upon development permits, etc.

(1) Not a cleanup action task. For informational purposes only.

8.0 References

CH2M HILL. 2004. Field Sampling and Analysis Plan, Onsite Soil Cells,, Reichhold, Inc. Tacoma, Washington Facility. March.

CH2M HILL. 2004. Corrective Action Management Unit Technical Summary, Reichhold, Inc., Tacoma, Washington. March

CH2M HILL. 2006. Final Focused Remedial Investigation. Prepared for Reichhold, Inc. Tacoma site, Tacoma, Washington. April.

CLARC. Ecology Cleanup Levels and Risk Calculations database.

Floyd|Snider. 2008. *Supplemental Soil Investigation Report*. Prepared for SSA Containers, Inc. 31 January.

Leja, S. 2002. Unpublished Memorandum from Washington State Department of Ecology to Kay Seiler at Washington State Department of Ecology re: Noxious Odors and Potential Air Release at the Reichhold site. 15 October.

Model Toxics Control Act (MTCA). Chapter 173-340 WAC.

U.S. Environmental Protection Agency (USEPA). 1996. BIOSCREEN Natural Attenuation Decision Support System User's Manual Version 1.3. National Risk Management Research Laboratory, EPA Office of Research and Development, EPA/600/R-96/087. August.

U.S. Environmental Protection Agency (USEPA). National Recommended Water Quality Criteria.

Walters, K. L. and G. E. Kimmel. 1968. "Ground-water occurrence and stratigraphy of unconsolidated deposits, central Pierce County, Washington." Washington Department of Water Resources Water–Supply Bulletin No. 22.

Washington State Department of Ecology (Ecology). 2002. *Model Toxics Control Act Cleanup Regulation Chapter 173-340 WAC.* Washington State Department of Ecology Toxics Cleanup Program. Publication No. 94-06. 12 February.

Attachment A – Point of Compliance Letter

Note: reserved for letter from intervening property owners (off- site ground water conditional point of compliance).

Puyallup Tribe of Indians

Mr. Skip Sahlin
SSA Containers, Inc.
1131 S.W. Klickitat Way
Seattle, WA 98134

October 14, 2008

Dear Mr. Sahlin,

I am writing on behalf of the Puyallup Tribe of Indians (the Tribe). The Tribe is the owner of certain real properties abutting the Blair Waterway that are shown on Exhibit A, attached hereto.

To the east of our Blair Waterway properties is the parcel owned by SSA Containers, Inc. at 3320 Lincoln Avenue in Tacoma, Washington, commonly called the Reichhold/SSA Property. The Reichhold/SSA Property has been the subject of significant remedial activities. The Tribe is aware of those activities and has reviewed sampling data, including data generated from monitoring wells on the Tribe's property, concerning groundwater contamination originating from the Reichhold/SSA Property.

In connection with its proposed remedial actions, SSA has asked the Tribe to approve the establishment of a conditional point of compliance for groundwater on the Tribe's Property. Pursuant to WAC 173-340-720(d)(ii), the Tribe consents to the use of a conditional point of compliance on the Tribe's Property for groundwater for SSA's Cleanup Action Plan.

Our understanding and expectation is that compliance monitoring will be performed at the SSA Containers downgradient property line near Alexander Avenue, to confirm that groundwater concentrations coming off of the SSA site remain below Source Area Target Concentrations protective of cleanup levels at the point of compliance. The use of a conditional point of compliance of the Tribe's Property is consistent with the deed restriction that is already in place on out properties in the area prohibiting groundwater withdrawal for drinking water.

By agreeing to the establishment of a conditional point of compliance for groundwater on the Tribe's property the Tribe does not waive, and expressly reserves, all claims and causes of action it may have concerning any contamination originating from the Reichhold/SSA property.

Very truly yours,

Puyallup Tribe of Indians

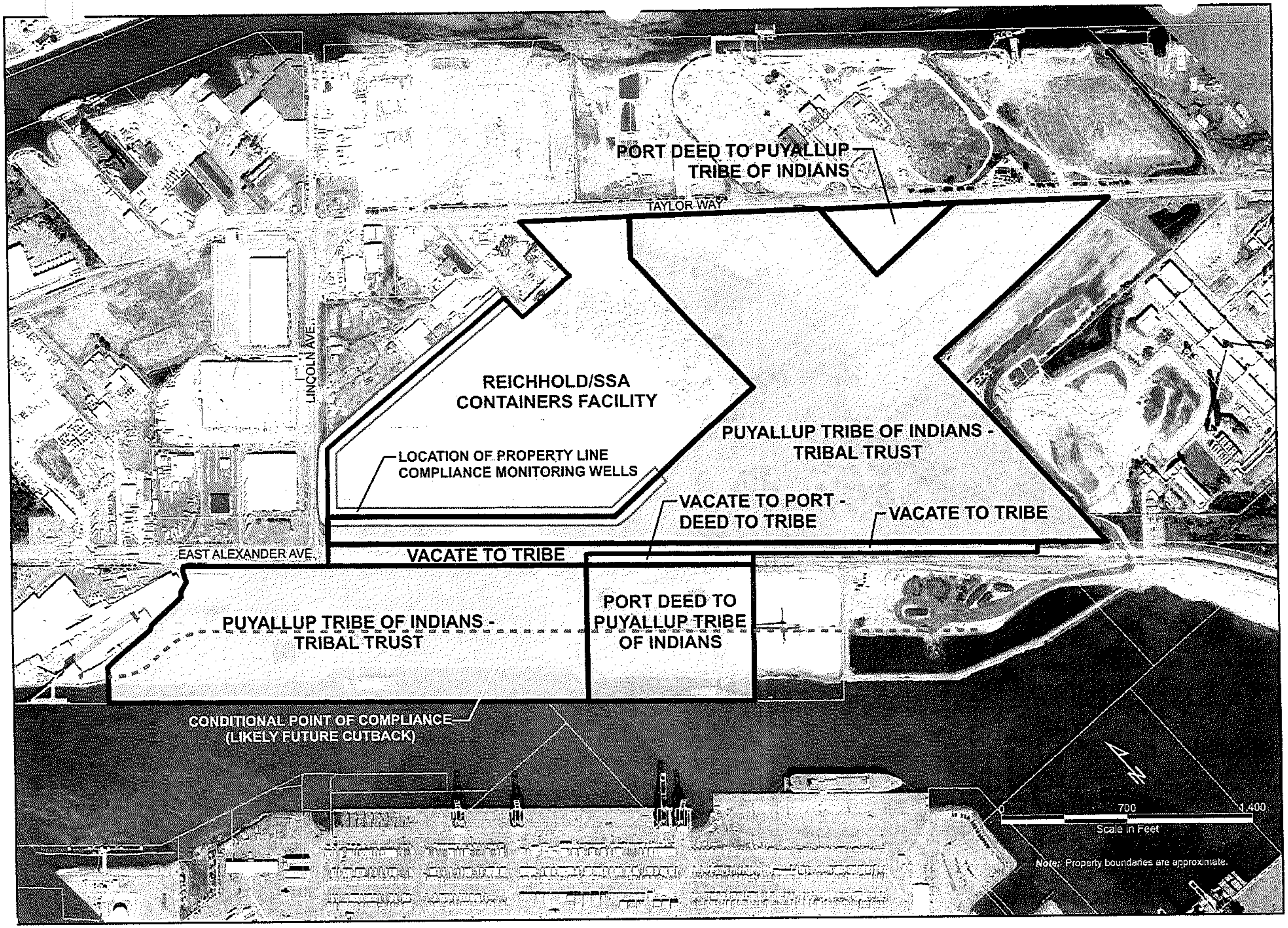
Bill Sullivan

Bill Sullivan, Environmental Director

cc: Stan Leja, Washington State Department of Ecology

Al Jeroue, SSA Containers, Inc.

3009 E. Portland Ave. • Tacoma, Washington 98404 • (253) 573-7800



File: F:\projects\SSA-RHOLD\GIS\MXD_Figures\Task 3060\CAP Figures\Figure X (Exhibit A REV Oct 2008).mxd
Date: 10/28/2008

Exhibit A