FIFTH FIVE-YEAR REVIEW REPORT FOR
COMMENCEMENT BAY NEARSHORE/TIDEFLATS SUPERFUND SITE
PIERCE COUNTY, WASHINGTON

Prepared by

U.S. Environmental Protection Agency
Region 10
Seattle, Washington

CALVIN TERADA
Digitally signed by CALVIN TERADA
Date: 2020.04.22 17:28:21 -07'00'

Calvin Terada, Division Director

Date

This page is intentionally blank

Table of Contents

Appendices

List of Tables

Figures (located after text)

LIST OF ABBREVIATIONS & ACRONYMS

AC	Asphalt Concrete
AET	Apparent Effects Threshold
AOC	Administrative Order on Consent
APP	Associated Petroleum Products
ARAR	Applicable or Relevant and Appropriate Requirement
BFPP	Bona Fide Prospective Purchaser
BNSF	Burlington Northern Santa Fe
CB	Commencement Bay
CB/NT	Commencement Bay Nearshore/Tideflats Superfund Site
CD	Consent Decree
CDF	Confined Disposal Facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHB	Citizens for a Healthy Bay
cm	Centimeter
CPM	Community Protection Measure
CSL	Cleanup Screening Level
CWA	Clean Water Act
DEHP	Bis(2-ethylhexyl)phthalate
DMMP	Dredged Material Management Program
DNAPL	Dense Non-aqueous Phase Liquid
DNR	Washington Department of Natural Resources
DOF	Dalton, Olmsted and Fuglevand
ENR	Enhanced Natural Recovery
EPA	United States Environmental Protection Agency
ERA	Expedited Response Action
ESD	Explanation of Significant Difference
ESA	Endangered Species Act
FS	Feasibility Study
FYR	Five-Year Review
gpd	Gallons per Day
gpm	Gallons per Minute
GWET	Groundwater Extraction and Treatment
HCC	Hylebos Cleanup Committee
HHCG	Head of Hylebos Cleanup Group

I&M	Inspection and Maintenance
ICs	Institutional Controls
LCRS	Leachate Collection and Removal System
LDCRS	Leak Detection, Collection, and Removal System
LMRP	Long-term Monitoring and Reporting Plan
LTMP	Long-term Monitoring Plan
MCL	Maximum Contaminant Level
mg/kg	Milligram per Kilogram
MGP	Manufactured Gas Plant
MINI	Marine Industries Northwest, Inc.
MLLW	Mean Lower Low Water
MTCA	Model Toxics Control Act
NAPL	Non-aqueous Phase Liquid
NCDF	Nearshore Confined Disposal Facility
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OCC	Occidental Chemical Corporation
OCF	On-site Containment Facility
OFA	Ohio Ferro-Alloy
OMMP	Operations, Maintenance, and Monitoring Plan
OU	Operable Unit
OVRA	Olympic View Resource Area
PAHs	Polynuclear Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCC	Portland Cement Concrete
PCE	Tetrachloroethene
PCL	Programmable Logic Unit
PMI	Port Marine Industrial
ppb	Parts per Billion
ppm	Parts per Million
ppt	Parts per Trillion
PRP	Potentially Responsible Party
PSE	Puget Sound Energy
PVC	Polyvinyl Chloride

QAPP	Quality Assurance Project Plan
RA	Remedial Action
RACR	Remedial Action Construction Report
RAL	Remedial Action Level
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RAO	Remedial Action Objectives
RI	Remedial Investigation
RNA	Restricted Navigation Area
ROD	Record of Decision
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SCO	Sediment Cleanup Objective
SMA	Sediment Management Area
SMS	Sediment Management Standard
SMU	Sediment Management Unit
SOP	Standard Operating Procedure
SOW	Statement of Work
SPI	Sediment Profile Imagery
SQO	Sediment Quality Objective
SR	State Route
SVOC	Semi-volatile Organic Compound
TBC	To Be Considered
TBT	Tributyltin
TCE	Trichloroethene
TEQ	Toxicity Equivalent Quotient
TPCHD	Tacoma-Pierce County Health Department
TPH	Total Petroleum Hydrocarbons
TTP	Tacoma Tar Pits
TZGM	Transition Zone Grading Material
UAO	Unilateral Administrative Order
UWI	Urban Waters Initiative
µg/dL	Microgram per Deciliter
µg/kg	Microgram per Kilogram
µg/L	Microgram per Liter
UPRR	Union Pacific Railroad
USACE	United States Army Corp of Engineers

USGS	United States Geological Survey
UU/UE	Unlimited Use and Unrestricted Exposure
VOCs	Volatile Organic Compounds
WAC	Washington Administrative Code
WCC	Washington Conservation Corp

1 INTRODUCTION

The purpose of the Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review process, if any, and documents recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan [NCP; 40 CFR Section 300.430(f)(4)(ii)] and considering EPA policy.

This is the fifth FYR for the Commencement Bay Nearshore/Tideflats (CB/NT) Superfund Site (Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

1.1 SITE OVERVIEW

The Site consists of the following seven operable units (OUs):

OU 01 Sediments
OU 02 Asarco Tacoma Smelter Facility
OU 03 Tacoma Tar Pits
OU 04 Asarco Off-Property (referred to as Ruston/North Tacoma Study Area)
OU 05 Sources to OU 01 Sediment
OU 06 Asarco Groundwater and Sediment
OU 07 Asarco Facility Demolition

There are also five removal actions[1] associated with OU 01: Puyallup Land Claim, General Metals, Olympic View Resource Area (OVRA), Blair Tributyltin (TBT), and Occidental Chemical.

Six of the OUs at the Site are addressed in this FYR. OU 07, which consisted of the former Asarco Tacoma Smelter Facility structures, is not addressed in this FYR because it was demolished in 1995 and all remaining waste was transferred from OU 07 to OU 02, therefore OU 07 is considered UU/UE.

The CB/NT Superfund Site fifth FYR was led by Kristine Koch, remedial project manager (RPM), of the EPA. EPA participants included: Kay Morrison, community involvement coordinator; Piper Peterson, RPM for OU 03 Tacoma Tar Pits; Elizabeth Allen, toxicologist; Tim Maley, hydrologist; Kelly Cole, Assistant Regional Counsel; Ted Yackulic, Assistant Regional Counsel; Richard Mednick, Associate Regional Counsel; Justine Barton, Ecologist; and Joyce Mercuri, Cleanup Manager, Washington Department of Ecology (Ecology) Southwest Region. Relevant entities such as the potentially responsible parties (PRPs) were notified of the initiation of the FYR. The review began on 1/28/2019.

[1] Removal actions at this Site are interim or partial response actions taken within the Site to abate or control a time-sensitive threat to human health or the environment.

1.2 SITE BACKGROUND

This section provides a general Site description, including former, current, and future land use(s) of the Site and surrounding areas, a history of contamination, a discussion of initial response actions, and a basis for taking remedial action. The discussion is separated by OU, with the exception that OUs 01 and 05 are discussed together as they contained under one ROD.

1.2.1 OU 01 Sediment and OU 05 Source Control

The CB/NT Superfund Site is located in Tacoma and Ruston, Washington at the southern end of the main basin of Puget Sound (Figure 1-1). The Site encompasses an active commercial seaport and includes 10-12 square miles of shallow water, shoreline, and adjacent land, most of which is highly developed and industrialized. The upland boundaries of the Site are defined according to the contours of localized drainage basins that flow into the marine waters. The marine boundary of the Site is limited to the shoreline, intertidal areas, bottom sediments, and water of depths less than 60 feet below mean lower low water. The nearshore portion of the Site is defined as the area along the Ruston shoreline from the mouth of Thea Foss Waterway[2] to Pt. Defiance. The tideflats portion of the Site includes the Hylebos, Blair, Sitcum, Milwaukee, St. Paul, Middle, Wheeler-Osgood, and Thea Foss Waterways; the Puyallup River upstream to the Interstate-5 bridge; and the adjacent land areas. The precise landward extent of the Site was adjusted as new information regarding surface water and groundwater flow patterns was developed based on source control activities conducted by Ecology.

The Hylebos Waterway is a narrow, manmade navigation channel approximately 3 miles in length, with two bends and widening for two turning basins. The bed of the waterway is about 300 to 600 feet wide, with the navigation channel portion authorized at a minimum 200 feet bottom width plus required side slopes. The Port is the primary owner of the submerged lands of the Hylebos Waterway. The Port owns the navigation channel and the adjacent lands to the pierhead line. Contaminants of concern in the Hylebos waterway included: arsenic, mercury, zinc, LPAHs [anthracene, phenanthrene, and fluorene], HPAHs [benzo(b+k)fluoranthenes, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, pyrene, chrysene, benzo(a)anthracene, benzo(a)pyrene, and benzo(g,h,i)perylene], PCBs, DEHP, hexachlorobutadiene, PCE/TCE/vinyl chloride, and DDT.

Sitcum Waterway is a deep navigational waterway, created by dredging and filling native mudflats since 1910. The Port owns the submerged land and bottom sediment in the waterway and the land adjacent to the waterway. The Sitcum Waterway is a 55-acre area of contaminated marine sediments in the main navigational channel and berth areas. Sediments were contaminated with metals (arsenic, cadmium, copper, lead, nickel, and zinc) and PAHs at concentrations greater than the SQOs identified in the CB/NT ROD.

The St. Paul Waterway was about 2,000 feet long, about 500 feet wide, and from about 10 to 30 feet deep. The Waterway was created in stages, beginning in the 1920s. The Waterway was privately owned by Simpson and previous mill owners. This waterway was not used or needed for navigation, other than its historical and current use for log rafts, chip barges, and similar small craft. Sediments were

[2] The City Waterway in the 1989 CB/NT ROD was renamed the Thea Foss Waterway by United States Geological Survey (USGS) September 1, 1990.

contaminated with 4-methylphenol, phenol, 2-methoxyphenol, l-methyl-2-(methylethyl), benzene, and other compounds.

The Middle Waterway is bordered by the Thea Foss Waterway on the southwest and the St. Paul Waterway on the northeast. The Middle Waterway is approximately 3,500 feet long and 300 feet wide. The total area of the Middle Waterway is approximately 49 acres. The head of the Middle Waterway consists of one of the few remaining natural intertidal mudflats in Commencement Bay. Contaminated sediments in the Middle Waterway had high concentrations of mercury, copper and PAHs.

The Thea Foss Waterway is 8,000 feet long and is the southernmost waterway within Commencement Bay. The Wheeler-Osgood Waterway is approximately 0.3 miles long, running east-west. It is currently a shallow, privately-owned channel connected to the east side of the Thea Foss Waterway at approximately its midpoint. Contaminants found at elevated levels in the Thea Foss and Wheeler-Osgood Waterways included zinc, lead, mercury, cadmium, copper, nickel, PAHs, 2-methylphenol, 4-methylphenol, DEHP, benzo(a)pyrene, and PCBs. In addition to these contaminants, NAPL seeps have been found at the head of the Thea Foss Waterway.

Groundwater flows from upland areas to the waterways. This pathway of potential contaminant migration from uplands to waterway sediment underscores the importance of upland source control efforts. Effective remediation of contaminated upland soil and groundwater are necessary to prevent sediment recontamination and provide high quality groundwater discharge into the waterway. Areas of subtidal groundwater discharge appear to be more diffuse towards the mouth of the waterway where the native sediment consists largely of sand-rich delta-front deposits. Further upstream in the Hylebos Waterway, groundwater discharges appear to occur where discrete aquifers, separated by aquitards, subcrop beneath the waterway surface.

Contaminants in the CB/NT area originate from both upland and in-water sources and are described in the Conceptual Site Model. Early industrial surveys conducted by the Tacoma-Pierce County Health Department (TPCHD) and the Port of Tacoma (Port) indicated that there were more than 281 active industrial facilities in the CB/NT area. With industrialization, the release of hazardous substances and waste materials into the environment resulted in alterations to the chemical quality of waters and sediments in many areas of the bay. Contaminants found in the nearshore area include arsenic, lead, zinc, cadmium, copper, mercury, and various organic compounds such as polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs), and phthalates.

The City of Tacoma has a population of approximately 210,000 and the City of Ruston has a population of 816. The land, water, and shoreline within the Site are owned by various parties, including DNR, Metro Parks, Port of Tacoma, City of Tacoma, Pierce County, Puyallup Tribe of Indians (Tribe), and numerous private entities. Much of the publicly owned land is leased to private enterprises. Within the Site boundaries, land use is chiefly industrial and commercial.

The Port owns approximately 35-40 percent of the 2,700 acres that make up the port and industrial areas within the CB/NT Site. The Port operates many cargo handling and storage facilities along the waterways and leases other properties to large and small industrial, manufacturing, and commercial tenants. Many of the remaining properties within the port and industrial area were under Port ownership at one time but have since been sold. Major private landowners include lumber, chemical, and petroleum companies. Property along the Hylebos Waterway were owned almost exclusively by private companies, and there were several privately-owned parcels along the Blair Waterway. Other privately-owned parcels are found predominantly at the landward end of the port and industrial area.

A large portion of the tideland and offshore areas of the CB/NT Site is either owned outright by the State of Washington or is designated as state-owned harbor areas. The Port owns tidelands and bottom sediments in several areas including the head of Hylebos Waterway, the head of Blair Waterway, and Milwaukee and Sitcum waterways. The St. Paul and Wheeler-Osgood Waterways are privately owned. Private ownership of shorelines and intertidal areas in many portions of the Site generally corresponds with ownership of the adjacent upland property parcels.

Commencement Bay, including the CB/NT Site, supports important fishery resources. Salmonid species including steelhead and bull trout occupy the bay for part of their life cycle. Extensive inshore marine fish resources include English sole, rock sole, flathead sole, C-O sole, sand sole, starry flounder, and speckled sand dab. Rock sole, C-O sole, and several species of rockfish are most abundant along the outer shoreline. Although the TPCHD has warned against regularly consuming fish, shellfish, and crabs caught within the Site, recreational harvesting of many of these species occurs, primarily within the Thea Foss Waterway and along the Ruston-Pt. Defiance shoreline. Signs are posted around the waterway in five languages warning the public not to eat the fish and shellfish. Puget Sound Chinook salmon and bull trout are Endangered Species Act (ESA) listed species. The CB/NT Site is located in a tribal Usual and Accustomed fishing area.

1.2.2 OU 01 SEDIMENT AND OU 05 SOURCE CONTROL REMOVAL ACTION AREAS

There were five removal actions at the Site and the background for each one is discussed in this Section.

1.2.2.1 Puyallup Land Claim Removal Actions

The Tribe has asserted title to land in the Tacoma tideflats area, including former Puyallup River bottomland and filled tidelands adjacent to the Puyallup Reservation. A Settlement Agreement was approved by tribal members and by federal, state, and local governments on August 27, 1988, transferring six parcels of property (Figure 1-2) within OUs 01 and 05 to the United States in trust for the Tribe. These six parcels, which are defined as the "Settlement Properties," include the Inner Hylebos Property (72.9 acres), Upper Hylebos Property (5.9 acres), Taylor Way Property and East-West Road Property (7.4 acres), Blair Waterway Property (43.4 acres), and Blair Backup Property (85.2 acres). The Settlement Agreement provides that prior to transfer to the Tribe, the Port will perform cleanup actions as necessary, in order to assure that such properties comply with applicable federal, tribal, and state laws and can be used for commercial and industrial purposes.

The Blair Waterway, Blair Backup, Upper Hylebos, and Taylor Way/East-West Road Properties will be used only for commercial/industrial purposes, with an emphasis on maritime-related activities. Such uses will be consistent with uses already established in the area. The Inner Hylebos property will be used only for fisheries, commercial or industrial purposes. The Outer Hylebos property was conveyed to the Tribe by the Terminal 3 agreement with the Port and shall be used only for fisheries, commercial or industrial purposes.

1.2.2.2 General Metals Removal Action

The General Metals Removal Action area is located within OU 01 offshore of the General Metals (dba Schnitzer Steel of Tacoma) facility within the Hylebos Waterway in Commencement Bay, Tacoma, Washington (Figure 1-3). The facility operates a scrap metal recycling facility located at 1902 Marine View Drive, on the Hylebos Waterway in Tacoma, Washington. The 26-acre facility includes 1,080 feet of frontage on the Hylebos Waterway.

In December 1995, an approximate 100-foot portion of the facility's bulkhead failed requiring emergency repair measures. Additional sections of the steel wharf collapsed in 1996 and 1997. In 1997, General Metals decided to replace the existing 525-foot steel wharf, scrap metal deflector, and two floating crane ship docks with a new 500-foot concrete wharf, a new steel sheet bulkhead, a new concrete dolphin, and a traveling crane with a 200-ton capacity. As part of the bulkhead replacement and wharf construction project, Schnitzer Steel entered into an Administrative Order on Consent (AOC) for a Removal Action for the General Metals Sediment area. Contaminants in sediments include PCBs, zinc, bis(2-ethylhexyl)phthalate (DEHP), mercury, N-nitrosodiphenylamine, 2,4-dimethylphenol, dibenzofuran, and PAHs.

1.2.2.3 Olympic View Resource Area Removal Action

The OVRA Removal Action area is located within OU 01 offshore of the peninsula between the Thea Foss and Middle Waterways in Commencement Bay, Tacoma, Washington (Figure 1-4). The OVRA area is approximately 12.4 acres in size and includes 11.7 acres of state-owned land and approximately 0.7 acres of private property. State-owned lands consist of approximately 10.6 acres of intertidal (ordinary high water to mean lower low water) and shallow subtidal (deeper than mean lower low water) marine aquatic land and 1.1 acres of upland property. Land currently owned by the City of Tacoma is comprised of 0.4 acres of upland property and 0.3 acres of intertidal land. Land use within the vicinity of the OVRA area is primarily heavy industrial, commercial, and recreational. The state-owned aquatic lands at the OVRA area are part of a Washington State environmental reserve.

A large portion of the OVRA area and adjacent property was either owned or leased by the Puget Sound Plywood Company from approximately 1942 until 1994. Past plywood manufacturing operations were considered to be the primary sources of contamination. Stormwater and process wastewater was discharged directly into Commencement Bay through outfalls along the north shore of the peninsula. Disposal of other solid and contaminated wastes from the Puget Sound Plywood facility is believed to have occurred on the intertidal and subtidal marine aquatic lands in the OVRA area. The contaminants of concern (COCs) at the OVRA area are metals (arsenic, copper, mercury, zinc), PCBs, PAHs, polychlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans).

1.2.2.4 Blair TBT Removal Action

The Blair TBT Removal Action area is located on Port property in OU 01, at Pier 4 on the west side of the northern portion of the Blair Waterway (Figure 1-5) and encompasses approximately 21 acres. The area is currently zoned for port maritime and industrial use. Since its creation, the Blair Waterway has been operated, managed, and maintained as an industrial and commercial navigable waterway and is an active shipping terminal. Although TBT is the COC in this area, the source is unknown, as there were no indications of or paint chips observed during sample collection events, or during microscopic analysis of sediment samples collected from the area of highest detected TBT concentrations. Additionally, no other indications of contamination were observed during sample collection events.

1.2.2.5 Occidental Removal Actions

The Occidental Removal Action area is located within OU 05 and includes property currently owned by both the Occidental Chemical Corporation (OCC) and the Port (Figure 1-6). OCC and its predecessors operated a chemical plant at the Occidental property from 1928 until 2001. At various times, the plant manufactured chlorine, sodium hydroxide, calcium chloride, muriatic acid, ammonia, ammonium hydroxide, trichloroethene (TCE), tetrachloroethene (PCE), sodium aluminate, and aluminum chloride.

Chlorinated solvent production occurred from 1947 to 1973. From approximately 1929 to 1970, effluents from the chlorine production operations were discharged directly to the Hylebos Waterway through an outfall. Wastes from the TCE and PCE production operations were either discharged to the Hylebos Waterway or disposed of off-site. These wastes were temporarily held in on-site settling ponds prior to discharge or disposal. There were also spills of caustic soda (sodium chloride).

COCs in soils, sediment and groundwater in both upland areas and beneath the waterway portion of the Occidental Removal Action area includes volatile organic compounds (VOCs) such as PCE, TCE, and degradation compounds, heavy metals (arsenic, lead, copper, mercury and zinc), PCBs, dioxins/furans, and sodium hydroxide.

1.2.3 OU 02 Asarco Tacoma Smelter Facility

The former Asarco Tacoma Smelter Facility was located on the western shore of Commencement Bay (Figure 1-7) within the cities of Ruston and Tacoma. OU 02 encompasses 90 acres of land; 67 acres of property that contained the former Smelter Facility and a 23-acre breakwater peninsula. From the 1890s to the 1960s, a number of sawmills operated in the area and wood waste was deposited along the shoreline. A lead smelter and refinery were in operation from 1890 through 1912. It was converted in 1912 to smelt and refine copper. By-products of the smelting operations were further refined to produce other marketable products, such as arsenic metal, arsenic trioxide, sulfuric acid, liquid sulfur dioxide, and copper reverberatory slag. Operation of the Copper smelter ceased in 1985. Arsenic production was discontinued in 1986 and the facility was taken completely out of production.

The former Asarco Tacoma Smelter Facility property was previously industrial land use, although the land use has been changed to adopt a Master Development Plan for redevelopment of the facility into mixed residential use. Asarco filed for bankruptcy in 2005, and subsequently entered into an agreement with MC Construction Consultants to sell its 67-acre former smelter portion of OU 02, along with another nearby Asarco property known as Stack Hill. MC Construction Consultants then assigned its purchase rights to Point Ruston, LLC, which entered into a Bona Fide Prospective Purchaser (BFPP) agreement with EPA in 2006.

The 23-acre breakwater peninsula has been the home of the Tacoma Yacht Club since the 1920s. In 2016, the EPA partnered with Metro Parks Tacoma to clean up the peninsula with upgrades to the Tacoma Yacht Club area and redevelopment of the remainder of the property into a park (recreational use).

1.2.4 OU 03 Tacoma Tar Pits

The Tacoma Tar Pits is located within the Tacoma Tideflats industrial area near Commencement Bay. Specifically, OU 03 is located between the Puyallup River and the Thea Foss Waterway, approximately three-quarters of a mile north of Interstate 5 (Figure 1-8). This OU comprises approximately 52 acres and is bounded by the Union Pacific and BNSF railroad tracks on the northeast and southwest, respectively; the area of the Northwest Immigration and Customs Enforcement (ICE) Processing Center (formerly the Hygrade meat packing plant) on the north; and a natural gas regulating station and cardlock service station on the southeast.

Imported or dredged fill material was placed in the vicinity of the OU around the turn of the last century to provide foundation support for structures associated with a meat packing plant, a bulk fuel storage facility, and railroad tracks. In 1924, a manufactured coal gasification plant began operating on the eastern portion of the OU and operated on the property through 1956, the facility was demolished in

1966. Waste materials remaining within the OU from coal gasification operations included coal ash, coal tar liquor, and coal tar solids and semisolids. This waste material was either buried on-site at shallow depths or disposed of in on-site ponds.

Starting in 1967, a portion of the Tacoma Tar Pits was used for metal recycling operations by Joseph Simon & Sons (which was sold to Simon Metals, now to Fairmount Inc., and is known as Metro Metals Northwest, Inc. (Metro Metals); sold October 19, 2019). As part of construction and operation of the metals recycling facility, a variety of new fills were emplaced, including metal debris, soil, and shredded car interiors referred to as "auto fluff." During the early operational history of the recycling facility, metals predominantly from automobiles and electrical transformers were recycled. Recycling of transformers led to the release of oils containing polychlorinated biphenyls (PCBs). The auto fluff used as fill also contained PCBs as well as heavy metals. The metal recycling operations on-site are still currently active; however, auto fluff and other materials containing PCBs are no longer being handled at the facility.

Results of investigations conducted in the 1980s indicated that soil, surface water and groundwater across most of the OU were contaminated with organic and inorganic contaminants from former on-site coal gasification plant operations and the recycling of automobiles and electrical transformers. The primary contaminants included metals, PAHs, PCBs, and various volatile organic compounds (VOCs) including benzene.

The OU and adjacent properties are zoned as "PMI – Port Maritime Industrial." The OU is currently occupied by the following businesses: 1) Metro Metals, a metals recycling business, 2) NW ICE Processing Center (formerly known as the Northwest Detention Center), an immigration detention facility owned and operated by The GEO Group, Inc., under contract with the U.S. Immigration and Customs Enforcement (a component of Homeland Security), located on the former Hygrade meat packing plant property, 3) Tri-Pak, a transloading facility, formerly KML Corporation, 4) Burlington Northern/Santa Fe (BNSF) and Union Pacific Railroad (UPRR) rail lines, 5) a Puget Sound Energy (PSE) natural gas regulation station, and 6) an Associated Petroleum Products (APP) cardlock fueling station. The remainder of the OU is occupied by an engineered and covered waste pile containing stabilized soils and wastes from the RA, two lined detention ponds, light industrial buildings and concrete/asphalt paving.

1.2.5 OU 04 Asarco Off-Property (Ruston/North Tacoma Study Area)

The Ruston/North Tacoma Study Area (Study Area) comprises approximately 950 acres within a one-mile radius surrounding the former Asarco Tacoma Smelter Facility within the cities of Ruston and Tacoma, Washington (Figure 1-9). High bluffs form the shoreline boundary of the Study Area separating it from Commencement Bay and the former Asarco Tacoma Smelter facility. There are steep ravines in the vicinity of rail tracks that cross the Study Area in an east-west direction. There are areas of dense vegetation, such as steep slopes of ravines (particularly southwest and west of the former Asarco Tacoma Smelter property) and along the slope toward Commencement Bay above Ruston Way. The Study Area soils were contaminated from airborne emissions from smelting operations. COCs are primarily arsenic and lead.

The Study Area land use is primarily residential and includes schools, playgrounds, and parks. The Study Area includes a population of approximately 4,290, and about 1,820 housing units. Commercial development, consisting of retail shops and small businesses, is limited in extent and mainly confined to an area along Pearl Street. The former Asarco Tacoma Smelter facility (located in OU 02), which ceased

operations in 1985, was located to the northeast of the Study Area and was the principal industrial facility in the area. The southern portion of Point Defiance Park and Zoo, which extends along a wooded peninsula to the northwest of the smelter, is located within the Study Area and includes access to the Vashon Island Ferry. Properties to the southeast of the Study Area, which were previously industrial in nature, are actively being redeveloped with restaurants, a fishing pier, park areas, and other public uses.

1.2.6 OU 06 Asarco Groundwater and Sediment

The groundwater portion of OU 06 underlies the 67-acre former Asarco Smelter Facility property. Shallow and deep aquifer systems have been identified at the property. The deep aquifer is located approximately 70 to 100 feet below ground surface. The shallow aquifer is located within 10 to 50 feet below the ground surface. Offshore sediments were contaminated by runoff from the smelter property, contaminated groundwater discharges, and erosion of the slag in the shoreline. Contaminants primarily include copper, arsenic, lead and zinc. Local groundwater beneath OU 02 leach contaminants from the soil to underlying groundwater in OU 06 and are transported by prevailing groundwater flow to Commencement Bay where they are discharged and threaten marine waters and sediments.

Groundwater in OU 06 is not currently used for any purpose. There are no known water-bearing zones of adequate transmissivity in the shallow aquifer system to provide dependable and significant yield to a water production well. The former Asarco water production well (abandoned and sealed in 1994) was screened in the deep aquifer indicating this water-bearing zone is adequately transmissive to yield significant quantities of water. Based on the proposed redevelopment plans for the property, there is no evidence that the planned reuse of the property will alter the potential use of groundwater in the shallow or deep aquifer systems. Drinking water for the former Asarco Tacoma Smelter facility and for the surrounding residential and commercial areas is supplied by Tacoma Public Utilities.

OU 06 also includes 150 acres of marine sediments that extend approximately 1,000 feet offshore into Commencement Bay (Figure 1-10). Intertidal and subtidal slopes range from relatively flat to steep inclines (slopes to approximately 50 percent). The steepest sub-marine slopes were generally formed by placing molten slag directly into the water where it hardened in massive forms. Water depths in the steepest gradient areas are up to approximately 300 feet deep. Approximately 30 acres of offshore intertidal and subtidal lands are owned by Point Ruston, the remainder is owned by the state of Washington and Metro Parks Tacoma. Recreational harvesting of shellfish and finfish from the marine areas of OU 06 is not common. A recreational salmon fishery is located offshore of the northern portion of the Breakwater Peninsula. In addition, usual and accustomed fishing for the Tribe occurs in this area.

1.3 FIVE-YEAR REVIEW SUMMARY

SITE IDENTIFICATION		
Site Name: Commencement Bay Nearshore/Tideflats		
EPA ID: WAD980726368		
Region: 10	**State:** WA	**City/County:** Tacoma and Ruston/Pierce

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** No

REVIEW STATUS
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]*:**
Author name (Federal or State Project Manager): Kristine Koch and Piper Peterson
Author affiliation: EPA, Region 10
Review period: 1/28/2019 - 12/2/2019
Date(s) of site inspection(s): April 10, 2019 (OU 03 Tacoma Tar Pits), May 20, 2019 (Head of Thea Foss); June 5, 2019 (Pier 24/25 – Mouth of Hylebos), August 1, 2019 (St. Paul)
Type of review: Statutory
Review number: 5
Triggering action date: 12/1/2014
Due date *(five years after triggering action date)*: 12/1/2019

2 RESPONSE ACTION SUMMARY

This section discusses the basis for taking action, the response actions taken, the status of implementing the response actions, institutional controls that are used where waste is left in place, and operation and maintenance activities for each OU at the Site.

2.1 BASIS FOR TAKING ACTION

This section provides a list out the contaminants of concern (COCs) by media type and discusses the resources/receptors that have been or could potentially be affected, as well as primary human and/or ecological health threat and exposure pathways.

2.1.1 OU 01 Sediment and OU 05 Source Control

Hazardous substances that have been released within OUs 01 and 05 include:

SEDIMENT		
Antimony	PCBs	1,3-Dichlorobenzene
Arsenic	Naphthalene	1,4-Dichlorobenzene
Cadmium	Acenaphthylene	1,2-Dichlorobenzene
Copper	Acenaphthene	1,2,4-Trichlorobenzene
Lead	Fluorene	Dimethyl phthalate
Mercury	Phenanthrene	Diethyl phthalate
Nickel	Anthracene	Di-n-buytl phthalate
Silver	Hexachlorobenzene	Butyl benzyl phthalate
Zinc	2-Methylnaphthalene	DEHP
Benzoic acid	Fluoranthene	Di-n-octyl phthalate
Dibenzofuran	Pyrene	Phenol
Hexachlorobutadiene	Benz(a)anthracene	2-Methylphenol
N-Nitrosodiphenylamine	Chrysene	4-Methylphenol
PCE	Benzofluoranthenes	2,4-Dimethylphenol
Ethylbenzene	Benzo(a)pyrene	Pentachlorophenol
Xylenes	Indeno(1,2,3-c,d)pyrene	PAHs
p,p'-DDE	Dibenzo(a,h)anthracene	
p,p'-DDD	Benzo(g,h,i)perylene	
p,p'-DDT	Benzyl alcohol	

Contaminants found in the Thea Foss and Wheeler-Osgood waterways sediments included zinc, lead, mercury, PAHs, cadmium, copper, nickel, 2-methylphenol, 4-methylphenol, DEHP, butyl benzene phthalate, and PCBs. In addition, manufactured gas plant (MGP) non-aqueous phase liquid (NAPL) seeps have been found at the head of the Thea Foss Waterway.

Contaminants found in the Hylebos Waterway sediments included chlorinated organic compounds (PCBs, pesticides, hexachlorobenzene and hexachlorobutadiene), PAHs, lead, copper, zinc, mercury, and arsenic.

Contaminants found in Middle Waterway sediments included mercury, copper, and PAHs.

Contaminants found in Sitcum Waterway sediments included arsenic, cadmium, copper, lead, nickel, zinc, and PAHs.

Contaminants found in the St. Paul Waterway sediments adjacent to the pulp and paper mill included 4-methylphenol, 1-methyl-2-methyethyl benzene), 2-methoxphenol), phenol, and PAHs.

Bioaccumulation of PCBs through the food chain and human consumption of fish and shellfish is associated with unacceptable human health risks due to consumption of contaminated fish and shellfish in OU 01. All other contaminants found in fish and shellfish from OU 01 did not pose risks to humans greater than risks from consuming fish from the reference area (Carr Inlet).

Direct contact with contaminants in sediment pose adverse biological effects, primarily to the benthic infaunal community.

2.1.2 OU 01 Sediment and OU 05 Source Control Removal Actions

This Section discusses the basis for taking action for all removal actions within OUs 01 and 05.

2.1.2.1 Puyallup Land Claim Removal Actions

Inner Hylebos Property

Hazardous substances that have been released at the Inner Hylebos Property include:

AUTO REFUSE AREA SOIL	PENINSULA SOIL	LOG YARD SOIL	SEDIMENT
Lead	TPH	TPH	Arsenic
Cadmium	Benzene		Cadmium
Mercury	PAHs		Copper
Zinc	Ethylbenzene		Zinc
PCBs	Xylenes		PCBs
PAHs			Hexachlorobenzene
			Hexachlorobutadiene
			Phenol
			4-methylphenol

The basis for action on soil and groundwater was contaminant concentrations greater than MTCA cleanup levels.

Bioaccumulation of PCBs through the food chain and human consumption of fish and shellfish is associated with unacceptable human health risks due to consumption of contaminated fish and shellfish in OU 01. All other contaminants found in fish and shellfish from OU 01 did not pose risks to humans greater than risks from consuming fish from the reference area (Carr Inlet).

Upper Hylebos Property

Hazardous substances that have been released at the Upper Hylebos Property include:

SEDIMENT
Arsenic
PCBs
PAHs

Bioaccumulation of PCBs through the food chain and human consumption of fish and shellfish is associated with unacceptable human health risks due to consumption of contaminated fish and shellfish in OU 01. All other contaminants found in fish and shellfish from OU 01 did not pose risks to humans greater than risks from consuming fish from the reference area (Carr Inlet).

Direct contact with contaminants in sediment pose adverse biological effects, primarily to the benthic infaunal community.

Taylor Way Property

Hazardous substances that have been released at the Taylor Way Property include:

GROUNDWATER
Arsenic
Manganese
Formaldehyde

The basis for action on groundwater was the exceedance of MTCA cleanup levels.

East-West Road Property

Hazardous substances that have been released at the East-West Road Property include:

GROUNDWATER
Antimony
Manganese
Formaldehyde
cis-1,2-Dichloroethene
TCE
Vinyl chloride

The basis for action on groundwater was the exceedance of MTCA cleanup levels.

Blair Waterway Property

Hazardous substances that have been released at the Blair Waterway Property include:

LINCOLN DITCH SOIL	WEYERHAEUSER DITCH SOIL	SLAG	SEDIMENT	MUD LAKE SEDIMENT	GROUNDWATER
Arsenic	Arsenic	Arsenic	Arsenic	PAHs	Arsenic
PCBs			PCBs	Phthalates	Pentachlorophenol
Dioxins/furans			DEHP		Vinyl chloride

The basis for action on soil and groundwater was the exceedance of MTCA cleanup levels.

Bioaccumulation of PCBs through the food chain and human consumption of fish and shellfish is associated with unacceptable human health risks due to consumption of contaminated fish and shellfish in OU 01. All other contaminants found in fish and shellfish from OU 01 did not pose risks to humans greater than risks from consuming fish from the reference area (Carr Inlet).

Direct contact with contaminants in sediment pose adverse biological effects, primarily to the benthic infaunal community.

Blair Backup Property

Hazardous substances that have been released at the Blair Backup Property include:

SOIL
Arsenic
PAHs

The basis for action on soil was the exceedance of MTCA cleanup levels.

2.1.2.2 General Metals Removal Action

Hazardous substances that have been released at the General Metals Removal Action area include:

SEDIMENT
PCBs
Mercury
Zinc
DEHP
N-Nitrosodiphenylamine
2,4-Dimethylphenol
Dibenzofuran
PAHs

Bioaccumulation of PCBs through the food chain and human consumption of fish and shellfish is associated with unacceptable human health risks due to consumption of contaminated fish and shellfish in OU 01. All other contaminants found in fish and shellfish from OU 01 did not pose risks to humans greater than risks from consuming fish from the reference area (Carr Inlet).

Direct contact with contaminants in sediment pose adverse biological effects, primarily to the benthic infaunal community.

2.1.2.3 Olympic View Resource Area Removal Action

Hazardous substances that have been released at the OVRA area include:

SEDIMENT
Dioxins/furans
Arsenic
Copper
Mercury
Zinc
PAHs
PCBs

Bioaccumulation of PCBs through the food chain and human consumption of fish and shellfish is associated with unacceptable human health risks due to consumption of contaminated fish and shellfish in OU 01. All other contaminants found in fish and shellfish from OU 01 did not pose risks to humans greater than risks from consuming fish from the reference area (Carr Inlet).

Direct contact with contaminants in sediment pose adverse biological effects, primarily to the benthic infaunal community.

2.1.2.4 Blair Waterway TBT Removal Action

Hazardous substances that have been released at Terminal 4 include:

SEDIMENT
TBT

Direct contact with contaminants in sediment pose adverse biological effects, primarily to the benthic infaunal community.

2.1.2.5 Occidental Removal Actions

Hazardous substances that have been released at the Occidental property include:

SOIL, SEDIMENT, & GROUNDWATER
TCE
PCE
Vinyl chloride
Hexachlorobenzene
Hexachlorobutadiene
Caustic Soda

Direct contact with sediments at low tide may have posed unacceptable risk to human health.

Direct contact with contaminants in sediment pose adverse biological effects, primarily to the benthic infaunal community.

2.1.3 OU 02 Asarco Tacoma Smelter Facility

Hazardous substances that have been released at the Asarco Tacoma Smelter Facility include:

SOIL	SURFACE WATER	SLAG	GROUNDWATER
Antimony	Arsenic	Arsenic	Antimony
Arsenic	Cadmium	Lead	Arsenic
Cadmium	Copper		Beryllium
Chromium VI	Lead		Cadmium
Copper	Mercury		Chromium
Lead			Copper
Mercury			Lead
PAHs			Mercury
PCBs			Manganese
			Nickel
			Selenium
			Silver
			Zinc
			Aniline

Exposure to soil, groundwater, surface water, and slag are associated with unacceptable risk to humans. Arsenic in soil and slag is the primary contributor to carcinogenic risks. Arsenic, lead, and copper are the primary contaminants associated with non-cancer adverse health effects. The risks from exposure to surface water were significant due to the presence of arsenic, copper, and lead. Potential risks associated with exposure to contaminated groundwater discharging to Commencement Bay are attributed to the presence of aniline, arsenic, mercury, manganese, and beryllium that exist at concentrations that exceed EPA's water quality criteria for protection of human health from fish consumption.

Direct contact with contaminants in sediment pose adverse biological effects, primarily to the benthic infaunal community. Discharge of contaminated groundwater and surface water to Commencement Bay exceeded federal and state water quality criteria.

2.1.4 OU 03 Tacoma Tar Pits

The results of investigations at the Tacoma Tar Pits conducted in the 1980s indicated that soil, surface water and groundwater across most of the OU were contaminated with organic and inorganic contaminants from former on-site coal gasification plant operations and the recycling of automobiles and electrical transformers. The primary contaminants included metals, PAHs, PCBs, and various VOCs including benzene. Results of investigations on the NW ICE Processing Center (former Hygrade meat packing plant property), located northwest of the coal gasification plant and metals recycling facility, showed groundwater contamination but little to no soil contamination. A risk assessment was performed that considered the risks to on-site workers because the Tacoma Tar Pits OU is located in a heavily industrialized area. Three organic contaminants and one trace metal were selected as indicator chemicals representing the overall level of contamination. These were: cPAHs, PCBs, benzene, and lead. Avian receptors were also considered because of an avian population that occasionally used the ponds at the property. Based on unacceptable risks to on-site workers and avian receptors, and the potential discharge of contaminated groundwater to off-site surface water bodies, maximum allowable concentrations for on-site soils, surface water, and groundwater were calculated as part of the risk assessment.

2.1.5 OU 04 Asarco Off-Property (Ruston/North Tacoma Study Area)

Hazardous substances that have been released at the Ruston/North Tacoma Study Area include:

SOIL
Arsenic
Lead

Exposure to arsenic in soil are associated with unacceptable human carcinogenic risks. Non-carcinogenic health effects associated with exposure to soil are due to arsenic and lead.

2.1.6 OU 06 Asarco Groundwater and Sediment

Hazardous substances that have been released in OU 06 include:

SEDIMENT	GROUNDWATER	
Arsenic	Antimony	Manganese
Copper	Arsenic	Nickel
Lead	Beryllium	Selenium
Zinc	Cadmium	Silver
	Chromium	Zinc
	Copper	Aniline
	Lead	Mercury

Groundwater in the shallow aquifer system is contaminated by arsenic, cadmium, copper, lead, nickel, and zinc. As the groundwater discharges to the adjacent Commencement Bay, concentrations of aniline, arsenic, mercury, manganese, and beryllium were greater than EPA's water quality criteria for protection of human health via consumption of fish. Copper concentrations were greater than federal and state water quality criteria for aquatic life and posed a potential threat from groundwater discharging to Commencement Bay waters.

The ecological risk assessment identified adverse biological effects, primarily to the benthic infaunal community in sediments.

2.2 RESPONSE ACTIONS

This section provides a brief summary of any pre-ROD activities such as CERCLA removal actions, non-CERCLA removals/responses, and any related documents (such as enforcement orders or agreements) and parties involved in these activities, RAOs for the remedy selected in the ROD, remedy components selected in the ROD, remedy components that have been modified in an Explanation of Significant Differences (ESD), and provides a table of cleanup levels selected in the ROD.

2.2.1 OU 01 Sediment and OU 05 Source Control

Pre-Record of Decision (ROD) Actions

In September 1988, the Simpson Tacoma Kraft Company completed source control activities and implemented a sediment cleanup action in the St. Paul Waterway pursuant to a December 1987 Consent Decree (CD) with Ecology. The sediment action consisted of placing a clean layer of sediment over contaminated sediment. A portion of the capped area was converted to uplands and covered with an asphalt cap, and the remaining area was restored to intertidal and shallow subtidal habitats. Additionally, the wastewater outfall was relocated offshore of the capped area and additional controls were placed on the discharge with an NPDES permit.

Selected Remedy

A ROD was signed for OUs 01 and 05 on September 30, 1989 to address contamination in eight of the nine problem areas at the Site (Figure 2-1; Table 2-2); OU 06 addresses contamination at the last problem area (Ruston Shoreline). Five additional modifications to this ROD were documented in ESDs for various portions of these OUs and are further described below. The following information is from the 1989 ROD as modified by ESDs.

Remedial Action Objectives (RAOs) for the Selected Remedy

Fish Tissue: The average PCB concentration of 36 µg/kg measured in English sole from the Carr Inlet reference area was selected as the target tissue concentration following sediment cleanup at the CB/NT Site. Assuming a consumption rate of one pound per month, this PCB concentration equates to an individual lifetime risk in the 10-5 range.[3]

Sediment: The cleanup goal for Commencement Bay is reduction of contaminant concentrations in sediments to concentrations that will support a healthy marine environment and will protect the health of people eating seafood from the bay. The ROD designated biological test requirements and associated sediment chemical concentrations referred to as Sediment Quality Objectives (SQOs) in order to achieve this goal (see Table 2-1).

[3] An ESD was issued on July 28, 1997 to change the PCB SQO in sediment to 300 µg/kg based on a re-evaluation of the human health risks from consumption of fish. The revised PCB SQO was based on a fish tissue concentration of 117 µg/kg and a residual risk of 1 x 10-4 for a seafood consumption rate of 6 pounds/month (this equates to 5 x 10-6 for a seafood consumption rate of 1 pound/month).

TABLE 2-1. OU 01 SEDIMENT CLEANUP LEVELS (SQOs[1])		
CHEMICAL	**SQO [2, 5, 6]**	
Metals (mg/kg, dry-weight)		
Antimony	150	B
Arsenic	57	B
Cadmium	5.1	B
Copper	390	L
Lead	450	B
Mercury	0.59	L
Nickel	140	A,B
Silver	6.1	A
Zinc	410	B
Organic Compounds (µg/kg dry weight)		
Low Molecular Weight PAHs	5,200	L
Naphthalene	2,100	L
Acenaphthylene	1,300	A,B
Acenaphthene	500	L
Fluorene	540	L
Phenanthrene	1,500	L
Anthracene	960	L
2-Methylnaphthalene	670	L
High Molecular Weight PAHs	17,000	L
Fluoranthene	2,500	L
Pyrene	3,300	L
Benz(a)anthracene	1,600	L
Chrysene	2,800	L
Benzofluoranthenes	3,600	L
Benzo(a)pyrene	1,600	L
(1,2,3-c,d)pyrene	690	L
Dibenzo(a,h)anthracene	230	L
Benzo(g,h,i)perylene	720	L
Chlorinated Organic Compounds		
1,3-Dichlorobenzene	170	A,L
1,4-Dichlorobenzene	110	B
1,2-Dichlorobenzene	50	L, B
1,2,4-Trichlorobenzene	51	A
Hexachlorobenzene	22	B
Total PCBs	300 [3, 4]	
Phthalates		
Dimethyl phthalate	160	L
Diethyl phthalate	200	B
Di-n-butyl phthalate	1,400	A,L

TABLE 2-1. OU 01 SEDIMENT CLEANUP LEVELS (SQOs[1])		
CHEMICAL	**SQO [2, 5, 6]**	
Butyl benzyl phthalate	900	A,B
DEHP	1,300	B
Di-n-octyl phthalate	6,200	B
Phenols		
Phenol	420	L
2-Methylphenol	63	A,L
4-Methylphenol	670	L
2,4-Dimethylphenol	29	L
Pentachlorophenol	360	A
Miscellaneous Extractables		
Benzyl alcohol	73	L
Benzoic acid	650	L,B
Dibenzofuran	540	L
Hexachlorobutadiene	11	B
N-Nitrosodiphenylamine	28	B
Volatile Organics		
PCE	57	B
Ethylbenzene	10	B
Total xylenes	40	B
Pesticides		
p,p´ – DDE	9	B
p,p´ – DDD	16	B
p,p´ – DDT	34	B

Notes:

1. The CB/NT ROD established sediment cleanup levels, called SQOs. Note that Table 5 of the CB/NT ROD refers to Sediment Cleanup Objectives in error; the correct term is Sediment Quality Objectives, as referenced in Section 7.2.4 of the ROD.
2. These values (except for total PCBs) represent the lowest AET for the three biological effects indicators:
   A - amphipod mortality bioassay (acute test)
   L - oyster larvae abnormality bioassay (acute test)
   B - benthic infauna (chronic test)
3. The 1989 ROD SQO for total PCBs is 1,000 µg/kg for the protection of benthic organisms and 150 µg/kg for protection of human health.
4. The CB/NT ESD (1997) modified the SQO for total PCBs to 300 µg/kg, to be achieved within 10 years after cleanup through natural recovery processes. This modified SQO of 300 µg/kg total PCBs was based on a re-evaluation of the human health risk assessment (Weston 1997).
5. The CB/NT ROD (EPA 1989) also identifies that sediment toxicity tests may be used to override the SQOs, except for PCBs (human health-derived SQO), as indicated in Section 8.2.5 of the ROD: “When both biological and chemical test results are available for a particular sediment sampling station, the results of a particular biological test will outweigh the AET predictions of that biological effect based on chemistry.”
6. Habitat function and enhancement of fisheries resources will also be incorporated as part of the overall project cleanup objectives.

Source Control: Control major sources of contamination to the waterways prior to active remediation in the waterways to ensure that the sediment cleanup will achieve respective sediment goals.

Habitat: Maintain functional habitat and enhance fisheries resources.

Remedy Components

The major components of the remedy selected in the ROD are:

- OU 01 use restrictions consisting of public warnings and educational programs intended to reduce potential exposure to site contamination, particularly eating contaminated seafood, until cleanup goals are achieved.
- Source control using existing programs or enhanced programs identified in a June 30, 1989, cooperative agreement between EPA and Ecology. In general, Ecology will use consent orders, consent decrees, and administrative orders to drive source-related activities.
- Monitored natural recovery (MNR) through chemical degradation, diffusive losses across the sediment-water interface, and burial and mixing of contaminated surface sediments with recently deposited clean sediments.
- Sediment remedial action consisting of capping and dredging with either confined aquatic, nearshore, or upland disposal for those areas where concentrations of COCs exceeded the remedial action levels (RALs) identified in Table 2-2.

TABLE 2-2. OU 01 REMEDIAL ACTION LEVELS (RALs)

PROBLEM AREA	INDICATOR CHEMICAL	RAL[1]
Head of Hylebos	PCBs	240
	Arsenic	97
	HPAHs	32,000
Mouth of Hylebos	PCBs	300
	Hexachlorobenzene	100
Sitcum	Copper	1,100
	Arsenic	160
St. Paul	4-Methylphenol	1,300
Middle	Mercury	0.71
	Copper	470
Head of Thea Foss	HPAHs	22,000
	Cadmium	6.6
	Lead	580
	Mercury	0.77
Wheeler-Osgood	HPAHs	20,000
	Zinc	490
Mouth of Thea Foss	HPAHs	25,000
	Mercury	0.89

Notes:

1. Concentration expressed as µg/kg dry weight for organics and mg/kg dry weight for metals.

- Monitor sediment to: 1) determine the effectiveness of source controls, 2) define the volume of sediment exceeding the cleanup objective, 3) assess the natural recovery of surface sediment, 4) evaluate the effectiveness of habitat function, especially relative to fisheries resources, and 5) ensure the effectiveness of controls to contain waste left in place (in-situ caps, disposal sites, etc).

An ESD was issued on June 24, 1993 which identified dredging of sediment in the Sitcum Waterway with disposal in a nearshore disposal facility located in the Milwaukee Waterway as the selected remedy. The work was divided into two phases:

- Phase 1: Dredging of 396,000 cubic yards of contaminated channel sediments and sediment above the riprapped slopes in the Phase 2 area.
- Phase 2: Dredging of 32,300 cubic yards contaminated peripheral sediments not addressed under Phase 1.

The ESD also provided for 866,600 cubic yards of contaminated sediments dredged from the Blair Waterway for navigation purposes, and 32,500 cubic yards of contaminated sediment from Mud Lake to be disposed of in the Milwaukee nearshore disposal facility. The mitigation for the construction of the Milwaukee nearshore disposal facility included construction of nine acres of intertidal habitat and one acre of salt marsh in front the closure berm, 11 acres of intertidal habitat and one acre of shallow subtidal habitat connecting to the existing sandflats beyond the mouth of the Milwaukee Waterway, and nine and one half acres of restored habitat at an off-site location (Clear Creek Phase I) that provides refuge habitat for use by salmon and other fish from the Puyallup River.

An ESD was issued on July 28, 1997 to modify the cleanup level for remediation of marine sediments contaminated with PCBs. The PCB RAL to be achieved during cleanup was increased to 450 µg/kg and the PCB SQO identified in the CB/NT ROD was increased to 300 µg/kg, to be achieved within 10 years after cleanup.

An ESD was issued on August 3, 2000 prescribing the following changes to the remedial action for the Thea Foss, Wheeler-Osgood, and Hylebos Waterways:

- Increasing the size of the problem areas and volume of sediment to be dredged.
- Adding institutional controls (ICs) related to contaminated sediments contained on-site on a property-specific basis if determined necessary and feasible, including proprietary controls relying on real property interests, such as environmental easements and land use restrictions.
- Addition of an Enhanced Natural Recovery (ENR) option using a thin layer of clean material to allow marginally contaminated sediments to naturally recover.
- Selection of two in-water disposal sites (St. Paul Nearshore Fill, and Blair Slip 1) and upland disposal in a regional landfill.
- Incorporation of the Remedial Designs for the Thea Foss, Wheeler-Osgood, and Hylebos Waterways.
- Requiring compensatory mitigation for loss of habitat due to remedial actions.
- Elaboration of performance criteria for caps, dredging, confined disposal sites, MNR and ENR, subsurface contamination, source control in the Thea Foss Waterway, and mitigation.
- Inclusion of the ESA as an applicable, or relevant and appropriate, requirement (ARAR) for remedial actions under the ROD.

An ESD was issued on February 4, 2002, to select remedial actions for the Middle Waterway and update the estimated costs. The selected remedies for Areas A and B included a combination of dredging and

backfilling with clean material, thick capping, surficial capping with habitat mix, ENR, MNR and no action. The selected remedy for Area C, located at the head of the waterway, consisted of leaving contaminated subsurface sediments undisturbed in Sediment Management Unit (SMU) 51a, and ENR with long-term monitoring to address the surface sediment contamination in SMUs 51a and 51b. No action was required for SMU 52a and 52b.

An ESD was issued on March 20, 2003, to update the remedy and costs for Area C in Middle Waterway to excavation of contaminated sediments with upland disposal and backfilling within SMU 51a. The additional excavated volume of sediments will not exceed 4,000 cubic yards. Contamination found at depth in excess of this volume would be capped with clean material with long-term monitoring. The selected remedy for SMU 51b was unchanged.

An ESD was issued on September 30, 2004, to select the following remedial actions:

- Allow the Puyallup River delta area to be used as a temporary storage area for 264,000 cubic yards of suitable sediments dredged from the confined disposal facility (CDF) in the Head of the St. Paul Waterway. No less than one-third dredged sediment was reserved to remain in the delta to benefit juvenile salmonids and create additional aquatic habitat and the remainder was re-used as capping material in the Thea Foss Waterway, to create habitat mitigation areas, or for capping the CDF.
- Identify two new sources of capping material from the Puyallup River delta and the mouth of the Puyallup River for re-use in the Thea Foss and Wheeler-Osgood Waterways or for the CDF cover and in habitat mitigation areas.
- Decrease the final volume of dredged contaminated sediments from the Thea Foss and Wheeler-Osgood Waterways and the final capacity of the St. Paul CDF.
- Designate the habitat mitigation projects and the total number of acres created as a result of these projects which meet the performance criteria identified in the August 2000 ESD.
- Modify the selected remedy and the areas needing federal deauthorization within the navigation channel of the Thea Foss Waterway.
- Identify the basic ICs measures for the remedy in the Thea Foss Waterway and ensure the habitat mitigation areas are preserved in perpetuity.
- Identify capping as the final cleanup remedy for the NAPL seep area near SR-509 in the Head of the Thea Foss Waterway.
- Adjust the project costs for the remedial actions performed by the City of Tacoma and three companies known as “the Utilities,” Puget Sound Energy, PacifiCorp and Advance Ross Sub-company.

2.2.2 OU 01 Sediment and OU 05 Source Control Removal Actions

This Section discusses the response actions for all removal actions within OUs 01 and 05.

2.2.2.1 Puyallup Land Claim Removal Actions

Selected Remedy

A Settlement Agreement was signed for the Puyallup Land Claim Properties on August 27, 1988. The following information is from the cleanup reports prepared for each property.

RAOs for the Selected Remedy

Inner Hylebos Property

Soil: Remove contaminated soil exceeding the MTCA Cleanup Regulations Industrial Soil Cleanup Levels (Table 2-3) in the following areas:

- Auto Refuse area for total lead, cadmium, and mercury and PCBs.
- Peninsula area for total petroleum hydrocarbons (TPH), benzene, ethyl benzene, toluene, xylenes, and carcinogenic PAHs
- Oily soil/sawdust area for lead.

TABLE 2-3. MTCA INDUSTIRAL SOIL CLEANUP LEVELS

Chemical	Soil Cleanup Level (mg/kg)[1]
Lead	1,000
Cadmium	10
Mercury	1.0
PCB mixtures	10
TPH (as diesel)	200
TPH (as gasoline)	100
Benzene	0.5
Ethyl Benzene	20
Toluene	40
Xylenes	20
PAH (carcinogenic)[2]	20

Notes:

1. Method A Industrial Soil Cleanup Levels.
2. These include benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, and indeno(2,3-cd)pyrene. For purposes of demonstrating compliance with soil cleanup levels, measurements below the method detection limit shall be assigned a value equal to one-half the method detection limit. Detectable levels below the practical quantitation limit shall be assigned a value equal to the method detection limit.

Upper Hylebos Property

See RAOs and Cleanup Levels for OU 01 Sediment (Table 2-1).

Taylor Way Property

Groundwater: Prohibit humans from consuming groundwater from the property.

East-West Road Property

None stated.

Blair Waterway Property

None stated.

Blair Backup Property

None stated.

Remedy Components

Inner Hylebos Property

The remedy for the Auto Refuse area is excavation and off-site disposal, and backfilling with clean soil. The remedy for the Peninsula area includes excavation of the oily soil/sawdust material in the IT-22 and IT-41 area, excavation of the buried, crushed drums and oil-stained soil in the IT-31 and IGR-1 areas.

Rehabilitation, debris removal, and soil removal at the Log Yard were required and accomplished under the Port's lease agreement with Foss.

Upper Hylebos Property

The subtidal portion of the property is included in the OU 01 Sediment Head of Hylebos remediation area.

Taylor Way Property

ICs prohibiting the use of groundwater present in the shallow Upper Sand and Lower Sand units for drinking purposes.

East-West Road Property

Implementation of the following ICs:

- Restrict land use to commercial and industrial purposes.
- Prohibit use of groundwater to avoid potential exposure resulting from contact with or ingestion of contaminated groundwater.
- Restrict future development of structures with gas permeable floors to include a vapor mitigation system or other system to protect future human exposure to VOCs migrating from groundwater to indoor air. Future development documents must be approved by EPA.

Blair Waterway Property

Filling of Lincoln Ditch (per Amendment 1 to 1993 AOC) with clean material and compensatory mitigation at the Outer Hylebos.

Excavation of the Weyerhaeuser Ditch Sediments and the arsenic slag from the graving dock and the Upland Area of the Blair Waterway Property to the Blair Backup Property.

Disposal of sediment, slag, and associated soils on sand and gravel within a 7-acre portion of the Blair Backup Property.

Excavation of contaminated dredged sediments from the Mud Lake impoundment with upland disposal.

ICs to prevent use of shallow groundwater as a drinking water supply and minimize potential human exposure by restricting future use of the Blair Waterway Property to industrial uses.

Blair Backup Property

Excavation of the charcoal briquettes and the associated charcoal-contaminated soils and off-site disposal at the Blair Waterway property.

Excavation of sandblast grit/soil and dispose on-site within a 7-acre portion of the Ohio Ferro-Alloy (OFA) Area with the sediments/slag from the Blair Waterway Property and cap with either asphalt-geotextile material or cover with sand and gravel. Long-term groundwater monitoring of the cap and cover.

ICs implemented to:

- Prevent use of shallow groundwater as a drinking water supply.
- Minimize potential exposure by restricting the Blair Backup Property to industrial uses.
- Minimize potential exposure to contaminants that remain under the cap or cover by restricting subsurface work, requiring notification and oversight of any subsurface work that potentially penetrates/damages the cap or cover, and requiring that work be conducted under an appropriate Health and Safety Plan.
- Avoid compromising the integrity of the cap and cover by restricting construction activities that could compromise the cap or cover and requiring notification and oversight of any Tribal development on the capped or covered area.

2.2.2.2 General Metals Removal Action

Selected Remedy

An Administrative Order on Consent (AOC) was signed for the General Metals Removal Action on October 13, 1998. The selected remedy was the OU 01/05 ROD. The following information is from the Scope of Work (SOW) attached to the AOC.

RAOs for the Selected Remedy

Isolate contaminated sediments from ecological receptors and provide a cap surface that is consistent with the fish habitat goals of the natural resource agencies.

Cleanup Levels for OU 01 Sediment are presented in Table 2-1.

Remedy Components

The removal action included:

- Removal of metal and other debris from the sediment surface prior to capping.
- Placement of a cap over all areas where sediment contaminant concentrations exceed the SQOs identified in the CB/NT ROD (see Table 2-1).
- A cap designed to prevent long-term migration of contaminants and resistant to erosion, and consistent with habitat requirements as specified by natural resource agencies.
- A Post-Removal Site Control Plan that includes specific procedures and a schedule for long-term monitoring and maintenance of the capped area and proposes land use restrictions to ensure that the cap is performing as designed and meets the specified performance standards.

2.2.2.3 Olympic View Resource Area Removal Action

Selected Remedy

An Action Memo was signed for OVRA on July 17, 2001. The following information is from the 2001 Action Memo.

RAOs for the Selected Remedy

Removal or long-term isolation of chemical materials from the environment.

Elimination or significant reduction of potential human health and environmental risks.

Restoration of intertidal, subtidal, and upland areas to enhance habitat value and function as required by the Natural Resource Trustees pursuant to a separate CD with the City of Tacoma.

COCs found in sediments at the OVRA area were dioxins/furans, metals (arsenic, copper, mercury, and zinc), PCBs, and PAHs. A site-specific sediment quality criterion for dioxins/furans was set at 20 parts per trillion (ppt) 2,3,7,8-TCDD toxicity equivalence quotient (TEQ)[4]. The CB/NT ROD SQOs (Table 2-1) were used as cleanup standards for the other COCs.

Remedy Components

The OVRA was identified in 1997as one of five City of Tacoma restoration projects addressed in the City's Natural Resource Trustee CD to settle the City of Tacoma's liability for natural resource damages at the CB/NT Site. A non-time-critical removal action was conducted in 2001 to address contaminated marine sediments at the OVRA. Approximately 2 acres of contaminated sediment were excavated, and the area was subsequently backfilled and capped within the intertidal and subtidal areas.

2.2.2.4 Blair Waterway TBT Removal Action

Selected Remedy

An Action Memo was signed for the Blair TBT Removal Action on January 27, 2015. The following information is from the 2015 Action Memo.

RAOs for the Selected Remedy

None stated.

Remedy Components

The removal action consisted of demolition of most of the Pier 4 structure to allow for equipment access to remove the underlying material, and the dredging of approximately 47,000 cubic yards of TBT-contaminated sediments.

[4] As set forth in the Action Memorandum for OVRA, the sediment quality criterion of 20 ppt TEQ dioxins will ensure that the average remaining concentration at the OVRA will not exceed the site-specific background concentration of 7.4 ppt TEQ dioxins. This SQO and the background approach used to derive it are not necessarily applicable to other Superfund sites or problem areas identified in the CB/NT ROD.

2.2.2.5 Occidental Removal Actions

Selected Remedy

An Action Memo was signed for the Occidental Removal Actions on June 20, 2001. The following information is from the 2001 Action Memo.

RAOs for the Selected Remedy

The primary objective of the non-time-critical removal action was to remove an area of contaminated sediments and near-shore upland soils requiring treatment prior to disposal from the Mouth of the Hylebos Waterway.

Remedy Components

Two non-time critical removal actions were performed by OCC at its former chlor-alkali plant facility along the Hylebos Waterway. The Area 5106 Removal Action included dredging, treatment and disposal into the Slip 1 CDF of approximately 36,000 cubic yards of contaminated sediment from October 2002 through February 2003. While the work was completed as designed, the contamination was found to extend deeper than anticipated, and additional investigations were conducted to partly characterize remaining contamination. The Embankment Area Removal Action led to the 2003 draft design of a permeable cap to cover the intertidal and subtidal embankment to the toe of the slope. However, information obtained from the Area 5106 Removal Action, the upland RCRA groundwater extraction and treatment system, and further review of high pH release data identified cap design limitations and incomplete upland source control measures. Accordingly, the 1997 AOC for the Embankment Area Removal Action was amended to become an overall Occidental Site Removal Action to address remaining soil, groundwater, and sediment contamination.

2.2.3 OU 02 Asarco Tacoma Smelter Facility

Pre-ROD Actions

In 1987, pursuant to an AOC, Asarco began a remedial investigation and feasibility study for the Asarco Smelter facility. As part of the Smelter facility remedial investigation and feasibility study, soil stabilization was addressed, and the ore flues to the Asarco Stack were demolished in 1987. In January 1993, the Asarco Stack was imploded and temporarily buried on-site.

Selected Remedy

A ROD was signed for OU 02 on March 24, 1995. Two additional modifications to this ROD were documented in ESDs for various portions of these OUs and are further described below. The following information is from the 1995 ROD as modified by ESDs.

RAOs for the Selected Remedy

Contaminated soil, dust, and slag:

- Prevent ingestion and inhalation of contaminated soil/slag and dust where contaminants are present at concentrations that pose unacceptable risks to human health;
- Reduce releases of contaminants from soil to groundwater by removing source areas and limiting infiltration of surface water; and
- Limit the erosion of slag to offshore sediments.

Because all areas of OU 02 are in the process of being addressed either by excavation of soil/slag and disposal in the on-site containment facility (OCF) or contained by a cap, specific remediation goals for soils were not established.

On-site groundwater and surface water:

- Prevent ingestion of potable groundwater and on-site surface water with contaminant concentrations that may pose unacceptable risks to humans; and
- Reduce contact between contaminated soil, slag or fill and surface water and groundwater.

Groundwater, surface water, and treated water discharged to Commencement Bay:

- Reduce discharge to Commencement Bay of water containing contaminants in concentrations above ARARs or risk-based goals (Tables 2-4 and 2-5); and
- Reduce leaks and spills of contaminated surface water from drainage and sewage systems.

TABLE 2-4. OU 02 SURFACE WATER CLEANUP LEVELS[1]

Constituent	Surface Water Cleanup Level (µg/L)
Arsenic	2.0
Beryllium	1.0
Cadmium	8.0
Chromium VI	50
Copper	10
Lead	5.8
Mercury	0.2
Nickel	7.9
Selenium	71
Silver	1.2
Zinc	76.6
Total Petroleum Hydrocarbons	10,000
Aniline	1.3 - 37
4-Chloroaniline	29 – 61
N-Methylaniline	160
N-Nitrosodiphenylamine	10

Note:

1. These values have not been adjusted to take into account the background levels of these contaminants in uncontaminated surface water on land or in surface water in Puget Sound.

TABLE 2-5. OU 02 GROUNDWATER CLEANUP LEVELS	
Constituent	**Groundwater Cleanup Level (µg/L)**
Arsenic	6
Beryllium	1.0
Cadmium	8.0
Chromium VI	50
Copper	40
Lead	12
Mercury	0.2
Nickel	0.2
Selenium	71
Silver	1.2
Zinc	98
Total Petroleum Hydrocarbons	10,000
Aniline	1.3 - 37
4-Chloroaniline	29 – 61
N-Methylaniline	160
N-Nitrosodiphenylamine	10

Remedy Components

The remedy consists of the cleanup of soil, slag, surface water, and groundwater contaminated with arsenic, copper, lead and organic compounds found at the former Smelter Facility and adjacent Slag Peninsula. The remedy includes the following elements:

- Excavation of source area soils and slag (approximately 160,000 cubic yards).
- Disposal of source area soils and demolition debris designated as hazardous waste (approximately 240,000 cubic yards total) in the OCF.
- Capping of the entire boundary of OU 02 with a low permeability cap composed of layers of clean soil, gravel, and clay, or EPA approved equivalent.
- Demolition of the remaining buildings and structures.
- Replacement of the entire surface water drainage system.
- Armoring portions of the former plant property and slag peninsula shoreline.
- Implement ICs to prohibit use of the groundwater and actions that would impair the integrity of the cap.

The ROD also requires additional cleanup activities, if practicable, be identified in a subsequent ROD if source control activities do not result in groundwater that meets federal and state standards.

An ESD was issued on July 1, 1996, to select a new location for the OCF.

An ESD was issued on September 27, 2018, to select an environmental covenant as an IC for the OCF.

2.2.4 OU 03 Tacoma Tar Pits

Selected Remedy

A ROD was signed for OU 03 on December 30, 1987. Two additional modifications to this ROD were documented in ESDs for various portions of this OU and are further described below. The following information is from the 1987 ROD as modified by ESDs.

Remedy Components

The selected remedy consisted of the following components:

- Excavation and treatment of contaminated soils characterized as Extremely Hazardous Wastes due to a total carcinogenic polycyclic aromatic hydrocarbon (cPAH) content exceeding one percent (based on State of Washington Dangerous Waste Regulations, WAC 173-303-100).
- Excavation and stabilization of all surface soils (defined as less than three feet deep) containing contaminants that exceed a $1x10^{-6}$ lifetime cancer risk.
- Capping of the stabilized materials with a low permeability cover system to reduce surface water infiltration and human exposure. The contaminated residential soils excavated from the Ruston/North Tacoma Study Area (OU 04) can be used as a sub-base for the cap.
- Reduction of surface water transport of contaminants by channeling and managing surface water run-on and run-off.
- Removal and treatment of ponded water to achieve cleanup goals.
- Provisions for institutional controls to assure integrity of the engineered waste pile cap and prevent future use of on-site groundwater.
- Provisions for post-RA groundwater monitoring to evaluate the effectiveness of the RA with respect to groundwater quality and to evaluate the need for groundwater extraction and treatment in the event that groundwater quality goals are not achieved through implementation of the soils remedy. The ROD-identified cleanup levels for soil, surface water, and groundwater are based on Applicable or Relevant and Appropriate Requirements (ARARs) and the results of the risk assessment.

TABLE 2-6. OU 03 SOIL CLEANUP LEVELS

Constituent	Soil Cleanup Level (mg/kg)
Lead	166
PCBs	1
ROD-cPAHs (individual)[1]	1
ROD-cPAHs (total)1	5
Benzene	5,300

Notes:

1. ROD individual cPAHs include benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

TABLE 2-7. OU 03 SURFACE WATER CLEANUP LEVELS[1]	
Constituent	**Surface Water Cleanup Level (µg/L)**
Lead	3.2
PCBs	0.2
ROD-cPAHs (individual)[1]	5
ROD-cPAHs (total)[2]	30
Benzene	53

Notes:

1. Measured at OU 03 boundary.
2. ROD individual cPAHs include benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

TABLE 2-8. OU 03 GROUNDWATER CLEANUP LEVELS[1]	
Constituent	**Groundwater Cleanup Level (µg/L)**
Lead	50
PCBs	0.2
ROD-cPAHs (individual)[1]	5
ROD-cPAHs (total)[2]	30
Benzene	53

Notes:

1. For Sand and Fill Aquifers. Measured at OU 03 boundary.
2. ROD individual cPAHs include benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

An ESD was issued in 1991 as a result of studies conducted subsequent to the 1987 ROD. Revisions to the ROD included an expansion of the remediation area, an increase in the volume of contaminated materials to be excavated, consolidated and stabilized, import clean backfill to be placed in excavated areas including the capped engineered waste pile area to raise the bottom above the seasonally high water table, and expansion of the capped area to include the Metro Metals property. This ESD also added more specificity to the remedy requirements by providing area- and contaminant-specific criteria for excavation and treatment of waste materials.

An ESD was issued in 1995 based on field conditions encountered during remediation. These changes included modifications to treatability and stabilization mixes, an increase in the volume to be treated, the addition of a multi-layered geosynthetic cover over the engineered waste pile area, and cement concrete pavement in addition to asphalt to be placed in certain areas of the Metro Metals (formerly known as Simon Metals) property.

In 2002, a Groundwater Extraction and Treatment System (GWET) was installed as a result of increasing contaminant concentrations at the OU boundary. The treatment plant was replaced in 2017 to address requirements for groundwater optimization. This treatment system continues to contain the contaminant plume.

2.2.5 OU 04 Asarco Off-Property (Ruston/North Tacoma Study Area)

Pre-ROD Actions

In the late 1980s, 11 publicly available properties, known as the Expedited Response Action (ERA) properties, were identified, consisting primarily of school yards, parks and vacant lots. Asarco removed vegetation and placed clean soil cap over contaminated soil, at these locations.

Selected Remedy

A ROD was signed for OU 04 on June 16, 1993. The following information is from the 1993 ROD.

RAOs for the Selected Remedy

Contaminated Soil: Reduce potential exposure of current and future community residents to soil and dust so that risk associated with exposures will be within acceptable levels (Table 2-9) defined as:

- Reduce arsenic exposures to ensure that the upper-bound lifetime excess cancer risk to an individual is between 10^{-4} and 10^{-6}.
- Reduce exposures to lead to ensure that no individual has greater than a 5 percent chance of exceeding a blood lead level criterion of 10 µg of lead per deciliter of blood (10 µg/dL).
- Reduce the potential transport of soil contaminants inside homes or to other buildings where exposures may occur.

TABLE 2-9. OU 04 SOIL CLEANUP LEVELS

Constituent	Soil Cleanup Level (ppm[1])
Lead	500
Arsenic	230

Notes:

1. Parts per million; equates to concentrations of milligrams per kilogram (mg/kg).

Remedy Components

The remedy addressed the principal threat posed by contaminants in soil and dust in the Study Area, and contains the following elements:

- Excavation and off-site disposal of contaminated soil from properties where concentrations were greater than cleanup levels, backfilling with clean fill material. Contamination at depths greater than 18 inches was capped rather than excavated.
- Asphalt capping or excavation and backfill of contaminated soil in dirt alleys and parking areas.
- Fencing and planting low lying shrubs in steep areas where excavation was impractical or technically infeasible.
- Implementation of Community Protection Measures (CPMs), which are administrative requirements implemented in areas where arsenic and lead concentrations in soil were greater than 20 parts per million (ppm) and 250 ppm, respectively.

An ESD was issued on November 29, 1993 to allow material removed from the yards to be temporarily stockpiled in OU 02 until EPA made a final decision on a disposal site by December 30, 1994. Stored material would be removed by April 1995 and taken to an appropriate off-site facility for disposal unless

the dangerous waste exemption has been approved and a suitable disposal facility has been identified or EPA has selected a cleanup remedy for the smelter site which includes disposal or beneficial use of residential soils on smelter property.

A Removal Action was taken in 2005 to clean up 13 residential yards due to complications with bankruptcy court proceedings and limitations on expenditure of any available funding made the prospect of Asarco's response to the ongoing threat to human exposure significantly delayed at best.

2.2.6 OU 06 Asarco Groundwater and Sediment

Selected Remedy

A ROD was signed for OU 06 on July 14, 2000. The following information is from the 2000 ROD.

RAOs for the Selected Remedy

Groundwater:

- Prevent exposure to groundwater containing contaminant concentrations that pose unacceptable risk to human health.
- Prevent discharge to Commencement Bay of groundwater containing contaminants that pose unacceptable risk to marine life or human health.

TABLE 2-10. OU 06 GROUNDWATER CLEANUP LEVELS	
Constituent	**Groundwater Cleanup Level (µg/L)**
Shallow Aquifer[1]	
Arsenic	6
Copper	3.1
Deep Aquifer	
Metals	MCLs

Notes:

1. Includes the slag, marine sand, and intermediate aquifers as referenced in various OU 06 documents.

Sediment: Restore and preserve aquatic habitats by limiting and/or preventing the exposure of environmental receptors to sediments with contaminants above Washington State Sediment Management Standards (SMS; WAC 173-204).

TABLE 2-11. OU 06 SEDIMENT CLEANUP LEVELS	
Constituent	**Sediment Cleanup Level (mg/kg)**
Nearshore/Offshore & Northshore Areas	
Preponderance-of-Evidence Approach	
Yacht Basin	
Arsenic	93
Copper	390
Lead	450
Zinc	410
Moderate Impact Zone and Contaminant Effects Areas	
Preponderance-of-Evidence Approach	

Remedy Components

The selected remedy for groundwater included the following elements:

- Reduction of groundwater flow and contaminant loading to Commencement Bay through removal of source materials and limiting groundwater recharge to aquifers beneath the smelter portion of the Facility.
- Implement ICs to restrict future use of OU 06 groundwater.

The selected remedy for marine sediments included the following elements:

- Dredging contaminated sediment in the Yacht Basin and with on-site disposal in OU 02.
- Capping of contaminated sediments in selected offshore areas.
- Implementation of ICs to prevent activities that could damage the sediment caps.

2.3 STATUS OF IMPLEMENTATION

This section provides a brief discussion of the status of any response action or remedial action including whether remedial actions are complete or ongoing, the status of ICs that are necessary to protect the remedy, and the status of O&M for each OU.

2.3.1 OU 01 Sediment

Remedy Implementation

St. Paul and Blair Waterways

Construction of the 17-acre sediment cap in the St. Paul Waterway (Figure 2-2) was completed in 1988 prior to the ROD under a state consent decree. A source control completion report was approved in 1990. An area of 11.18 acres (Areas A and B) was approved by EPA under CERCLA for no further remedial actions pursuant to a federal CD in 1991. The remaining six acres (Area C) consists of a cap covering wood debris, which is not subject to CERCLA. Approximately six acres of new intertidal habitat and 11 acres of subtidal habitat were constructed over the cap. No action was required to be taken in the Blair waterway other than those actions identified in the Puyallup Land Settlement Agreement.

In 1996, EPA deleted the St. Paul Waterway and the Blair Waterway (including properties associated with the Blair Waterway transferred to the Tribe in the Puyallup Land Settlement Agreement) from the

National Priorities List (NPL) because cleanups had been completed in these areas, or studies had been completed showing that they did not require cleanup.

Sitcum Waterway

Under an AOC with EPA issued March 1991, the Port evaluated each of the four disposal options identified in the ROD as part of designing a remedial action plan and EPA selected the final remedial action in an ESD issued in June 1993, with Ecology and the Tribe concurring.

In 1993, EPA entered into a CD with the Port that required dredging of approximately 428,000 cubic yards of contaminated sediments from Sitcum Waterway for disposal in the Milwaukee

Waterway Nearshore Confined Disposal Facility (NCDF). A settlement with the Port for injuries to natural resources in Blair Waterway and other portions of Commencement Bay was also part of the Consent Decree.

The Milwaukee Waterway NCDF and Habitat Area (Figure 2-3) was constructed using about 1,225,400 cubic yards of clean dredged material from the Blair Waterway. As part of the 1988 Pullup Land Claim settlement, the Port also dredged approximately 874,600 cubic yards of contaminated sediments from Blair Waterway for disposal in the Milwaukee Waterway NCDF (also discussed in the Puyallup Land Claim, below).

Dredging was to occur in two phases. Approximately 396,000 cubic yards of bottom sediments was removed in Phase 1 (identified as Area A). The extent of dredging was limited by riprap and Pier 7 along the northern shoreline. Approximately 32,300 yards of sediment over existing riprap and slopes under Pier 7 was to be removed, to the extent technically feasible, in Phase 2. A memorandum from the Port (October 1995) recommended that no further action be required in the Phase 2 Area, and that the 4.5-acre area beneath Pier 7 would continue to be evaluated for MNR as specified in the Operations, Maintenance, and Monitoring Plan (OMMP), and is now known as Area B.

The Milwaukee Habitat Area and the Clear Creek Habitat Improvement Project (also known as the Clear Creek Phase 1 Area) are the mitigation sites (Figure 2-4) to compensate for and offset unavoidable environmental impacts of the Sitcum Waterway Remediation Project. The Milwaukee Habitat Area is located in front of the nearshore fill closure berm in the Mouth of the Milwaukee Waterway, consisting of approximately 20 acres of intertidal habitat. The construction of the Milwaukee Habitat Area was completed in 1995. The Clear Creek Habitat Improvement Project consists of approximately 9.5 acres of restored, off-site, refuge habitat for salmon and other fish from the Puyallup River. The construction of the Clear Creek Habitat Improvement Project was completed in 1998. The Remedial Action Report was approved by EPA March 9, 2017. In 2017, the Sitcum Waterway and sources draining only to that waterway were deleted from the NPL.

Thea Foss and Wheeler-Osgood Waterways

Two responsible parties are implementing the remedy: The Utilities party is responsible for cleaning up the head of the Thea Foss waterway, and the City of Tacoma is responsible for the remaining areas.

Mouth of Thea Foss and Wheeler-Osgood Waterways

In 1994, the City of Tacoma entered into an AOC with EPA to perform pre-remedial design study and remedial design. EPA issued a 2000 ESD to incorporate the remedial design for these waterways. Work on six project activities began in November 2002 under a Unilateral Administrative Order (UAO) issued by EPA on September 30, 2002. The City of Tacoma later entered into a CD on May 9, 2003 with EPA,

which superseded the 2002 UAO, to address 80 percent of the contaminated area and conducted cleanup activities, which occurred from summer 2003 through spring 2006. This work consisted of constructing the 11-acre St. Paul Waterway Confined Disposal Facility (St. Paul CDF; Figure 2-5), dredging 425,674 cubic yards of contaminated sediment with disposal in the St. Paul CDF, capping of 24 acres, four acres of ENR, and 21 acres were designated for MNR (Figure 2-6). Since 2006, the City has been monitoring natural recovery areas.

The following mitigation sites were constructed to compensate for and offset unavoidable environmental impacts of the Mouth of Thea Foss Waterway and Wheeler-Osgood Waterway Remediation Project:

- North Beach Habitat;
- Middle Waterway Tideflat Habitat;
- Puyallup River Side Channel; and
- Hylebos Creek Mitigation Site.

Additionally, the City of Tacoma was responsible for construction of four habitat enhancement areas within the Thea Foss Waterway as part of the remedial action:

- Johnny's Dock Habitat Enhancement;
- Head of the Thea Foss Shoreline Habitat;
- State Route (SR) 509 Esplanade Riparian Habitat; and
- Log Step Habitat Enhancement.

The City of Tacoma also conducted the following enhanced habitat actions as part of the remedial action:

- Middle Waterway Corridor Habitat; and
- Wheeler-Osgood and Thea Foss Slope Rehabilitation Areas

The Remedial Action Construction Report was submitted September 2006 and approved by EPA.

Head of Thea Foss Waterway

The Utilities signed a separate CD with EPA in 2003, which superseded the 2002 UAO, to perform cleanup activities in the remaining 20 percent of the waterway (Head of Thea Foss Waterway). The remedy consisted of an 8.8-acre cap (Figure 2-7). Construction was completed in February 2004, and a Remedial Action Construction Report was submitted in June 2004 but was not approved by EPA until 2008 when all ICs were in place.

The City of Tacoma was responsible for the removal of the City Pier located in the Head of the Thea Foss Waterway. In August of 2016, the City Pier was removed under the direction of the City of Tacoma; all pilings were cut at the mudline.

Hylebos Waterway

In 1993 EPA entered into an AOC with six parties [ASARCO, Inc., Elf Atochem North America, Inc. (now Arkema Chemicals, Inc.), General Metals of Tacoma, Inc., Kaiser Aluminum and Chemical Corporation, OCC, and the Port] who owned property along or draining into Hylebos Waterway, known as the Hylebos Cleanup Committee (HCC). The AOC required the HCC to complete the pre-remedial design studies for the Mouth of Hylebos and Head of Hylebos problem areas, as well as the portion of the waterway between the problem areas. That work was completed in 1999 with the issuance of the Pre-Remedial Design Evaluation Report.

The project was divided into the Head and Mouth of Hylebos Waterway performing party groups to conduct pre-remedial design sampling. During this time frame, contamination at the Occidental Site was found to be comingled between upland and waterway areas, and the 1997 AOC for Removal Action amended in 2005. Thus, the Hylebos Waterway evolved into three different administrative actions identified as Head of Hylebos, Mouth of Hylebos, and Occidental. The Head of Hylebos Waterway problem area covers the upper one-third of the Hylebos Waterway within the CB/NT Superfund Site (Segments 1 and 2). The Mouth of Hylebos Waterway problem area covers the lower two-thirds of the waterway (Segments 3, 4 and 5). The Occidental problem area includes upland and waterway portions of the former OCC facility in Segment 5, including areas beyond the property boundaries where groundwater flow has moved contamination.

Head of Hylebos Waterway

EPA issued ATOFINA Chemicals and General Metals of Tacoma (collectively referred to as Head of Hylebos Cleanup Group or HHCG) a UAO for remedial design and remedial action at the Head of Hylebos Waterway in March 2002. In a CD later signed with EPA in 2004, which superseded the 2002 UAO, ATOFINA and General Metals agreed to perform the remedial design/remedial action and pay past costs for cleaning up the Head of Hylebos Waterway.

The Remedial Design was conducted consistent with the ROD as modified by the 1997, 2000, and 2004 ESDs. EPA determined that the Hylebos Wood Debris Site at the upper turning basin of the Hylebos Waterway (see WDG Areas on Figure 2-8) should be addressed separately by Ecology from the overall waterway cleanup because the wood waste contamination was not due to the release of CERCLA contaminants. In addition to the waterway sediments, the embankment areas to be addressed included:

- Atofina (Arkema) dock/structure [Sediment Management Area (SMA) 231]
- Dunlap intertidal (SMA 242)
- Weyerhaeuser MNR area (SMA 102)
- J&G Investments intertidal (SMA 142)
- Ace Tank intertidal (SMA 121)
- General Metals graving dock MNR area (SMA 203)
- Hylebos Boat Haven dock/structure (SMA 233)

The remedial design was approved by EPA in March 2004. The Head of Hylebos Waterway remedial action construction work (Figure 2-8) was completed in 2006, with additional response actions in 2009, and included the following:

- Dredging of 405,000 cubic yards of sediment over approximately 42 acres. Dredged sediments were disposed in the Roosevelt Regional Landfill, now owned by Republic Services, located near Roosevelt, Washington. Post-dredging sampling results indicate that SQOs identified in the CB/NT ROD were met throughout the approximately 45-acre subtidal area.
- MNR was implemented under the Weyerhaeuser dock (SMA 102) in the upper turning basin [see the Operations and Maintenance discussion in Section 2.3.1.3].
- Removed contaminated shoreline soils/sediments at Ace Tank (SMA 121) under a 1998 Ecology Prospective Purchaser Agreement. Removed contaminated sediment under the dock structure as part of the Mouth of Hylebos remedial action.
- 1.5 acres (7,400 cy) of contaminated intertidal shoreline at General Metals graving slip (SMA 203), J&G Investment property (SMA 142), Arkema intertidal shoreline (SMA 231) and Dunlap

Log Haul out area (SMA 242) was excavated to clean and then backfilled with clean sand and gravel (aka transition zone grading material or TZGM) in 2003.

- Addendums 1 (2004) and 2 (2005) to the 2004 Remedial Action Work Plan modified the work to be performed for the Arkema southeast shoreline area (within SMA 221) for construction of a subtidal cap along the Arkema southeast shoreline (Figure 2-9). EPA approved the sediment cap installation under the Head of Hylebos CD with the documented understanding that the cap would not treat dissolved arsenic from an upland source.
- Addendum 3 to the 2003 Remedial Action Work Plan modified the work to be performed for the Arkema southeast shoreline area (part of SMA 221) for intertidal excavation along the shoreline and construction of an intertidal capped area.

As part of the intertidal remediation activities along the Arkema shoreline (Addendum 2), a small saltmarsh area was planted (totaling 0.26 acres) north of the Arkema Dock to offset the loss of intertidal salt marsh habitat associated with the remedial action at the Arkema dock (SMA 231). Additional mitigation action at the Arkema Dock Area (SMA 231) entailed placing four large woody debris cover structures at or near the Mean Higher High Water (MHHW) line behind the Arkema dock following completion of the remedial action.

EPA approved the Remedial Action Construction Report (RACR) in 2011. Completion of remedial action will depend upon source control actions at the Arkema Site being accomplished to EPA's satisfaction, and evidence from long-term sediment quality sampling that no further response actions are warranted.

Mouth of Hylebos Waterway

Remedial design and remedial action were performed by OCC and the Port under a 2005 CD (C 05-5103 FDB) which superseded and incorporated the substance of a 2002 UAO. The construction of the Blair Slip 1 Stage I Containment Berm was completed in January 2003. The Blair Slip 1 NCDF (Figure 2-10) is approximately 10 acres and had a disposal capacity of approximately 650,000 cubic yards. Most remedial action dredging at the mouth of the waterway occurred during the 2003-2005 in-water construction seasons. In 2003 and 2004, dredged sediments were transported to either the Commencement Bay open-water disposal site (approximately 190,000 cubic yards uncontaminated sediment) or the Blair Slip 1 NCDF (approximately 450,000 cubic yards contaminated sediment). The Chinook Marina (SMA 501), Navy Bank (SMA 534), TPU (SMA 402), Buffelen Natural (SMA 341), and SMA 123 were identified for MNR (Figure 2-11). Capping under Piers 24 and 25 (Figure 2-11a) was completed in 2008. EPA approved the Pier 24/25 RACR in 2013 and the Mouth of Hylebos Waterway RACRs (one for Segments 3 and 4 and a second one for Segment 5 and Slip 1) in 2015.

The Port constructed approximately 9 acres of habitat at the Blair Waterway Slip 5 and Clear Creek habitat sites (Figure 2-4) to compensate for habitat losses of the in-water remedial action and construction of the Blair Waterway Slip 1 CDF. This habitat mitigation construction was completed in 2004.

- The Clear Creek Habitat - Phase II mitigation site consists of the Reserve, Swan Creek, and Riparian planting areas. Construction was completed in 2004. The site was developed from a 3-acre unimproved area located between the Phase I site to the west and Clear Creek to the east. Performance monitoring was conducted in 2004, 2006, and 2009. Additional monitoring at the Riparian Planting Areas occurred from 2009 to 2013.
- The Blair Waterway Slip 5 Habitat mitigation consisted of four actions:

1. Construction of a reef and fill of the bulk of the remaining area in Slip 5 to convert subtidal habitat to intertidal and shallow subtidal habitat.
2. Extension of the sloping beach adjacent to Pier 1D by placement of fill.
3. Removal of a building and placement of select substrate on the slope above the existing mitigation beaches adjacent to Pier 5 and Pier 1D. This includes that area above the new mitigation action described in number 2.
4. Removal of Pier 1D, Pier 5 and associated in-water structures

An additional 1.58 acres of compensatory mitigation for the remedial action still needs to be constructed by the performing parties. EPA is currently working with the Mouth of Hylebos performing parties to locate a suitable location for the mitigation project.

Occidental

Completion of remedial design and remedial action work along Pier 25 (approximately 400 feet) is partly dependent upon results from ongoing investigations and source control actions at the Occidental problem area. The second amendment to the AOC for the removal actions at Occidental states that five years from the date that a consent decree or order implementing a final MTCA CAP is issued, Occidental shall submit to EPA for review and approval an Occidental Site Cleanup Status Report ("Status Report") that summarizes the status of activities conducted at the Occidental property since the Effective Date of this Second Amendment, evaluates whether those activities have sufficiently controlled releases of hazardous substances, pollutants, or contaminants from the Occidental property contaminated soil, groundwater, and surface water to Site sediments, and recommends whether additional response actions are necessary to evaluate and/or address Occidental Site sediment contamination. Upon review of this report, EPA will determine the final sediment cleanup for this area of the Site.

Middle Waterway

The Middle Waterway Action Committee (MWAC) was established to represent a group of Middle Waterway PRPs (Foss Maritime Company, Marine Industries Northwest, Inc., and Pioneer Industries). In April 1997, EPA and MWAC entered into an AOC for the Pre-Remedial Design and Remedial Design. During the investigation activities, Middle Waterway was divided into Area A (the mouth of the waterway), Area B (the mid-portion of the waterway) and Area C (the Head of the waterway). In 2002, EPA issued an ESD that selected the remedial actions for the Middle Waterway. In March 2003, EPA issued an ESD that specified a more extensive remedial action conducted by Ecology for SMU 51a in Area C.

In August 2003, EPA entered into two separate CDs for the cleanup of Middle Waterway. MWAC entered into a CD to implement the remedial action for Areas A and B. EPA, Washington Department of Natural Resources (DNR), the City of Tacoma, and other parties, entered into a Remedial Design/Remedial Action CD to address the cleanup of Area C.

After EPA approval of MWAC's design documents in April 2003, cleanup activities began in Areas A and B during the summer of 2003 and were completed in February 2004 (Figure 2-12). Approximately 109,500 cubic yards of dredged sediments from the Middle Waterway were placed in the Blair Slip 1 NCDF. In August 2004, MWAC proposed to do some additional dredging, ENR, and pile removal and replacement in Areas A and B to address unanticipated post-remediation issues. This work was completed by January 2005. An additional response action to place ENR material and shoreline stabilization was conducted in 2013 to address mercury contamination in sediment in a Natural

Recovery area that did not recover as originally anticipated (Figure 2-13). The remedial action was completed in 2018.

EPA approved the final remedial design for Area C in April 2004. The cleanup work in Area C was conducted by DNR during the summer and fall of 2004 (Figure 2-14). Approximately 3,125 cubic yards of contaminated sediment was excavated and disposed in the LRI landfill. The dredged area was subsequently backfilled with clean material. In Area 51b, a thin layer cap was placed over approximately 1.5 acres to ENR. MNR was selected for area 51a. EPA approved the RACR in 2005. This area of the Site is UU/UE.

Institutional Controls

There is a Site-wide fish advisory issued by TPCHD for OU 01. The fish consumption advisory was issued in 1985 and recommends that people not eat bottom-feeding fish, clams or crab caught from the waterways. Signs warning against fish and shellfish consumption are posted in the Thea Foss, Hylebos, and Blair Waterways informing the public about the danger of consuming fish and shellfish harvested from this area. TPCHD replaced some of the original English-language only signs in 1996 with multi-lingual versions. The location of the signs is shown in Figure 2-15.

Where contaminated sediments have been capped or left in place at depth, EPA has coordinated with the U.S. Army Corp of Engineers (USACE), Seattle District[5] to ensure that in-water construction projects do not result in disruptions to cap integrity or otherwise result in the release of subsurface sediment contaminants. The Seattle District office has developed a Standard Operating Procedure (SOP) for coordinating with EPA prior to issuing in-water construction permits within the CB/NT Site and has also developed standard permit language for CERCLA sites that is applied even if EPA does not identify any particular concerns or the need for particular permit conditions. Since the last FYR, EPA has coordinated with USACE on 71 permits, which are provided in Appendix C. This process is working effectively to protect human health and the environment.

A list of implemented ICs by Waterway is provided in Tables 2-12 through 2-16.

[5] U.S. Army Corp of Engineers (USACE) is the entity responsible for issuing permits under the Clean Water Act for in-water construction projects.

TABLE 2-12: OU 01 - ST. PAUL WATERWAY SUMMARY OF IMPLEMENTED ICs[1]					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Sediment cap	Yes	No	WA DNR Lease Area Parcel #22-002658	Restrict development or improvements to lease area without authorization. Prohibits releases of contaminants that will recontaminate the cap.	30-year Lease Agreement, January 1986, Amended February 1989, December 2001, January 2006 Expired January 2016
Sediment cap	Yes	No	WA DNR Deposition Agreement Parcel #20-012631	Restrict development or improvements to lease area without authorization. Prohibits releases of contaminants that will recontaminate the cap.	30-year Deposition Agreement December 1987 Amended December 2001 March 2006 Expired December 2017
Sediment cap	Yes	No	WA DNR Easement Parcel #51-093012	Restrict development or improvements to lease area without authorization. Prohibits releases of contaminants that will recontaminate the cap.	30-year Easement Agreement May 2018 Expires April 2048
Sediment Cap	Yes	No	Tax Parcel 930716603	Notice that a sediment cap is on this parcel and requires O&M	December 1999

Note:

1. See Figure 2-16 that presents the various parcel agreements.

TABLE 2-13: OU 01 - SITCUM WATERWAY SUMMARY OF IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents[1]**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Milwaukee Nearshore Confined Disposal Facility and Closure Berm	Yes	No	Tax Parcels 8950000121, 8950000050, and 8950000092	Restricts land use to prevent damage or disturbance of the integrity of the Milwaukee NCDF or closure berm	Environmental Covenant December 2009 Amended July 2011 November 2011
Milwaukee Nearshore Confined Disposal Facility and Closure Berm	Yes	No	Tax Parcels 8950000121, 8950000050, and 8950000092	Revise tenant lease language to include information on remediation sites and habitat areas on and adjacent to lease areas	Lease Agreement October 2017
Milwaukee Habitat Area[2] (WA DNR-owned)	Yes	No	WA DNR Conservation Easement #51-087166	Restricted use to conservation activities intended to preserve and enhance aquatic ecosystems	Easement Agreement November 2011
Milwaukee Habitat Area (Port-owned)	Yes	No	Portion of Tax Parcel 8950000121	Restricted use to habitat mitigation project.	Environmental Covenant July 2011 Amended November 2011
Milwaukee Habitat Area (WA DNR-owned)	Yes	No	Ptn of Harbor Area in front of Tracts 7 and 8, Tacoma Tidelands, Pierce County, Washington	Restricted use to habitat mitigation project.	Environmental Covenant December 2011
Clear Creek Habitat Improvement Project (Phase 1)	Yes	No	Tax Parcels 5000350671 and 5000350672	Restricted use to habitat mitigation project.	Environmental Covenant May 2010

Notes:

1. The 1993 CD for the Sitcum Waterway Remediation Project specifies administrative actions in addition to remedial actions. The CD commits the Port to operating and maintaining the NCDF and habitat mitigation sites in the long-term. The CD remains an effective enforcement tool and IC for requiring administrative actions in support of the remedy.
2. Only pertains to portion of the habitat area beyond the outer Harbor Line.

TABLE 2-14: OU 01 - THEA FOSS AND WHEELER-OSGOOD WATERWAYS SUMMARY OF IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Sediment Caps	Yes	Yes	Regulated Navigation Area	Prohibits anchorage and other activities that could disturb the cap on the seabed	USCG RNA 33 CFR 165.1329 January 2011
Sediment Cap	Yes	Yes	8950000700	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950001626	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[1]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[2]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950001851	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	2022000021	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950001871	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950001964	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950002070	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950001963	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[3]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[4]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007

TABLE 2-14: OU 01 - THEA FOSS AND WHEELER-OSGOOD WATERWAYS SUMMARY OF IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Sediment Cap	Yes	Yes	Other[5]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[6]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[7]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[8]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[9]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950002040	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950002050	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950002060	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950000690	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[10]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[11]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Other[12]	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	0320092019	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	0320041028 and 8950001601	Restricts activities that could disturb the cap	Restrictive Covenant January 2007

TABLE 2-14: OU 01 - THEA FOSS AND WHEELER-OSGOOD WATERWAYS SUMMARY OF IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Sediment Cap	Yes	Yes	8950001572	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950002131	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	8950001881	Restricts activities that could disturb the cap	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	895000980	Restricts activities that could disturb the cap	Restrictive Covenant March 2007
Sediment Cap	Yes	Yes	8950001560	Restricts activities that could disturb the cap	Restrictive Covenant March 2007
Sediment Cap	Yes	Yes	0320041017	Restricts activities that could disturb the cap	Restrictive Covenant March 2007
Sediment Cap	Yes	Yes	8950001590	Restricts activities that could disturb the cap	Restrictive Covenant March 2007
Sediment Cap	Yes	Yes	0320041054	Restricts activities that could disturb the cap	Restrictive Covenant March 2007
Sediment Cap	Yes	Yes	8950001052	Restricts activities that could disturb the cap	Restrictive Covenant March 2007
Sediment Cap	Yes	Yes	8950000990 and 8950000680	Restricts activities that could disturb the cap	Restrictive Covenant March 2007
Sediment Cap	Yes	Yes	8950001822	Restricts activities that could disturb the cap	Restrictive Covenant April 2007
Sediment Cap	Yes	Yes	8950001832	Restricts activities that could disturb the cap	Restrictive Covenant April 2007
Sediment Cap	Yes	Yes	8950001791	Restricts activities that could disturb the cap	Restrictive Covenant April 2007

TABLE 2-14: OU 01 - THEA FOSS AND WHEELER-OSGOOD WATERWAYS SUMMARY OF IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Sediment Cap	Yes	Yes	8950001761	Restricts activities that could disturb the cap	Restrictive Covenant April 2007
Sediment Cap	Yes	Yes	8950001843	Restricts activities that could disturb the cap	Restrictive Covenant June 2007
Sediment Cap	Yes	Yes	8950001624	Restricts activities that could disturb the cap	Restrictive Covenant June 2007
Sediment Cap	Yes	Yes	8950001740	Restricts activities that could disturb the cap	Restrictive Covenant July 2007
Sediment Cap	Yes	Yes	8950001613	Restricts activities that could disturb the cap	Restrictive Covenant October 2007
Sediment Cap	Yes	Yes	8950001971	Restricts activities that could disturb the cap	Restrictive Covenant October 2006
Sediment Cap	Yes	Yes	8950001614	Restricts activities that could disturb the cap	Restrictive Covenant January 2008
Sediment Cap	Yes	Yes	8950001611 8950001627 8950001751	Restricts activities that could disturb the cap	Restrictive Covenant August 2004
St. Paul CDF	Yes	Yes	R8950000480 R8950000490 R8950000528 R8950000530 R8950000531 R8950000563 R8950000564 R8950000565 R8950000566 R8950000404	Restrict activities that could cause releases of contamination from the CDF	Easement August 2003

TABLE 2-14: OU 01 - THEA FOSS AND WHEELER-OSGOOD WATERWAYS SUMMARY OF IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
North Beach Habitat and Middle Waterway Habitat	Yes	Yes	R8950000480 R8950000490 R8950000528 R8950000530 R8950000531 R8950000563 R8950000564 R8950000565 R8950000566 R8950000404	Prevent activities that would disturb the constructed habitat	Easement August 2003 DNR[15] Lease #22-074977 August 2003
Puyallup River Side Channel Habitat	Yes	Yes	8950000404	Prevent activities that would disturb the constructed habitat	Restrictive Covenant January 2007
Puyallup River Side Channel Habitat	Yes	Yes	8950000404	Prevent human access to site to protect constructed habitat	Barrier Fence Vehicle Barrier
Hylebos Creek Mitigation Site	Yes	Yes	0420062007 0420062009 0420062010	Prevent activities that would disturb the constructed habitat	Restrictive Covenant January 2007
Sediment Cap	Yes	Yes	Foss Landing Marina Foss Waterway Marina Foss Harbor Marina Delin Docks Johnny's Dock Marina Fire Station 18 D St. Hand Launch Float Dock St. Marina 16th St. Pier	Protect cap from the activity of pulling or driving piles	DNR[15] Lease #22-002775 February 2012 5-year DNR[15] Permit #20-A83384 August 2017 §404 Permits[13]
Sediment Cap	Yes	Yes	WA DNR Easement #51-SR1287	Allow WSDOT a right-of-way for 509 Bridge	WA DNR[15] Easement June 1994

TABLE 2-14: OU 01 - THEA FOSS AND WHEELER-OSGOOD WATERWAYS SUMMARY OF IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Utilities Sediment Cap	Yes	Yes	Head of Thea Foss Regulated Navigation Area	Deauthorizes Head of Thea Foss as regulated navigation	USACE[14] FR Notice 2008

Notes:

1. That portion of the NW Quarter of Section 4, Township 20 North, Range 3 East, W.M. described as follows: That portion of the East 11th Street right of way abutting the westerly line of the Thea Foss Waterway and lying below the line of Ordinary High Water.
2. Portion of the SW Quarter of Section 4, Township 20 North, Range 3 East, W.M. described as follows: That portion of the East 15th Street right of way abutting the westerly line of the Thea Foss Waterway and lying below the line of Ordinary High Water.
3. Portion of Section 4, Township 20 North, Range 3 East, W.M. described as follows: That portion of the East 18th Street and East "D" Street rights of way abutting the easterly side of the Thea Foss Waterway and lying below the line of Ordinary High Water.
4. Portion of the SW Quarter of Section 4, Township 20 North, Range 3 East, W.M. described as follows: That portion of the East 18th Street right of way abutting the westerly line of the Thea Foss Waterway and lying below the line of Ordinary High Water.
5. Portion of the SW Quarter of Section 4, Township 20 North, Range 3 East, W.M. described as follows: That portion of the East 21st Street right of way abutting the westerly line of the Thea Foss Waterway and lying East of the following described line: Commencing at the Southwest corner of Block 58, according to the official map of the Tacoma Tidelands filed in the office of the Commissioner of Public Lands at Olympia, Washington, 3 September 1895; thence North 82°40'59"E along the South line of said Block a distance of 146.12 feet to a point on a non-tangent curve, which radius point bears South 67°05'56"East, 31.48 feet, said point being the True Point of Beginning; thence southwesterly along said curve through a central angle of 25°41'28", an arch distance of 14.12 feet; thence South 05°47'39"East a distance of 66.66 feet to the South margin of East 21st Street and the terminus of this line.
6. That portion of The NW Quarter of Section 9, Township 20 North, Range 3 West, W.M. described as follows: That portion of the East 22nd Street right of way abutting the westerly line of the Thea Foss Waterway and lying below the line of Ordinary High Water.
7. That portion of the Northeast Quarter of the Northwest Quarter of Section 09, Township 20 North, Range 03 East, W.M. described as follows: That portion of the East "B" Street right of way abutting the southerly line of the Thea Foss Waterway and lying below the line of Ordinary High Water.
8. That portion of the Northeast Quarter of the Northwest Quarter and the Northwest Quarter of the Northeast Quarter of Section 09, Township 20 North, Range 03 East, W.M. described as follows: That portion of the East "C" Street right of way abutting the southerly and easterly lines of the Thea Foss Waterway and lying below the line of Ordinary High Water.
9. That portion of the Southeast Quarter of the Southwest Quarter and the Southwest Quarter of the Southeast Quarter of Section 04, Township 20 North, Range 03 East, W.M. described as follows: That portion of the East 21 St Street right of way abutting the easterly line of the Thea Foss Waterway and lying below the line of Ordinary High Water.
10. Aquatic lands in a portion of the Thea Foss Waterway within Section 4, T 20 N R 3 E and in Section 33, T 21 N R 3 E. All that portion of the Thea Foss Waterway, formerly known as the City Waterway, lying southerly of a line beginning at the intersection of the westerly Inner harbor line with the southerly boundary of Lot 32, Block 66, as shown on the Map of Tacoma Tidelands Volume 1, April 1895 of record in the offices of the Commissioner of Public Lands, thence northeasterly, perpendicular to said Inner harbor line, to the easterly Waterway line, and lying northerly of a line parallel to and 200' northerly of, as measured perpendicularly to the northerly boundary of the Public Place as shown and platted on the 1994 Supplemental Map of Thea Foss Waterway of record in the offices of the Commissioner of Public Lands, said line to extend from the Inner Harbor line to the opposing Inner Harbor Line, together with those portions of the Harbor Area(s) and Public Place(s) also lying between the afore described lines.

11. And: That portion of the Harbor Area lying in front of Lots 2 through 11, inclusive, Block 66, as shown on the l983 Supplemental Map of City Waterway, Tacoma Tidelands, of record in the offices of the Commissioner of Public Lands, the lateral boundaries of the subject parcel being the northwesterly line of Lot 2 and the southeasterly line of Lot 11 produced northeasterly to intersect with the Outer Harbor Line.
12. Aquatic lands in a portion of the Thea Foss Waterway within Section 4, T 20 N R 3 E and in Section 33, T 21 N R 3 E. All that portion of the Thea Foss Waterway, formerly known as the City Waterway, lying southerly of a line parallel to and 220' northerly of, as measured perpendicularly to the northerly boundary of the Public Place as shown and platted on the 1994 Supplemental Map of Thea Foss Waterway, of record in the offices of the Commissioner of Public Lands, said line to extend from the Inner Harbor line across Harbor Area and Waterway to the opposing Inner Harbor Line, together with those portions of the Harbor Area(s) and Public Place also lying southerly of said parallel line.
13. Aquatic lands in a portion of Commencement Bay within Section 33, T 21 N R 3 E. Beginning at the most southerly comer of Aquatic Lease #22-002658 being a point on the Inner Harbor Line, thence South 36° 32' 56" West, 319.42 feet along said Inner Harbor Line to the northeasterly boundary of Middle Waterway, thence along said waterway boundary North 30° 08' 26" West 263.66 feet to an angle point, thence continuing along said boundary North 67° 31' 18" East, 40.00 feet to an angle point, thence continuing along said boundary North 30° 08' 26" West, 300.00 feet to an angle point, thence continuing along said boundary North 67° 31' 18" East, 40.00 feet to an angle point, thence leaving the waterway boundary bearing North 67° 31' 18" East, 233.70 feet, more or less, to the southwesterly boundary of the aforementioned lease, thence South 27° 35' 58" East along said lease boundary 395.82 feet, more or less, to the Inner Harbor Line and the point of beginning.
14. USACE SOP 09-01 dated April 12, 2010 is the the vehicle for ensuring CERCLA coordination occurs between USACE and USEPA for §404 permits within Superfund Sites in Region 10. A list of authorized permitting actions can be found at https://www.nws.usace.army.mil/Missions/Civil-Works/Regulatory/Permit-Decisions-Appeals/
15. Congress authorized a federal navigation channel within the waterway in 1902. The federal project extends between harbor lines (pierhead/bulkhead lines) for a total distance of about 8,000 feet from the landward end to deep water at the mouth in Commencement Bay. The mudline elevations (MLLW) designated for navigation ranged from -29 feet MLLW (north of the 11th Street Bridge), to -22 feet MLLW (between the 11th and 14th Street Bridges), to -19 feet MLLW (from the 14th Street Bridge to the head of the Thea Foss Waterway).
16. The State of Washington, acting through the Department of Natural Resources (DNR), is the owner of the aquatic lands in the Thea Foss Waterway between the pierhead/bulkhead lines. These harbor areas are subject to leases between the property owner and DNR.

TABLE 2-15: OU 01 - MIDDLE WATERWAY SUMMARY OF IMPLEMENTED ICS

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Affected Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Sediment Caps	Yes	Yes	Regulated Navigation Area	Prohibits anchorage and other activities that could disturb the cap on the seabed	USCG RNA[1] 33 CFR 165.1329 January 2020

Note:

1. During the comment period for the Restricted Navigation Area (RNA) in April 2019, Anchor QEA LLC, on behalf of Foss Maritime, requested a waiver to the RNA for existing water activities.

TABLE 2-16: OU 01 - HYLEBOS WATERWAY SUMMARY OF IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Sediment Cap	Yes	Yes	R0321362032 R0321362033 R0321362037 R0321362038 R0321362053 P2003300000	Restricts activities that could disturb the cap	Restrictive Covenant March 2000

Confirmation needs to be made that the following ICs are in place:

- City of Tacoma Informational Handout to Developers
- Informational signs and navigational buoys and markers in the Thea Foss Waterway that notify mariners of vessel speed and size restriction and guide marine traffic

Legally enforceable ICs have not yet been developed and implemented for OU 01. The following ICs need to be implemented:

- Conservation Easement for Clear Creek Phase II Mitigation site
- Conservation Easement for Blair Waterway Slip 5 Mitigation site
- Environmental Covenant for Slip 1 NCDF
- Environmental Covenant for Pier 24/25 Embankment cap
- Environmental Covenant for the Arkema Embankment cap
- Environmental Covenant for the Arkema salt marsh area
- ICs for leaving contaminated sediment at depth in federally authorized navigation area

Operation and Maintenance

St. Paul Waterway

The 1989 ROD and 1991 CD required long-term monitoring to ensure protectiveness of human health and the environment. Appendix A of the 1991 CD provided the Monitoring, Reporting and Contingency Plan. Several years of monitoring have demonstrated that the contaminants are not migrating into the cap material. Due to the thickness of the cap and overlying habitat material (4 to 15 feet), further chemical monitoring was not deemed necessary.

In 1995, additional habitat material consisting of sandy gravel mixed with cobble was added in the area of Transect 5 of the sediment cap. This work placed about one foot of armored habitat material (approximately 1,650 cubic yards) on the existing sand cap, in an area roughly 300 feet long and 100 feet wide.

The CD was amended in 1999 to replace the Monitoring, Reporting and Contingency Plan with the Post Ten-Year Contingency Monitoring and Adaptive Management Plan. Monitoring of the cap is currently only required after a major storm (with winds from the north or southeast at 30 miles-per-hour or greater, which persists for more than four hours) or earthquake of significance occurs. Monitoring is tiered as follows:

- Intertidal transects survey coupled with a visual inspection will be conducted as soon as possible after the event.
- Bathymetric survey if the intertidal transects survey indicates the cap thickness in a particular location may not meet the CD minimum of three feet performance standard.
- Surface and subsurface chemistry may be conducted if the intertidal transects survey indicates the cap thickness in a particular location may be less than required.

A repair was made to the cap in 2003/2004 over a beach length of approximately 400 ft at Transect 4, where the cap had eroded, and material was deposited near the chip barge loading dock. Approximately 2,700 cubic yards of sandy material was removed from this area and placed back on the cap, returning it to its previous contours. An additional 2,600 cubic yards of sandy gravel mixed with cobble was placed over the sandy material for erosion protection. Additionally, three failing dolphins composed of creosote pilings near the southeastern edge of the cap were replaced with new steel pilings.

No operations and maintenance (O&M) activities have occurred since the last FYR as there have been no triggering events requiring O&M.

Because the current requirement of monitoring cap thickness is only triggered by the occurrences of storms with specific characteristics, no monitoring may occur within a specific FYR period, precluding EPA from having data to make a determination of protectiveness during the FYR. However, EPA conducted an inspection of the cap in 2019 and found that it was functioning as intended.

Sitcum Waterway

The OMM Plan for the Sitcum Waterway problem area, as adopted by the 1993 CD, provides requirements to determine the effectiveness of contaminated sediment removal (dredging), confirm natural recovery in appropriately designated areas, evaluate the success of the remedy, evaluate the effectiveness of the Milwaukee NCDF structure, evaluate the success of the habitat enhancement and fisheries mitigation, and confirm the attainment of cleanup objectives.

The operations, maintenance and monitoring activities associated with the Sitcum Waterway Remediation Project are described in the following documents:

- The OMMP for the Sitcum Waterway Remediation Project (Hart Crowser 1994)
- Clear Creek Habitat Improvement Project OMMP (Port of Tacoma 1995)

The only remaining requirements for this area of the CB/NT Site are maintenance of the Milwaukee Nearshore Disposal Facility with associated long-term monitoring of groundwater, and maintenance of the Milwaukee Nearshore Disposal Facility and long-term maintenance of the Milwaukee Habitat Area and Phase I of the Clear Creek Habitat Improvement Project.

Monitoring at the Milwaukee Nearshore Disposal Facility is conducted once every five years, the most recent monitoring event was conducted in March 2018. The OMMP for this groundwater monitoring is outdated and does not meet the requirements outlined in the 1993 CD.

Monitoring and maintenance of the Milwaukee Habitat Area and Clear Creek Habitat Improvement Project is conducted annually through the Port's Stewardship Program. The annual reporting by the Port's Stewardship Program is insufficient to determine if this program is adequate to ensure the habitat areas continue to perform in the long-term to meet the required performance standards.

There is no LTMP for the habitat areas. A LTMP is needed to ensure the long-term performance of the habitat areas.

Thea Foss and Wheeler-Osgood Waterways

Head of Thea Foss and Wheeler-Osgood Waterways

EPA approved the City of Tacoma's 10-year OMMP for the Mouth of Thea Foss and Wheeler-Osgood Waterways in 2006. The sampling program includes the following:

- Monitoring of capped, ENR, and MNR areas to evaluate the long-term effectiveness of the remedial actions and progress toward natural recovery;
- Monitoring cap integrity through low tide inspections and hydrographic surveys to ensure that the sediment caps remain intact;
- Source control monitoring to evaluate the potential for recontamination of remediated areas;
- Monitoring to evaluate the post-construction recovery of benthic organism communities;
- Groundwater monitoring in the vicinity of the St. Paul CDF to ensure contamination is effectively contained within the disposal facility; and
- Monitoring the condition of habitat established within the project area and to confirm that mitigation sites are providing the functioning habitat necessary to meet site-specific objectives.

All O&M activities were completed in 2016. EPA approved a Long-term Monitoring Plan (LTMP) in 2018 that replaced the OMMP. Continued monitoring of benthic recolonization, ENR and MNR was approved by EPA to be discontinued as the prior 11 years of monitoring showed that the remedy was operating and functioning as designed. The City of Tacoma conducted the first monitoring event under the LTMP in 2018 and reported the following findings:

- The SQOs identified in the CB/NT ROD have now been achieved within MNR areas.
- The SQOs identified in the CB/NT ROD have now been achieved within ENR areas.
- The hydrographic survey of subtidal caps identified limited areas where cap surface elevation has decreased, no response is proposed at this time.
- Shoreline caps have largely remained intact and stable. Some grout mat areas in need of minor repairs were identified and work was completed in 2018. Repairs are also proposed for areas of the shoreline slope cap above the apparent high-water line.
- Ongoing source control efforts within the drainage basin have been successful in substantially reducing or eliminating the contaminant load to these waterways.
- The results of groundwater monitoring of the St. Paul CDF indicate concentrations are consistent with baseline conditions pre-dating the CDF construction.
- Habitat mitigation and enhancement areas appear mature and are continuing to provide their desired function and objectives as intertidal habitat areas.

Head of Thea Foss Waterway

In 2003, a 10-year OMMP for the Head of Thea Foss Waterway was approved and implementation began in 2004 with baseline monitoring. Monitoring requirements included sediment sampling to ensure contaminants were not migrating through the cap and the cap was not being recontaminated from on-going sources, sediment profile imagery to ensure that the cap material was remaining in place, and sampling of the benthic macroinvertebrate population to ensure that the benthos was recolonizing.

The 10-year plan of O&M activities was completed in 2013. Results of surface sediment samples indicate that SQOs identified in the CB/NT ROD have been met for all COCs except for DEHP, which is a known ongoing urban and waterway operational contaminant. Ongoing source control efforts within the Thea Foss and Wheeler-Osgood Waterways drainage basin have been successful in reducing or

eliminating the contaminant load to these waterways. The shoreline and sediment cap were functioning as designed and there was no observed sheen from the gas bubbles. From 2015 through 2017, the Utilities voluntarily conducted low-tide visual inspections of the Head of the Waterway and submitted annual reports to EPA.

EPA approved a 20-year LTMP in 2018 that requires cap integrity and recontamination monitoring (contaminant migration through cap). The Utilities conducted the first monitoring event under the LTMP in 2018 and reported the following findings:

- The caps are all performing as designed and additional sediment is accreting on the cap from the stormwater outfalls.
- The sheet pile wall and rock buttress were in good condition.

The Utilities and EPA jointly conducted a low-tide visual inspection in May 2019 and observed that the wing walls around outfall #235 were separating and the capped area around the apron was eroding. The City of Tacoma (owner of the outfall) was notified in June 2019 and is planning to have a structural engineer inspect the outfall. Additionally, an area on the western shoreline just north of the SR-509 bridge was observed to be missing armoring, and an indentation may have been the result of a floating structure striking the shoreline. The Utilities repaired the area in June 2019.

Hylebos Waterway

Head of Hylebos Waterway

A revised draft of the Head of Hylebos Waterway OMMP (OMMP 1) was submitted in 2006 but never approved by EPA. The OMMP included the following monitoring requirements:

- Monitoring of SMA 102, a 0.2-acre area located beneath the Weyerhaeuser dock in the upper turning basin of the waterway, for natural recovery purposes.
- Habitat Monitoring to observe the condition of the material placed within the TZGM area and assess habitat function, observe and assess the relocated saltmarsh, and verify placement of large woody debris along the beach for habitat mitigation.

Although EPA did not approve the OMMP, the HHC Group proceeded with the proposed monitoring anyway. In 2008, all OMMP requirements were achieved and no further monitoring was required at that time.

Arkema Inc. submitted an OMMP (OMMP 2) in 2006 for the capping elements of remedial actions on its southeast shoreline. EPA has not approved this OMMP and explained in a letter to Arkema that the cap was not designed to treat dissolved arsenic. Cap construction was approved by EPA with the written understanding that source control at the Arkema property still remains to be accomplished, and that cleanup of the Arkema property to EPA's satisfaction will need to occur before Remedial Action certification under the CD, as described in EPA's cap approval letter. The lack of an OMMP and regular monitoring of the cap has led to the failure to regularly assess and address performance of the cap. In August 2019, Ecology and the Port visually inspected the cap at low tide and observed apparent bank sloughing along the Arkema southeast shoreline a couple of feet above the water line isolated to the intertidal cap. The Port is currently evaluating the appropriate repairs. An OMMP plan for regular inspections and maintenance will be required per Section III.A of the SOW.

Even though the 2004-2006 post-dredging confirmation sampling showed that all contaminants were below the SQOs identified in the CB/NT ROD and the remedial action objective was achieved in this

problem area, EPA wanted information to show that ongoing sources were not recontaminating this area of the Site. A pre-OMMP Sediment Sampling and Analysis Plan (SAP) submitted by the Port[6] (on behalf of Arkema) and General Metals was approved by EPA in December 2011, and surface sediment data was collected in 2012. A subsequent SAP, approved by EPA in August 2017, was designed to determine current surface sediment chemical concentrations in a manner that allows for direct comparison to the concentrations collected in 2012, as well as to the post-dredging confirmation sampling data collected 2004-2006, and sampling was conducted in 2017.

In 2012 and 2017, PCBs were the only contaminant that exceeded the SQOs identified in the CB/NT ROD; all other contaminants were either non-detect or detected at concentrations below the cleanup goal. The 2004-2006 dredging effort removed all contaminated sediment and post-dredge confirmation samples for PCBs were all less than 115 µg/kg. However, in 2012, PCBs were detected at three stations with concentrations greater than the cleanup goal of 300 µg/kg and in 2017 two stations were greater than the cleanup goal. The stations that exceeded the cleanup goal in 2012 were different than the stations that exceeded in 2017. The higher concentrations observed in the 2012 and 2017 sampling may be indicative of an ongoing PCB source to the waterway.

The Head of Hylebos CD incorporated the 2000 Sediment Post-Removal Site Control Plan for the General Metals cap. Four monitoring events for sediment quality and physical integrity of the cap were identified at specific intervals over a 10-year period, with an evaluation of the need for further monitoring to take place at the completion of the initial 10-year period. Monitoring of the cap indicated that it was performing as intended; however, no monitoring has occurred since 2010. A LTMP is needed to ensure the integrity and long-term performance of the cap.

Mouth of Hylebos Waterway

The Mouth of the Hylebos Waterway (Segments 3, 4, and 5) OMMP was approved in October 2015, and an OMMP Addendum was approved in 2019. The first sampling event took place in 2015 with future sediment monitoring frequency and locations to be determined from that initial sampling event. However, there is currently no requirement to conduct further sediment monitoring. Monitoring of Segments 3, 4, and 5 included the following:

- Sediment chemical monitoring of surface sediment (top 10 cm) in MNR areas to verify the effectiveness of natural recovery in reducing surface sediment concentrations of COCs over time.
- Sediment chemical monitoring in surface sediment throughout this area to determine the effectiveness of source control.
- Groundwater monitoring at the Blair Waterway Slip 1 NCDF to ensure contaminants from the NCDF are not migrating to adjacent surface waters.

Sediment chemical monitoring occurred in 2016. Data for the 2016 sampling event was compared to the baseline data. The majority of the data demonstrate that the SQOs were either achieved post remediation or in 2016. The 2016 data also demonstrate that the contaminant concentrations have decrease or remain stable; none of the data show significant increases in concentrations. However, the data report for the 2016 sampling event indicated that five stations exceeded one or more of the SQOs identified in the

[6] The Port of Tacoma has purchased the Arkema property at the Head of the Hylebos Waterway and is performing cleanup actions required by Arkema.

CB/NT ROD for the following contaminants: PAHs, benzyl alcohol, hexachlorobutadiene, and PCBs. In 2019, samples were collected from these five stations (Figure 2-17), and hexachlorobutadiene was the only contaminant that exceeded the SQOs identified in the CB/NT ROD at two stations. Subsequent bioassay tests with samples from these two stations passed. However, all stations were not resampled in 2019. As this is not a static system, there is insufficient information to determine whether or not this area of the Site meets performance standards and the adequacy of source control actions.

Groundwater samples were collected at the Slip 1 NCDF in October 2016, and in February, May, and August 2017. Copper was detected in samples from monitoring well MW8S. Concentrations ranged from 3.52 to 4.25 ug/L over the four sampling events, which is greater than the Marine Water Quality Criteria of 3.1 ug/L. Additional sampling is being conducted in 2019 and 2020.

The Pier 24/25 OMMP was approved in July 2016. Monitoring of the Pier 24/25 cap was to consist of:

- Video surveillance at five-year intervals to assess subtidal cap areas that remain permanently submerged.
- Bathymetric surveys at five-year intervals to identify and quantify deposition, consolidation, and/or erosion areas relative to the 2008 baseline.
- Annual low tide visual inspections to assess changes in condition of pertinent physical features of the cap.
- Chemical monitoring of in surface sediment 2016, and of surface sediment and pore water in 2021 and 2026 to assess whether contaminants are migrating through the cap.

The video surveillance monitoring occurred in 2016 using a remotely operated vehicle (ROV). No signs of damage, cracking, buckling, or significant cap erosion were observed in real-time during the ROV transect surveillance. The upper extent of the cap surface showed little depositional sediment although greater sediment deposition and debris was observed further downslope. The next video surveillance is to occur in 2021.

Bathymetric surveys occurred in 2016 and 2017. The 2016 bathymetric surface shows relatively consistent slopes, indicative of cap stability. The 2016 survey was compared to the 2008 as-built survey to determine increases and decreases in elevation. Some decreases in elevation were noted on the upper and lower edges of the survey and throughout the area under Pier 25. The majority of the area between Piers 24 and 25 has decreased in elevation. A comparison of the 2017 survey to the 2016 survey shows further decreases in elevation under Pier 25. The elevation changes depicted in the comparisons to the bathymetric surveys was not corroborated by the under-pier visual and subtidal video inspections. This discrepancy may be a reflection of the precision and accuracy limitations of the under-pier survey methodology. The next bathymetric survey is to be conducted in 2021. It is recommended that this methodology be revisited by EPA and the Port to determine whether this is an appropriate means to survey the cap to ensure the appropriate cap thickness is maintained or some other method should be employed.

Visual monitoring of the cap occurred in 2016, 2017, 2018 and 2019 during low tides; EPA attended the 2017 and 2019 monitoring inspections. The visual observations and photo documentation do not corroborate the findings of the bathymetric survey (i.e., loss of cap material) and calls into question the adequacy of that type of survey in this area. The visual observations of area of cap above the waterline during the inspection indicate is performing as designed and is continuing to achieve the performance standards. The next low tide visual monitoring event is to occur in 2020.

Chemical monitoring of surface sediment was attempted in 2016, but there were insufficient fines to collect samples in the intertidal areas. This was also observed by EPA in 2017 and 2019. Subtidal surface sediment samples were collected and analyzed for metals (arsenic, copper, mercury, and zinc), total PCBs, hexachlorobutadiene, and PAHs (dibenz(a,h)anthracene, fluoranthene, and phenanthrene). Only PAH concentrations at Stations SS-04, SS-07, and SS-08 exceeded SQOs identified in the CB/NT ROD. While not a COC for this area, dibenzofuran exceeded the SQO at Station SS-03. The PAH and dibenzofuran fingerprints observed in surface sediment samples collected from these stations match weathered creosote materials, which is a known source in this area. Since surface sediment sampling is only predictive of ongoing sources rather than cap performance, these exceedances are likely attributed to degraded creosote pilings in the area. The Port is actively replacing these piles with treated wood piles as they fail structural integrity. Chemical monitoring of pore water in 2016 was conducted by the Occidental Chemical Corporation Tacoma Site. The results show relatively low concentrations of arsenic and total polychlorinated biphenyl (PCB) corroborating the accuracy of cap model predictions. Therefore, no porewater sampling is required in year 2021/2026 assuming no substantive increasing trend in arsenic and total PCB concentrations. The chemical monitoring required by the OMMP does not provide adequate information to assess the cap performance relative to upward migration of contaminants contained below the cap. It is recommended that EPA and the Port discuss and implement appropriate monitoring methods to determine cap performance.

The OMMP for the Blair Waterway Slip 5 Mitigation site was provided in the Exhibit B and D of the 2000 Terminal 3/4 Northern Expansion Project Post-Project Habitat Mitigation Monitoring Manual. EPA approved the final monitoring report for the Blair Waterway Slip 5 mitigation site in 2012. Monitoring was required for a period of 6 years and included:

- Physical monitoring consisting of acreage by habitat type, changes in bathymetric contours, substrate characterization and photo points conducted in spring or summer for Years 0 (2004), 1, 2, 3, 4 and 6;
- Biological monitoring of epibenthic plankters and juvenile salmonids in Spring for Years 1, 3 and 6; and
- Biological monitoring of avifauna quarterly in Years 1, 3, and 6.

On May 17, 2013, EPA approved the final monitoring report that shows the Slip 5 Mitigation site is meeting performance standards. A LTMP needs to be developed and implemented to ensure the site continues to meet the required performance standards.

The OMMP for the Clear Creek Phase II Habitat Improvement was provided in the 2000 Terminal 3/4 Northern Expansion Project Post-Project Habitat Mitigation Monitoring Manual. The original 6-year monitoring program was completed in 2009. The requirement to provide riparian vegetation was not met, as the planted riparian areas along Clear Creek upstream of the Phase II habitat site had become overrun with invasive species by 2009. These were removed and the area was replanted, and annual monitoring of the area was conducted through 2013. In 2013, the Port submitted the final monitoring report for the 6-year monitoring program and unilaterally determined the project could be moved to its stewardship program even though the performance standards had not been strictly met. Several rounds of comments and responses were exchanged between EPA and the Port between 2013 and 2015, but the document was never approved by EPA. The CD for the Mouth of the Hylebos requires a pre-certification inspection to determine whether performance standards have been met. A site visit was held on May 21, 2013 between EPA, Port of Tacoma, and USACE and EPA determined the all performance standards had not yet been met. EPA conducted another inspection in fall of 2018 with the Port. EPA

noted areas where performance standards have not been met, primarily due to overspray of herbicides by the adjacent railroad track and required plantings of additional trees, which were planted later in 2018. A follow-up inspection has not been scheduled. Once performance standards have been achieved, a Long-term Monitoring and Maintenance Plan will be required to ensure long-term protection of this mitigation site.

Middle Waterway

Monitoring pursuant to the OMMP for Middle Waterway problem areas A and B and additional monitoring required by EPA during reviews of the monitoring reports occurred in years 0, 3/4, 5, 8, and 10 and included chemical monitoring of MNR and ENR areas to ensure that cleanup goals were achieved within 10 years, and surveys of capped areas to ensure that the caps were performing as designed. Chemical monitoring of the material that accumulated over the caps was also performed if the thickness of the material was greater than 2 cm. Monitoring of surface sediment in the dredged area was done to ensure that this area was not recontaminated from ongoing sources and confirm that sources were controlled. All required monitoring of the OMMP has been conducted and the performance measures have been achieved. A LTMP was submitted to EPA in 2019 and is currently under review. This document will be needed for the capped areas to ensure they are protective in the long-term.

Monitoring in Area C at SMUs 51a and 51b pursuant to the 2005 OMMP took place over a period of 5 years. The performance objectives were to verify that near surface backfill, and capping materials had not been recontaminated. Monitoring activities included:

- Visual Inspections of exposed intertidal areas for signs of erosion.
- Surveys to determine relative sediment elevation at selected mudflat locations relative to the baseline established in October 2004
- Sampling and analysis of surface sediments.
- Qualitative evaluation of intermixing of surficial backfill in SMU 51a and thin layer capping materials in SMU 51b with underlying sediments.

All required monitoring of the OMMP has been conducted and the performance measures have been achieved, and no further monitoring is required.

2.3.2 OU 05 Source Control

Remedy Implementation

In 1992, EPA released the Source Control Strategy Report that describes the methods that are currently being used to identify and control contaminant sources at the CB/NT site. The following five milestones were developed for tracking and reporting source control efforts for each problem area:

- **Milestone 1—Ongoing Confirmed Sources Identified:** Milestone 1 is achieved when all confirmed ongoing sources of problem chemicals are identified for a problem area.
- **Milestone 2—Essential Administrative Actions in Place for Major Sources:** Milestone 2 is achieved when essential administrative actions (permits, orders, decrees) are in place for major sources of problem chemicals in each problem area.
- **Milestone 3—Essential Remedial Action Implemented for Major Sources:** Milestone 3 is achieved when essential remedial actions (construction, BMPs, soil removal) have been implemented for all major sources in a problem area. Essential remedial actions are those physical changes that represent elimination and/or reduction, to the extent practicable, of those contaminant sources that are most directly linked to existing sediment impacts.

- **Milestone 4—Administrative Actions in Place for All Sources:** Milestone 4 is achieved when administrative actions are in place for all confirmed ongoing sources of problem chemicals to a problem area.
- **Milestone 5—Remedial Action Implemented for All Sources:** Milestone 5 is achieved when remedial actions have been implemented for all ongoing sources of problem chemicals to a problem area.

Ecology provided reports to EPA when each milestone for source control was achieved.

St. Paul and Blair Waterways

Milestone Reports were not required to be conducted for these waterways. Sources that drained only to the St. Paul and Blair Waterways were deleted from the NPL in 1996 because cleanups had either been completed in these areas or studies had indicated that no contamination requiring cleanup was present.

Sitcum Waterway

Milestone Reports 1 through 5 were completed by Ecology and all sources in the Sitcum Waterway were controlled by 1994, and all RA construction activities were completed by 1998. In 2017, the Sitcum Waterway and sources draining only to that waterway were deleted from the NPL.

Thea Foss Waterway and Wheeler-Osgood Waterway

Milestone Reports 1 through 5 were completed by Ecology and EPA was notified that source control is complete for all identified sources of problem chemicals to the Mouth of the Thea Foss Waterway in 1999, the Wheeler-Osgood Waterway in 2000, and the Head of the Thea Foss Waterway in 2003. Ecology continues to conduct periodic reviews of D Street Petroleum and American Plating; D Street Petroleum continues to monitor groundwater contamination. Ecology is currently overseeing cleanup actions at Standard Chemical, Tacoma Coal Gas site, and Nustar/Superior Oil.

An additional action was taken by Ecology in 1997 at 1114 Dock Street to remove contaminated embankment fill and disposed at an upland landfill. Residual contamination was capped. Ecology continues to conduct periodic reviews of this cleanup action.

Hylebos Waterway

Milestone Reports 1 through 5 were completed by Ecology and EPA was notified that source control is complete for all identified sources of problem chemicals to the Mouth of the Hylebos Waterway and the Head of the Hylebos Waterway in 2000. Groundwater monitoring is being conducted at 3009 Taylor Way Log Sorting (Atofina) and B&L Landfill to determine whether they meet performance standards. Long-term groundwater monitoring is being conducted at Kaiser Aluminum, General Metals, Wasser Winters Log Sorting Yards, Louisiana Pacific Log Sorting Yards, and Tacoma Boat and Ecology conducts periodic reviews of these sites.

Source control is not complete at the former Arkema site. Arsenic is leaching to groundwater and discharging to the waterway. Ecology entered into a MTCA Agreed Order with the Port of Tacoma in 2011 to replace the pre-MTCA enforcement order with Arkema, and effectively released Arkema from state liability. Ecology is working with the Port to develop a feasibility study for the upland source area.

Sediment samples were collected from the edge of the General Metals cap in early 2009. Zinc was detected as concentrations greater than the cleanup goal; further sampling is planned to determine the reason for these detections.

Cleanup of the upland portion of the Occidental Site is being conducted under an Administrative Order on Consent (AOC) amended in 2005 to specifically include CERCLA and RCRA cleanup provisions. This amended AOC includes the remaining portions of the non-time critical removal actions (Area 5106 and Embankment Area), and it also serves as the substance of an updated Ecology RCRA corrective action permit. Ecology is currently working with Occidental to finalize a MTCA Corrective Action Order to implement a groundwater and soil/vapor monitoring plan as well as a draft Cleanup Action Plan for the contaminated groundwater.

Since the last FYR, Ecology discovered that arsenic-contaminated groundwater is leaking into storm drains and discharges at Lincoln Avenue into Hylebos. The sources of this contamination include USG, Arkema, and Superlon. Ecology is currently working clean up these sites.

Middle Waterway

Ecology identified Marine Industries Northwest, Inc. (MINI) as the only major contaminant source to the Middle Waterway at the mouth of the waterway. Milestone Reports 1 through 5 were completed by Ecology and a Source Control Completion Report was issued in December 2000 documenting that all Milestone criteria were met. MINI leased property from Foss and is no longer operating in the waterway. Foss is currently conducting active voluntary cleanup under Ecology oversight at the property for soil and groundwater contamination discovered after the original cleanup.

Institutional Controls

ICs for OU 05 include NPDES permits and upland restrictive covenants. Table 2-17 presents those ICs that are known to be in place. Location of Port of Tacoma owned stormwater outfalls in the Hylebos, Blair and Sitcum Waterways is presented in Figure 2-18. Additional confirmation of all ICs for OU 05 needs to be coordinated with Ecology.

TABLE 2-17: OU 05 - SUMMARY OF IMPLEMENTED NPDES DISCHARGE ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Affected Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Foss Maritime Co. NPDES Permit	Yes	No	Middle Waterway Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0040444 July 2009 State Waste Discharge Permit #ST0006175 July 2009
West Rock NPDES Permit	Yes	No	St. Paul Cap	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0000850 Modified March 2014
City of Tacoma NPDES Permit	Yes	Yes	Thea Foss Waterway Sediment	Regulates discharges of contaminants in stormwater from City of Tacoma Outfalls	Phase I Municipal Stormwater Permit August 2019

TABLE 2-17: OU 05 - SUMMARY OF IMPLEMENTED NPDES DISCHARGE ICs					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Port of Tacoma NPDES Permit	Yes	No	Blair and Hylebos Waterway Sediment	Regulates discharges of contaminants in stormwater from Port of Tacoma Outfalls	Phase I Municipal Stormwater Permit WAR044200 August 2019
SeaPort (Targa) NPDES Permit	Yes	No	Hylebos Waterway Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0003204 Modified June 2018
Pacific Functional Fluids (Lilyblad) NPDES Permit	Yes	No	Blair Waterway Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0038679 Renewal September 2016
Silver Cloud Inn NPDES Permit	Yes	No	Commencement Bay Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0041084 January 2014 Modification February 2015
Shore Terminal NPDES Permit	Yes	No	Thea Foss Waterway Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0039501 May 2014
Phillips 66 Co Tacoma North NPDES Permit	Yes	No	Thea Foss Waterway Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0000728 August 2014 Modification February 2016
McFarland Cascade Pole NPDES Permit	Yes	No	Puyallup River Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0037953 August 2014

TABLE 2-17: OU 05 - SUMMARY OF IMPLEMENTED NPDES DISCHARGE ICs					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
B&L Woodwaste Landfill NPDES Permit	Yes	No	Hylebos Waterway Sediment via Hylebos Creek	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0040321 Modification May 2015 Reissued October 2016
Graymont Western US Inc. NPDES Permit	Yes	No	Blair Waterway Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0001007 October 2016
Occidental Chemical Corp. NPDES Permit	Yes	No	Hylebos Waterway Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0037265 November 2016
Schnitzer Steel of Tacoma NPDES Permit	Yes	No	Hylebos Waterway Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0040347 August 2009
Motive Power Marine Shipyard NPDES Permit	Yes	No	Blair Waterway Sediment	Regulate discharge of wastewater effluent and stormwater discharged to waterway sediment	NPDES Permit #WA0041106 March 2018

TABLE 2-18: OU 05 - SUMMARY OF UPLAND IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Impacted Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
General Metals Upland Cap	Yes	Yes	0321363032 0321362033 0321362037 0321361038 0321362057	Restrict land use to protect upland remedy	MTCA Environmental Covenant June 2015

Operation and Maintenance

The City of Tacoma has an extensive stormwater monitoring program that has been in place under EPA and Ecology oversight since 2001. The Thea Foss Waterway CD requires stormwater outfall monitoring

of seven outfalls in the Thea Foss Waterway. The program is also a requirement of their Phase I Municipal Stormwater Permit (Permit No.: WAR044003). Monitoring included the collection of event-based composite and grab samples for chemical analysis as well as annual sediment samples for chemical analysis.

Water quality enforcement actions have been taken by Ecology at the following sites:

- Sunset Estates
- BNSF Tacoma Yard
- Tri Pak 3
- McFarland Cascade Pole & Lumber Co.
- USF Reddaway Inc. Tacoma
- Pacific Northwest Terminals, Inc.
- Tacoma Silver Cloud Inn LLC
- Walsh Trucking Co. Ltd. Tacoma
- Calbag Metals Co. Marine View Dr.
- Tacoma City General Svcs Fleet Div Shop 1
- Port of Tacoma Parcel 27
- Weyerhaeuser Tef
- SCS Supply Chain Solutions
- South Intermodal Yard
- Devonshire
- APM Terminals Pacific Ltd.
- Point Defiance Waterfront Phase 1
- Husky Terminal & Steve Doring Inc.
- IPT Tacoma Logistics Center
- Court C Apartment Kissler Management
- Arclin Surfaces Inc.
- Port of Tacoma
- First Student Inc. Tacoma
- Tacoma Link Extension
- WM Dickson Co. Waller Rd. Pit
- Temco

2.3.3 OU 01 Sediment and OU 05 Source Control Removal Actions

2.3.3.1 Puyallup Land Claim Removal Actions

The Port entered into a CD with EPA and the Tribe as Intervenor in 1995. The CD describes the obligations and responsibilities that the Port and the Tribe have regarding environmental cleanups and long-term monitoring at six properties within the CB/NT Site, which were transferred from the Port to the Tribe.

Two Port mitigation actions performed under this CD are within the Mouth of Hylebos problem area. The Tribe, the Port, and EPA developed a 2012 Contingency Plan in response to EPA identifying work that had not been completed as required by the 1995 CD. The Contingency Plan presents mitigation

actions at two locations to address a shortfall of intertidal wetland mitigation credit at the Outer Hylebos Mitigation Site, which was constructed pursuant to the 1995 CD. Puyallup Land Transfer CD Contingency Plan was approved by EPA in 2012 for two mitigation sites in the Hylebos Waterway: the Hylebos Peninsula Mitigation Site (0.68 acre), and the Outer Hylebos Mitigation Site (0.42 acre). The Tribe constructed both mitigation sites in 2012. As-built drawings were provided in December 2012; however, the EPA has not received the technical memorandum for the As-Built Report.

Remedy Implementation

Inner Hylebos Property

The buried fuel tanks at the former service station were removed in 1988. Site rehabilitation and cleanup, including removal of wood and concrete structures, an above-ground diesel fuel tank, oil-contaminated soil, and upland wood debris were completed in 1990 by Foss Maritime Co., Inc. (Foss), the Port's former tenant at the site. In July 1991, log-banding cables and decomposing bark and wood were removed from areas exposed above -3.5 ft MLLW in the intertidal area adjacent to the Log Yard uplands. In 1991, EPA issued a UAO to the Port of Tacoma to perform remove oily soil/sawdust and buried crushed drums on the Peninsula and auto refuse material along East 11th Street. In 1992, a remedial investigation report concluded that no further action was required. The contaminated sediment offshore of this property (SMA 123) was included in the remedial action for the Mouth of Hylebos (see Section 2.3.1.4). All sediment in areas where contaminant concentrations exceed the cleanup goals was removed, and EPA approved the RACR in August 2011.

Upper Hylebos Property

In 1991, an investigation report provided sufficient information to determine that cleanup of this property was not required.

Taylor Way Property

In 1996, EPA deleted the upland property from the National Priorities List (NPL) because all required cleanup had been completed in this area.

The sediment cleanup offshore of the Taylor Way Property (SMA 421B) was included in the Mouth of Hylebos cleanup action (see Section 2.3.1.4). In 2004, approximately 90,000 cubic yards of sediment was removed and disposed of in the Slip 1 NCDF.

East-West Road Property

In 1996, EPA deleted this property from the National Priorities List (NPL) because all required cleanup had been completed.

Blair Waterway Property

In 1996, EPA deleted this property from the National Priorities List (NPL) because all required cleanup had been completed.

Blair Backup Property

The Port cleaned up this property in 1993 by excavating approximately 4,100 cubic yards of charcoal briquette-laden soil and backfilling the excavation and placing that material along with the 14,600 cubic yards of Blair Waterway property slag/soil, 850 cubic yards of sandblast grit-contaminated soil, and 80 cubic yards of Weyerhaeuser Ditch sediments on a 7-acre portion of the property. This material was placed on a 6-inch buffer of sand and gravel and then covered with 6-inches of crushed rock, 3 inches of

asphalt with a central paving fabric, and topped with additional 8 inches of crushed rock. The remaining 10 acres of the property was covered with 2 feet of sand and gravel. Construction was completed by the Port of Tacoma in January 1994.

In 1996, EPA deleted this property from the National Priorities List (NPL) because all required cleanup had been completed.

To compensate for the loss of intertidal estuarine habitat as a result of filling of the Lincoln Street ditch in 1995, the Outer Hylebos Mitigation site was constructed, but for the most part it proved unsuccessful. EPA approved the Contingency Plans for the Hylebos Peninsula Mitigation Site and the Outer Hylebos Mitigation Site in 2011. The Puyallup Tribe constructed both mitigation sites in 2012. As-built drawings were provided in December 2012; however, the EPA has not received the technical memorandum for the As-Built Report.

Institutional Controls

Legally enforceable ICs have not yet been developed and implemented for the Puyallup Land Claim properties. The following ICs need to be implemented:

- Covenant on the Blair Backup property (Parcel #5000350090) for the capped area and to restrict groundwater use.
- The Port and Tribe have proposed that the Tribe designate the mitigation sites as "Conservancy" and that the Tribe take action, under Tribal law, to protect them.

Operation and Maintenance

The groundwater monitoring program was developed as part of the 1993 cleanup plan for the OFA/Pennwalt Area. Groundwater compliance monitoring conducted by the Port of Tacoma at the Blair Backup Property is required to demonstrate that groundwater quality on the site is not being affected from contamination under the on-site capped material. In general, the groundwater compliance program consists of comparing baseline OFA/Pennwalt Area groundwater quality data to post-placement groundwater quality results. Eight rounds of post-closure monitoring were conducted in April and October of each year from 1994 through 1997. In May 1998, the groundwater compliance monitoring program was revised to reflect the need for less frequent but longer-term monitoring. Groundwater was monitored annually in 1998-2000, and then every other year from 2002 through 2018.

The performance and monitoring requirements for the mitigation sites associated with Puyallup Land Claim properties was included in the 2011 Outer Hylebos Mitigation Site Contingency Plan. EPA has an Interagency Agreement with the USACE to evaluate the performance of the two mitigation sites. The USACE has conducted annual inspections since 2013. The most recent field inspection was conducted in July 2019 and the following issues were noted:

- Two out of the three upland areas in the Outer Hylebos area were cleared in 2018 and the majority of installed tree and shrubs in the remaining eastern upland area have died. This area needs to be replanted with native upland trees, shrubs, and woody ground cover and protected from future human use.
- On the Hylebos Peninsula, rope webs intended to keep geese out are down and need to be repaired or removed, and trash is present within the marsh and surrounding uplands.

In addition, a LTMP and associated ongoing annual monitoring and maintenance will be necessary for the removal of trash and invasive species to ensure long-term protection of this mitigation site.

2.3.3.2 General Metals Removal Action

Remedy Implementation

General Metals entered into an AOC in October 1998 for construction of the cap located beneath the General Metals dock (SMA 232). This work was completed in 1999. Minor repairs were required in 2001 after a docked ship damaged several pier pilings located within the cap footprint. While no significant damage was done to the cap, new pilings were put in and additional cap material was placed around the new pilings. In 2007-08, a remedial action to remove scrap steel along the cap toe berm caused minor damage, which was repaired in early 2009.

Institutional Controls

The AOC required implementation of necessary ICs to ensure the long-term effectiveness of the cap and maintenance of the cap. In 2004, this requirement was incorporated into the Head of Hylebos Remedial Design and Remedial Action CD (see Section 2.3.1.4).

Operation and Maintenance

Cap monitoring was initiated under the 2000 Sediment Post-Removal Site Control Plan. Monitoring included both physical integrity and sediment quality monitoring. Data collected from years 0-10 indicated that cap thickness remained within design limits. The General Metals Cap Post-Removal Site Control Plan calls for sediment quality sampling if an increase in thickness indicates that significant new sedimentation has occurred. The remaining long-term monitoring of the cap was incorporated into the Head of Hylebos Remedial Design and Remedial Action CD in 2004.

2.3.3.3 Olympic View Resource Area Removal Action

Remedy Implementation

Pursuant to a 2001 AOC, the City of Tacoma performed a non-time-critical removal action to address approximately 3 acres of contaminated marine sediments at OVRA. EPA's Action Memorandum was signed in July 2001, and the removal action took place in 2002 and encompassed 2.3 acres. Approximately 600 wooden piles and 11,438 tons of contaminated sediment and debris were removed from the nearshore area and disposed of in an off-site upland landfill. Approximately one acre of marine sediments was capped with clean material. EPA approved the Removal Action Completion Report in March 2003.

Institutional Controls

Table 2-19 provides a summary of the implemented ICs associated with the OVRA action.

TABLE 2-19: OU 01 – OVRA SUMMARY OF IMPLEMENTED ICs					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Sediment Cap	Yes	Yes	Regulated Navigation Area	Prohibits anchoring and other activities that could disturb the cap on the seabed	USCG RNA 33 CFR 165.1329
Sediment Cap	Yes	Yes	OVRA Project Area	Protect this area from further commercial use and potential development or commercial leasing	DNR Environmental Reserve[1] May 2004
Sediment Cap	Yes	Yes	DNR Lease Area #22-A02787	Maintain access and control over the capped areas	30-year DNR Aquatic Lands Lease #22-A02787 May 2002 Amended January 2006
Sediment Cap	Yes	Yes	OVRA Cap Area	Limit disturbance by the general public, and establishing offshore buoys per Coast Guard requirements to prohibit mooring or anchoring	Informational Sign[2] and offshore buoys January 2004

Notes:

1. DNR withdrawal of the OVRA project area from leasing under RCW 79.90.460.
2. The signs describe the cleanup action, show a map of the capped areas, and provide contact information.

Operation and Maintenance

EPA approved the Final Long-term Monitoring and Reporting Plan (LMRP) for the OVRA In 2003. The goals are to ensure that the selected cleanup action continues to be protective of human health and the environment. The specific objectives are:

- The sediment cap continues to isolate contaminants in underlying sediments from marine biota and other biological receptors.
- The sediment cap is not recontaminated with COCs from underlying sediments.

The LMRP describes the physical integrity and sediment monitoring and associated performance standards that apply to the site. It also details the process for contingency planning and response in the event that performance standards are not met. After five years of monitoring, results confirmed the continued success of the removal action at the OVRA and long-term monitoring was completed in 2007.

In the Year 5 Annual Monitoring Report for 2007 monitoring, the City of Tacoma recommended annual visual inspections of the site with subsequent electronic mail reports to support the EPA's FYR reporting. During the visual inspection performed in August 2015, it was noted that some substrate

materials on the beach appeared to have shifted, and exposed remnants of filter fabric were present in some areas. Additional land-based surveys were performed in October 2015 and May 2016 to determine the extent to which cap material thicknesses might have changed. The surveys showed the caps in Areas A and C5 have experienced erosion at levels exceeding the performance standards for the site, although contaminated sediments below the cap have not been exposed. The City of Tacoma is currently working with EPA on a repair for the cap.

EPA requested in 2015 that an Addendum to the Final LMRP be developed, which was completed in April 2016 and requires the City of Tacoma to survey the elevations at a minimum of once every five years in April or early May, beginning in 2016. Results of the surveys are to be submitted to EPA in a draft report by September 1st of the year in which the surveys occur.

2.3.3.4 Blair Waterway TBT Removal Action

Remedy Implementation

In an AOC signed with EPA on February 16, 2015, the Port agreed to perform a removal action and pay past costs for cleaning up the site. Approximately 71,000 cubic yards of TBT-contaminated sediment was dredged and sent to an off-site landfill for disposal. The Removal Action field activities were completed in March 2016.

Institutional Controls

There are no ICs associated with this removal action.

Operation & Maintenance

There is no required O&M associated with this removal action.

2.3.3.5 Occidental Removal Actions

Remedy Implementation

A non-time-critical removal action was taken at Area 5106 between October 2002 and February 2003 to removed sediment contaminated with chlorinated organic chemicals. Post removal investigations were conducted to delineate the nature and extent of remaining subsurface sediment and groundwater contamination in this area, and indicated that PCE, TCE, hexachlorobenzene, and hexachlorobutadiene were present at concentrations greater than their respective cleanup goals. The remaining work required under the Area 5106 UAO was incorporated into the Occidental Site AOC as amended in 2005.

A removal action was planned Embankment Area but was never implemented. Contamination in this area and will addressed through remedial actions under the ROD.

Institutional Controls

There are no ICs associated with this removal action.

Operation and Maintenance

There is no required O&M associated with this removal action.

2.3.4 OU 02 Asarco Tacoma Smelter Facility

Remedy Implementation

Asarco Incorporated agreed to conduct a remedial design/remedial action and pay past costs for cleaning up the site pursuant to a January 1997 CD. The Remedial Design was conducted consistent with the ROD as modified by the 1996 ESD. An amendment to the CD was signed in November 2000 that extended the cleanup schedule to November 2005, deferred EPA oversight costs, and added lump sum penalties for schedule milestones. Asarco completed the following remedial actions prior to filing for bankruptcy in August 2005:

- Demolition of the remaining buildings and structures;
- Construction and closure of the RCRA Subtitle C OCF;
- Removal of source area soils and disposal in the OCF;
- Construction of a portion of the shoreline armoring along the frontage of the smelter property and the outer edge of the breakwater peninsula;
- Construction of the habitat basin as mitigation for the shoreline armoring;
- Remediation of the Stack Hill property to residential standards

The 2001 Nisqually earthquake caused the collapse of a portion of the breakwater forming the habitat basin, and part of the peninsula shoreline cap.

The OCF received an addition 25,000 cubic yards of smelter waste in 2004 from the Everett Asarco Smelter removal action.

Asarco sold its property in December 2005 through bankruptcy to MC Construction (a developer who later assigned rights to Point Ruston, LLC). EPA and DOJ negotiated a second amendment to the original Asarco CD and a Lien Release Agreement with MC Construction (which was approved by the bankruptcy court) in 2006 to assume responsibility for cleanup of the Smelter property and outlying areas. The settlement with Point Ruston called for a cap on the former smelter property and 17 acres of the breakwater peninsula and allowed for site buildings and hardscapes to be integrated as part of the site cap as long as EPA approved controls and construction methods. Integration of remediation and development required the site to be remediated in phases.

The bankruptcy court approved a $27 million (plus interest) settlement between Asarco and the United States in June 2009 that would settle EPA's claims against Asarco for the three OUs related to the Asarco Smelter. These funds were deposited to a special account.

Construction Phase I remediation was completed in 2015, which included remedial action of Master Infrastructure, Phase I construction, Waterwalk cap, Shoreline Armoring, and 17-acre cap on the breakwater peninsula. Construction of the remaining 6 acres of the upland cap and the remaining shoreline cap on the breakwater peninsula was completed by Metro Parks Tacoma in 2019. Remediation of several areas of Phases II, III and IV are also complete. All areas that are not complete are fenced and covered with a temporary cap. The remaining remediation of the Point Ruston site is ongoing and scheduled to be completed by June 2021 under the following schedule:

- Phase II construction complete by June 2020;
- Phase III construction complete by June 2020;
- Phase IV construction complete by June 2021.

Institutional Controls

Table 2-20 provides a summary of the implemented ICs associated with the Former Asarco Tacoma Smelter Facility.

TABLE 2-20: OU 02 –SUMMARY OF IMPLEMENTED ICS

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Affected Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Capped contaminated soil/slag	Yes	Yes	8950003314 8950003316 8950003318 8950003320 8950003326 8950003327 8950003328 8950003329 0221231087 0221231088 0221231090 0221231091 0221231092 0221231001	Prevent human contact with contaminated soil/slag and prevent surface water from penetrating contaminated soil/slag and contaminating underlying aquifer	Environmental Covenant May 2016

The following ICs need to be implemented:

- Environmental Covenant for the OCF, which is currently being negotiated;
- Environmental Covenant for the capped area of the Breakwater Peninsula;
- Environmental Easement for the habitat basin.

Operation & Maintenance

In January 2007, Point Ruston submitted the OMMP for the OCF that includes the requirements described in 40 CFR Sections 264.115-120 and 264.310, with the exception that O&M for the OCF shall be indefinite rather than 30 years. Specific O&M requirements include:

- Operate the leachate collection system;
- Maintain and monitor the leak detection system;
- Maintain the integrity and effectiveness of the final cover;
- Prevent run-on and run-off from eroding the final cover;
- Protect and maintain surveyed benchmarks used to comply with Sec. 264.309; and
- Maintain a groundwater monitoring system.

Due to the site location, an additional action was added that requires a thorough inspection after a significant earthquake. The OCF cover and the Leachate Collection and Leak Detection Systems are to be inspected annually.

Point Ruston submitted an OMMP in November 2013 for the smelter site cap, slag (breakwater) peninsula cap, shoreline armoring, and utilities to cover work completed at that time. As the site

remediation progresses, Point Ruston provides periodic updates (at least every five years) to the OMMP to cover those parts of the site where remediation is complete.

Point Ruston updated the OMMP in 2018-2019, and EPA agreed to remove Point Ruston's OMMP requirements for the breakwater peninsula as Metro Parks Tacoma (property owner) will be taking on that responsibility. Other updates were made to include new owner requirements and areas where construction has been completed. Monitoring of the OU 02 remedy will occur through routine inspection activities. In addition to normal day-to-day inspection of the site by maintenance personnel, annual inspections of OU 02 by a qualified inspector will be conducted to:

- Identify needed repair or maintenance;
- Evaluate the effectiveness of the maintenance being performed;
- Analyze monitoring data; and
- Ensure the cap is protective of public health and safety.

The inspection program will include three types of inspections:

- **Engineer's Periodic Inspections:** A professional engineer will conduct annual inspections during the first five years following occupancy and every five years, thereafter.
- **O&M Inspections:** The Site O&M Supervisor will conduct annual inspections on the interim years between the Engineer's inspections.
- **Special Inspections:** The Site O&M Supervisor will conduct inspections after extreme events such as: major storm events, high winds, fire, major traffic accidents, earthquakes, or following a breach of the cap for repair and maintenance activities. These inspections will be limited in scope to those structures that may have been damaged, as described in specific sections of the OMMP.

During an inspection of the shoreline in early 2019, it was observed that the armor rock along the upland edge of the Point Ruston shoreline had been removed and thrown onto the beach by the public, and that children were digging through the upland cap along the shoreline into the contaminated soil and slag. Such activities were not anticipated in the design, the City of Tacoma has subsequently installed larger rock to prevent the public from being exposed to the contaminated soil and slag beneath the armor rock.

There is no OMMP for the shoreline cap on the breakwater peninsula that was completed by Asarco in 2000. During construction of the upland cap on the breakwater peninsula in 2017, EPA noted that the shoreline cap had failed. EPA is drafting an OMMP for the entire breakwater peninsula for the owner, Metro Parks Tacoma, to implement through a new agreement, which is expected to be in place by December 2020.

2.3.5 OU 03 Tacoma Tar Pits

Remedy Implementation

Soil

Major components of the implemented soil remedy included contaminated soil excavation, screening and stockpiling, stabilization and placement, and capping. The RA included excavation of soil, auto fluff, and tarry materials containing ROD indicator contaminants above cleanup criteria. Excavated material was stockpiled and characterized to determine stabilization requirements. Oversized debris (wire, metal, concrete, wood, etc.) was screened or manually removed prior to treatment, some of which was placed in the stabilized waste pile and some disposed of off-site.

The contaminated materials under the original waste pile area were excavated to the top of the underlying clay layer and were backfilled with clean materials. The clean backfill was placed well above the seasonally high-water table, and stabilized wastes were placed on top of the clean material. Materials were stabilized using either a pug mill or a custom-designed and built batch mix plant. The primary stabilizing agent was Portland cement, although tarry materials were stabilized with a combination of cement and the proprietary ingredient "P-27" manufactured by the Silicate Technology Company. The end result of either stabilization process was a roller compactable material which was placed and compacted within the waste pile on top of the clean fill. Plates were installed on top of the pile to monitor settlement. Little settlement was observed.

According to the ROD, an estimated 45,000 cubic yards of material was to be excavated and stabilized on site. Ultimately a total of 185,170 cubic yards of non-tarry soil, tarry material, and auto fluff were excavated and stabilized during the remediation. The additional volume of material was from peripheral areas and the metals recycling operating areas, as well as expansion of hot spot excavations as RA construction progressed.

Cap materials varied by location. The engineered waste pile received a cap composed of soil and turf over two low permeability geosynthetic layers of 60-mil high-density polyethylene (HDPE), and received a 60-mil HDPE liner over a geosynthetic clay liner on the side slopes of the pile. Asphalt and concrete paving were placed to cover the surfaces of the metals recycling facility. The asphalt consists of a minimum of 1.5 inches of low permeability asphalt protected by a minimum of 1.5 inches of an asphalt wear surface. Reinforced concrete slabs, generally eight inches thick, were used in high-traffic areas. The two detention basins are lined with low permeability asphalt and have a minimum thickness of three inches. See Figure 2-19 for locations of remedial actions.

Surface Water

Components of the surface water remedy included temporary handling of storm water during remedial construction, and construction of the permanent storm water drainage system. The permanent storm water drainage system consists of both the waste pile drainage system and the metals facility drainage system. Box culverts collect surface water draining from the capped waste pile, which direct drainage to Detention Basin No.1 via a buried culvert and an asphalt lined ditch. A series of catch basins and buried pipes collect surface water draining from the metals facility and divert it to a covered manhole in Detention Basin No. 2. This basin contains an oil water separator. Both detention basins drain into the BNSF ditch through restricting orifices, then to the Cleveland Way pumping station, and ultimately on to the Puyallup River. Metro Metals has a has a Washington State Industrial Stormwater Discharge permit for the surface water discharge from Detention Basin No. 2 on site.

Groundwater

Components of the groundwater extraction and treatment system include the groundwater treatment plant, extraction wells, and piping. The ROD anticipated the need for groundwater remediation if the initial RA did not achieve ROD groundwater quality criteria at the site boundary in a timely manner. In October 1998, EPA directed PSE to implement a groundwater remedy at two locations where benzene concentrations continued to exceed ROD criteria. These locations, known as the "TTP-3M Area or East Branch" and the "TTP-18M Area or North Branch" were named after monitoring wells near the center of the two benzene plumes. The TTP-3M (East Branch) Area is located in the south portion of the site, while the TTP-18M (North Branch) Area is located in the central portion of the northeast site boundary.

In 2002, a groundwater extraction and treatment system were installed. It was designed to treat up to 25 gallons per minute (gpm) of on-site contaminated groundwater and prevent it from migrating off site and potentially impacting the Puyallup River. The system consisted of the treatment plant, four extraction wells (two in each of the two benzene plumes), and ancillary piping. The groundwater treatment plant utilizes air stripping to eliminate benzene from groundwater and uses granular activated carbon to sorb volatile organic compounds (VOCs) from the vapor stream. Treated groundwater effluent is discharged to the City of Tacoma publicly owned treatment works (POTW) under a discharge permit. The system was operating full time by September 2002 and underwent optimization in 2017.

Cleanup levels have been achieved in all aquifers for metals, cPAHs and PCBs. Benzene in one aquifer (Sand Aquifer) along two portions of the site boundary is being addressed with an optimized pump and treatment system.

Institutional Controls

Currently there are no environmental covenants for this Site. Instead, the ICs are set forth in 3 consent decrees with landowners. The landowners who signed those decrees had an obligation to record the decrees and notify the EPA RPM of having done so. Whenever there is to a transfer of an ownership interest, EPA is to be notified by the current owner of the proposed transfer and the new owner is obligated to sign-up to the consent decree. This process was completed in October 2019 with Fairmount (Metro Metals), the new owner of the Joseph Simon/Simon Metals property. This approach is older and unusual, but it works in terms of being able to hold a party accountable for abiding by the ICs. If a new owner for any reason does not sign-up to the decree, the old owner remains responsible for compliance of the ICs. And if the new owner does not abide by the ICs, the new owner may than become a PRP who is required to remedy the new problem they created. The IC obligations in each consent decree are the same – do not disturb the cap or any groundwater monitoring equipment and do not pump groundwater.

Operation and Maintenance

The O&M program encompasses two main elements: 1) the initial remedy consisting of low permeability caps and storm water drainage systems completed in 1995, and 2) the groundwater extraction and treatment system completed in 2002 and replaced and optimized in 2017.

Inspection and Routine Maintenance/Surface Water Monitoring

Inspection and routine remedy maintenance follow the Inspection and Maintenance (I&M) Manual (Ebasco 1995; revised DOF 2019) for the components of the initial remedy. The manual calls for routine inspection of the following items: metals facility drainage system including Detention Basin No. 2, asphalt and concrete pavements, waste pile cap drainage and turf, waste pile drainage system including Detention Basin No. 1, and BNSF ditch. Inspection frequency generally occurs every annually for the engineered waste pile cap drainage and turf and other remedial components. Also, the I&M manual requires routine inspection after heavy rainfall events.

During the FYR period the following maintenance/repair activities occurred:

- Moving of capped stabilized waste pile and brush clearing in rocked drainage channels and BNSF Ditch (occurred annually in the fall of each year).
- Development of an asphalt repair plan and repair of damaged asphalt in the metal recycling area (summer 2017). The asphalt repair procedure was incorporated into the revised I&M Plan.
- Detention basin asphalt permeability testing (2018 and 2019).

- Repair of an asphalt curb along the edge of DB#1 (summer 2019).
- Sediment removal from DB#1 control structure (summer 2019).

Surface water quality monitoring is conducted semi-annually (March and September) at approximately 65 feet upstream of where the BNSF ditch enters a buried culvert. The BNSF ditch is located on the south side of the site and receives surface water runoff from the OU 03 exiting the two detention basins.

In the early morning of September 17, 2018, Simon Metals reported a fire in the scrap metal yard. Tacoma Fire responded and began to put the fire out. Simon Metals requested that some of the runoff from the firefighting activities be allowed to collect in DB#1. DOF and EPA were consulted and agreed to allow this to occur after blocking of the basin outlet. After the fire was extinguished, Simons pumped and cleaned the basin and it was returned to its normal use as a storm water detention basin.

Groundwater Monitoring Program

Post-remediation groundwater monitoring between March 2002 and the present was completed in accordance with the Revised Water Quality Monitoring Program by Dalton, Olmsted and Fuglevand, Inc. (DOF; the PRP's remediation contractor), approved by EPA in January 2002 (DOF 2002). Quarterly groundwater monitoring events usually occur during the months of March, June, September and December of each year and is reported in semi-annual reports.

Groundwater Extraction and Treatment System

O&M of the groundwater extraction and treatment system is conducted in accordance with the Groundwater Remediation System, Operation and Maintenance Plan (DOF 2018). Typical maintenance items for the pump and treat system include the following inspections and operational checks: 1) weekly monitor general plant operations and resupply biofouling treatment chemicals if needed, 2) monthly check meter functions and the need for replacement of vapor phase carbon, 3) monthly cleaning of the air strippers, and 4) other system checks monitored remotely to verify the plant is operating properly. In addition to the above O&M activities, the City of Tacoma reviews and renews PSE's Industrial Wastewater Discharge Permit (PSE 2017) every five years and inspects and performs compliance sampling twice a year.

2.3.6 OU 04 Asarco Off-Property (Ruston/North Tacoma Study Area)

Remedy Implementation

EPA issued a UAO to Asarco in October 1993 to initiate sampling and design for the cleanup of residential yards in the Ruston/Tacoma Study Area surrounding the Smelter. Cleanup activities were initiated in the spring 1994, and Asarco entered a CD with the United States in 1995 to perform the cleanup. Asarco completed remediation of Stack Hill to residential standards in accordance with the Revised Work Plan for Excavation and Removal of Soils – Ruston and North Tacoma, Washington, December 1994. The remainder of the Study Area was divided into four Zones to facilitate cleanup.

Sampling was required for all properties in Zones 1 – 3 and remediation (excavation and backfill with clean soil) was required where concentrations exceeded the cleanup goals. Remedial action in Zones 1-3 was completed by Asarco in 2004, with the exception of four refusals.

While sampling Zones 1-3, Asarco also sampled 10 of the ERA properties to determine if the cap of clean soil remained in place and protective. The cap on a few properties was determined to have failed and those areas were excavated and backfilled with clean soil by Asarco in 1995. Over the course of the next two decades, many of these vacant lots were developed into residential homes. After EPA assumed

the project from Asarco in 2009, the agency determined it would be best to clean up areas where houses had been built to the same standards as the rest of the Study Area. All but one property owner agreed to be sampled and remediated. In addition to this home where sampling was not allowed, there are four ERA sites remaining with a cap of clean material over native soils with arsenic or lead contamination and one site that was never resampled because it is now very heavily vegetated and inaccessible.

Sampling in Zone 4 was started as a voluntary program at the request of property owners; however, all property owners in this zone were eventually sent a notice to have their property sampled and an overwhelming response resulted in all properties in this zone being sampled, with the exception of 12 properties. Sampling in 2004-2009 by Asarco indicted that approximately 40 to 50 percent of the properties in Zone 4 required remediation. Properties in Zone 4 were remediated unless the property owners refused, which only happed at six properties.

Pursuant to United States v. Asarco, Inc. and Southern Peru Holding Corporation, in January 2003 Asarco and its parent company, Grupo Mexico, signed a CD with the United States deferring enforcement of their national environmental liabilities in exchange for setting up a trust fund to be used for Asarco's environmental liabilities around the country. The Trust was to be paid out over 8 years for Asarco's liability nation-wide. Due to the three-year enforcement ban in this CD, site activities slowed due to lack of funding, although Asarco continued to perform yard cleanups at a rate of 100 to 150 per year using contributions from the Trust.

Asarco filed for bankruptcy in August 2005, although it continued work with funding from the Trust. EPA conducted a Removal Action in 2005 on 13 yards to complete the work that Asarco had initiated. EPA assumed the remainder of the residential remediation work in 2009 and entered into an inter-agency agreement with the USACE (Seattle District) to complete the cleanup in Zone 4. EPA funded the remaining cleanup using the 2003 Asarco Trust Fund, 2009 American Recovery and Reinvestment Act (ARRA) federal funds, and 2005 Asarco bankruptcy settlement funds. Cleanup of the Study Area was completed in 2012, and EPA drafted the Remedial Action Completion Report in 2013.

EPA entered into a cooperative agreement with Ecology in 2010 to complete the following tasks:

- Remediation of eight properties, and sampling and remediation (if necessary) of two additional properties.
- Conversion of project files and uploading to Ecology's web-based "Arsenic in Soil Database". Ecology will maintain this database and add results from their project as it progresses. Users can search this database by parcel or address to locate soil sampling results and cleanup records.
- Incorporation of the educational program for the Study Area into Ecology's ongoing Dirt Alert soil safety program.
- Determine long-term soil disposal options through a workgroup of agency representatives from TPCHD, Ecology, EPA, and City of Tacoma.

Since the last FYR, Ecology has sampled an additional 112 properties and removed and replaced soil on 222 properties that exceeded the cleanup levels. The status of the cleanup actions for this OU are presented in Figure 2-20.

Institutional Controls

EPA entered into a Cooperative Agreement with Ecology in 2010 to develop a community protection measures program for the Study Area that addresses areas where complete removal of soils above the action levels is not practicable (defined as areas where contamination above action levels is to be left at

depths greater than 18 inches or may be detected in the future under roadways, sidewalks or buildings), and areas where arsenic concentrations in soil exceed those normally found in urban areas, but are below the action level and would not require cleanup. The CPM program consists of the following elements:

- Measures to control soil disturbances
- Soil testing, collection and disposal program
- Measures to maintain the integrity of caps
- Development of a property-specific database
- Notification to future property owners
- Evaluations of the effectiveness of the CPM program

Institutional controls where contamination was not remediated at the property owned by the BNSF Railway includes physical barriers, such as steep slopes, fencing, and no trespassing signs.

Operation and Maintenance

O&M is covered under the CPM program being implemented by Ecology and TPCHD.

2.3.7 OU 06 Asarco Groundwater and Sediment

Remedy Implementation

The OU 06 ROD determined that groundwater remedial actions, over and above those already being implemented under the Smelter Facility ROD (source removal and site capping), were not necessary. The only groundwater requirement was to continue to monitor groundwater to evaluate the long-term effects that the OU 02 cleanup will have on future groundwater quality. The source material has been removed and placed in the OCF. Capping the site is ongoing and scheduled to be completed in June 2021.

EPA issued a UAO to Asarco in March 2002 to conduct remedial design and remedial action. Asarco completed the remedial design for capping offshore sediments and excavating the Yacht Basin in 2004. Following the 2005 Asarco bankruptcy filing, Point Ruston, under the 2006 second amended CD, agreed to cap the offshore sediments, complete the hard cap (the part of the sediment cap that joins with the shoreline armoring), and dredge shallow sediments in the Yacht Basin (in addition to its Smelter Facility responsibilities).

Point Ruston capped approximately 10 acres of offshore sediments between November 2006 and February 2007 but could not place the cap under the dock structures due to interference with the pilings. Point Ruston and the Washington State DNR worked together to remove the docks in 2010. DNR capped the dock footprints and some of the adjacent areas with between 1 to 2.5 feet of sand utilizing a total of 17,381 tons. In the intertidal areas that are subject to wave action DNR placed 2,627 tons of quarry spalls. Point Ruston installed the final 8 acres of cap in 2013 (Figure 2-21).

Cleanup of the Yacht Basin sediments still needs to be implemented and is expected to be initiated in 2026.

Institutional Controls

A summary of the implemented ICs for groundwater and sediment at the Former Asarco Tacoma Smelter Facility is provided in Table 2-21.

TABLE 2-21: OU 06 – ASARCO TACOMA SMELTER SUMMARY OF IMPLEMENTED ICS					
Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Affected Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Groundwater	yes	yes	89500033148 95000331689 50003318895 00033208950 00332189500 03322895000 33248950003 32689500033 60355500044 00221231076 02212310770 22123107802 21231079022 12310800221 23108102212 31082022123 10830221231 08402212310 85022123108 60221231087 02212310880 22123108902 21231090022 12310910221 23109202212 31093022123 10940221231 09502212310 96 0221231097	Restrict the use of contaminated groundwater beneath the Site to prevent human exposure	Declaration of Restrictive Covenants, Conditions, Restrictions, Reservations and Easements for Point Ruston June 2014 Re-Recorded May 2016

The following legally enforceable ICs will be developed and implemented for OU 06 sediment:

- A restrictive covenant for sediment cap.

EPA approved the OMMP for the offshore sediment cap in August 2015. Upon EPA approval, DNR was to request that the U.S. Coast Guard Office of Marine Safety establish a No Anchor Zone" at the Site. The request was to include the reason to establish the zone, a map of the proposed zone, and the latitude and longitude coordinates of the area boundaries. The Coast Guard was to announcement a Notice to Mariners by mail to marinas in the local area. After the Notice to Mariners was announced, the No Anchor Zone was to be published on future navigational charts of the area and marked by shoreline signs. It is not known whether these actions have been taken.

Operation and Maintenance

EPA approved the OMMP for the offshore sediment cap in August 2015, which requires the following monitoring:

- Bathymetric inspections of the subtidal sediment cap surface at five-year intervals for years. Subsequently, monitoring will be required every 10 years, and may be reduced to once every 15 years if three sequential monitoring events separated by a minimum of five years indicate a trend of performance reliability.
- Visual inspections where areas of the intertidal sediment cap are exposed during low tides at five-year intervals through 2026. Subsequent monitoring will be required every 10 years and may be reduced to once every 15 years if three sequential monitoring events separated by a minimum of 5 years indicate a trend of reliability of remedial performance.
- Underwater visual inspections of submerged subtidal areas of the sediment cap will be conducted in years 2 (2018), 5, and 10. After year 10, monitoring will be required every 10 years Monitoring may be reduced to once every 15 years if three sequential monitoring events separated by a minimum of 5 years indicate a trend of reliability of remedial performance.
- Chemical monitoring of the sediment cap will be conducted in years 2 (2018), 5, and 10. After year 10, monitoring will be required every 10 years. Monitoring may be reduced to once every 15 years if three sequential monitoring events separated by a minimum of 5 years indicate a trend of reliability of remedial performance.
- Chemical monitoring of the uncapped Moderately Impacted Areas will be conducted in years 2 (2018), 5, and 10. After year 10, monitoring will be required every 10 years. Monitoring may be reduced to once every 15 years if three sequential monitoring events separated by a minimum of 5 years indicate a trend of reliability of remedial performance.

Under the 2016 third amended CD, Point Ruston is conducting the performance monitoring of the cap and MNR areas.

3 PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations, statements, and recommendations from the last FYR as well as the current status of those recommendations.

TABLE 3-1: PROTECTIVENESS DETERMINATIONS/STATEMENTS FROM THE 2014 FYR

OU #	Protectiveness Determination	Protectiveness Statement
01/05	Will be Protective	Taken as a whole, the remedies for the Sediments OU are expected to be protective when completed. In the interim, remedial actions completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in those areas. Until site remedial objectives are met, site use restrictions (i.e., fish and shellfish consumption advisories) shall remain in effect to limit human exposure to contaminated seafood.
02	Will be Protective	The remedy is expected to be protective of human health and the environment upon completion of construction. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in those areas. Exposure pathways that could result in unacceptable risks are being prevented because the site is being controlled by the developer during construction using best management practices as described in the Development and Occupancy Plan (temporary covers, fencing, etc.).
03	Short-term Protective	The remedy is functioning as intended and currently protects human health and the environment in the short-term because 1) sources of contamination (waste materials and contaminated soils) have been excavated, disposed of off-site or treated and contained on site, 2) low permeability caps and surface water controls have been placed across critical areas of the site, 3) institutional controls that prohibit using site groundwater are in place, and 4) the groundwater extraction and treatment system has been optimized and contains contaminated groundwater such that exposures are under control and there are no unacceptable risks to humans or the environment, e.g. contaminated site groundwater is not being used as, or migrating to, a drinking water source nor is it discharging to the downgradient Puyallup River.
04	Protective	These cleanup actions were completed in 2012. CPMs, mostly educational in nature, are in place. Ecology has assumed responsibility for all future work, including properties where owners have refused sampling or cleanup.
06	Will be Protective	The remedy is expected to be protective of human health and the environment upon completion of the remedy for the Yacht Basin sediments. In the interim, remedial activities completed to date in the capped offshore sediments (i.e., where the remedy has been implemented) have adequately addressed all exposure pathways that could result in unacceptable risks in those areas.
Sitewide	Will be Protective	No statement was provided.

This page is intentionally blank

TABLE 3-2: STATUS OF RECOMMENDATIONS FROM THE 2014 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
01/05	Recent fish tissue data for PCBs have not been collected in Commencement Bay. It is unknown whether PCB concentrations in fish tissues have been reduced since the remedies have been implemented, and whether fish advisories should be continued, modified, or removed.	Develop and implement a Quality Assurance Project Plan, which will include a sampling plan for collection and analysis of bay wide fish tissue data for bioaccumulative chemicals (particularly for PCBs, which have a human-health based SQO identified in the CB/NT ROD). Provide results to appropriate state and local agencies to evaluate protectiveness of health-based fish consumption advisories for Commencement Bay.	Completed	EPA developed a SOW and entered into an CA with WDFW in 2019 to collect English sole under an EPA approved QAPP to be analyzed for PCBs as total Aroclors (EPA lab) and total congeners (NOAA lab). The Aroclor data will be compared to the PCB number for fish tissue in the ROD (36 ppb) as modified in the 1997 ESD (117 ppb). The sample design was the same as that used for the RI. The fish were collected in June 2019. The results will be available in 2020. Upon review and evaluation, these data will be provided to state and local agencies	December 2019
01/05	Additional post-construction sediment sampling needs to be conducted throughout the entire Hylebos Waterway to determine the status of the remedy as constructed.	Conduct sediment sampling and evaluate if the remedy is meeting performance standards. Update existing OMMP based on results.	Completed	Samples were collected and analyzed at the Head in 2017 and at the Mouth in 2016 and 2019 to compare to post-construction concentration and determine the extent of recontamination.	September 2019
03	Benzene concentrations in the groundwater plume within the sand aquifer continue to exceed ROD criterion across the site.	Evaluate and address issues related to benzene exceedances and make recommendations for optimizing the groundwater extraction and treatment (GWET) system and the groundwater monitoring systems to reduce the benzene plume.	Completed	Optimization of the GWET system completed.	November 2017
03	The ROD groundwater remedy and RAOs focused on treatment and containment of the contaminated plume, but do not appear to have considered groundwater restoration.	Evaluate whether groundwater restoration at this site is feasible and necessary to 1) comply with ARARs, CERCLA, and EPA's CERCLA groundwater policies, and 2) ensure long-term protectiveness.	Completed	The ROD evaluated groundwater cleanup and determined it was not practicable. Therefore, a containment and treatment remedy were selected, which was determined to be protective in the long-term.	September 1987

TABLE 3-2: STATUS OF RECOMMENDATIONS FROM THE 2014 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
03	Property owner compliance with site ICs requirements is not optimal.	Request site property owners to comply with all CD conveyance of site/IC requirements. Voluntary compliance with the state of Washington's Uniform Environmental Covenants Act (UECA) should also be requested to ensure the long-term effectiveness of site ICs.	Completed	Fairmount signed the CD. Any future property ownership changes will require this and EPA notification.	October 2019

4 FIVE-YEAR REVIEW PROCESS

This section discusses the FYR process, including community notification, involvement and site interviews, review of data collected during the past five years, and a summary of site inspection conducted by the RPM.

4.1 COMMUNITY NOTIFICATION, INVOLVEMENT AND SITE INTERVIEWS

EPA published a public notice in the Tacoma News Tribune on 5/18/2019, stating that there was a FYR underway and inviting the public to submit comments. The results of the review and the report will be made available at the Site information repository located at Citizens for a Healthy Bay, 535 Dock Street, Suite 213, Tacoma, WA 98402 and U.S. EPA Region 10 Library, 1200 Sixth Avenue, 1st Floor Seattle, WA 98101. Citizens for a Healthy Bay manages an environmental list serve for the area and sent out an announcement for EPA.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedies in OU 01/05 that have been implemented to date. Interviews for other OUs were not conducted as the RPMs have been actively involved in the site and in communication with the RPs. The results of the interviews are summarized below.

On July 2, 2019, Kristine Koch, EPA met with the Citizens for a Healthy Bay (CHB), at which time EPA provided an update on CB/NT activities and preparation of the fifth FYR. The CHB submitted comments on August 15, 2019. The CHB raised the following concerns pertaining to OU 01/05:

- The effectiveness of source control implemented by Ecology and the potential for the site to recontaminate.
- The effectiveness of the fish and shellfish consumption advisory implemented by TPCHD.
- Implementation of ICs and O&M Plans.
- Monitoring of contaminants not posing a risk in the baseline risk assessment.

4.2 DATA REVIEW

This section provides a summary of the data collected at the site since the last FYR.

4.2.1 OU 01 Sediment and OU 05 Source Control

Since the fourth FYR (2014), activities for OUs 01 and 05 have been related to O&M monitoring of the remedy. Data in the following documents were evaluated:

- 2014 Middle Waterway Area C Year 10 OMMP Report
- 2014 Head of Thea Foss Year 10 Long-Term OMMP Results
- 2016 Mouth of Hylebos Post-Construction Sediment Data Report
- 2016 Occidental Chemical Corporation Data Report
- 2016 Thea Foss and Wheeler-Osgood Waterways Source Control Monitoring Report
- 2016 Thea Foss and Wheeler-Osgood Waterways Year 10 Monitoring Report
- 2017 Thea Foss and Wheeler-Osgood Waterways Source Control Monitoring Report
- 2017 Head of Hylebos Sediment Sampling Report
- 2017 Pier 24-25 OMMP Year 9 Report
- 2018 Head of Thea Foss Year 14 Long-Term OMMP Results
- 2018 Thea Foss and Wheeler-Osgood Waterways Source Control Monitoring Report
- 2018 Thea Foss and Wheeler-Osgood Waterways Year 12 Long-Term Monitoring Report

- 2019 Mouth of Hylebos Sediment Sampling Report
- 2019 Pier 24-25 OMMP Year 11 Report

Thea Foss and Wheeler-Osgood Waterways

This section summarizes the data collected in the Thea Foss and Wheeler-Osgood Waterways since the last FYR.

Natural Recovery and Enhanced Natural Recovery Monitoring

MNR and ENR monitoring was conducted in 2018 at four MNR and one ENR station as part of the LTMP remedial area monitoring. DEHP concentrations at these stations either were less than the SQO identified in the CB/NT ROD or bioassay testing results showed no effects. Based on these monitoring results, the City of Tacoma is no longer required to conduct MNR and ENR monitoring during future LTMP monitoring events in accordance with the LTMP. Additionally, these outcomes for natural recovery and enhanced natural recovery mean that all the Thea Foss and Wheeler-Osgood Waterways RAOs have now been met and that the remedial action in these waterways can now be considered complete.

Cap Monitoring

Recontamination monitoring of the cap at the head of the waterway was evaluated by collecting subsurface cores and analyzing them evaluate whether contamination was migrating upward into the cap at a rate where the SQOs identified in the CB/NT ROD would be exceeded at the point of compliance prior to the 100 year design lifetime of the cap. Sediment cores were collected at six stations using a vibracore device, core recovery ranged from 3.3 to 4.9 feet. None of the cores displayed a distinct color change from dark gray to black and therefore do not appear to have fully penetrated the cap. The observed cap thicknesses ranged from 3.1 feet to 4.9 feet. The core logs and grain size analyses indicate that the cap thickness of approximately 3 feet is present within the Utilities Work Area. Samples collected from the bottom of the core were submitted for laboratory analysis of BEHP, HPAHs, LPAHs, total PCBs, lead, and zinc. Low concentrations of PAHs, BEHP, and PCBs were detected in several core samples. None of the concentrations exceeded an SQO identified in the CB/NT ROD in the bottom interval analyzed from the six core samples. The non-detect, infrequent detections and low sediment concentrations of the capping materials at depth indicate that there is no evidence of bottom-up recontamination at this time and that the cap is performing as designed. Remedial area sediment monitoring to evaluate cap chemical integrity will continue under the LTMP and will be conducted next in 2028.

Cap physical integrity performance monitoring was conducted in 2018 as part of the LTMP remedial area monitoring and included subtidal cap hydrographic surveys and low-tide slope cap inspections. The subtidal cap hydrographic surveys were compared to baseline and the results showed that these caps have been stable over time, with most cap surface elevations within 6 inches of the baseline or 2008[7] surface elevations and within the allowable accuracy of the survey equipment. The cap at the head of the waterway installed by the Utilities has notable accretion up to one foot in the shoreline areas mainly due to sediment deposition from stormwater outfalls. Additionally, the sheet pile wall and supporting rock

[7] The 2008 survey was used as baseline in some areas as those areas were not available for survey due to interferences, such as berthed ships.

buttress supporting the cap at the mouth of the waterway was inspected by a diver and found to be in good condition. There were no proposed response actions for the subtidal cap areas. In general, the slope caps have remained intact and stable over time with most areas having no observed issues regarding cap integrity between the baseline and 2018 low-tide slope cap monitoring events. A few exceptions were observed in certain slope cap areas and these areas were addressed through proposed response actions in 2019 or have been noted as focused slope cap inspection areas for future slope cap inspections.

No sheens were observed in the vicinity of the former SR 509 seep or elsewhere in the Utilities Work Area. During the site visit, gas bubbles were observed along the shoreline throughout the area including along the east shoreline in the vicinity of the former SR 509 seep area. The intensity and frequency of bubbles were similar to past observations, with increasing activity at lower tides. No sheen was observed in bubbling areas. Crabs, crab shells, clam shells, mussels, barnacles, geese, herons, gulls, ducks, pigeons, crows, seaweed and algae were observed at the site during the inspection.

Remedial area monitoring to evaluate cap physical integrity, including subtidal cap hydrographic surveys and low-tide slope cap inspections, will continue under the LTMP and will be conducted next in 2023.

Source Control Monitoring

The City of Tacoma continued to monitor seven of the 13 primary municipal outfalls to the Thea Foss Waterway annually since the last FYR. Mercury, PAHs and phthalates are being discharged in base flow at concentrations greater than state of Washington marine acute AWQCs. Concentrations trends were analyzed through Year 17 using simple linear regression, and were determined to be either decreasing, or no discernable trend was observed. These analyses were used to calculate the percent reduction for each contaminant:

- TSS: Approximately 50-75 percent reduction in five of the seven outfalls, including OF230, OF235, OF237A, OF237B and OF245
- Copper: Approximately 33-52 percent reduction on OF235 and OF237B
- Lead: Approximately 63-79 percent reduction in all seven outfalls
- Zinc: Approximately 48-67 percent reduction in all seven outfalls
- PAHs: Approximately 70-95 percent reduction in all seven outfalls
- DEHP: Approximately 46-82 percent reduction in all seven outfalls.

Stormwater sediment monitoring indicates that PAHs and phthalate concentrations are greater than the SQOs identified in the CB/NT ROD and have the potential to recontaminate the site. However, sediment concentrations in the waterway to date for these contaminants have been decreasing.

Based on the results of the 2018 waterway source (sediment) monitoring, no response actions are proposed at this time. No metals exceeded the SQOs identified in the CB/NT ROD at the 12 waterway source monitoring stations, and HPAHs were detected just exceeding their SQOs identified in the CB/NT ROD at three of these stations. DEHP concentrations exceeded the SQO identified in the CB/NT ROD at 10 of the 12 waterway source monitoring stations, but these results were generally consistent with the DEHP results from the past OMMP monitoring samples collected at these stations. DEHP concentrations in 2018 at Stations WS-7 and WS-10 were greater in comparison to previous results. DEHP is a known ongoing urban and waterway contaminant and will continue to be monitored at these stations during future LTMP monitoring events. Waterway source monitoring will continue to occur at the 12 monitoring stations during future LTMP monitoring events and will be conducted next in 2023.

St. Paul CDF Groundwater and Surface Water Monitoring

Copper, lead, mercury, nickel, and zinc were not detected in surface water sample. Data of acceptable quality were collected from all performance monitoring wells and the adjacent surface water location during 2018 to achieve the objectives of CDF performance monitoring. Analyte concentrations detected in wells during performance monitoring were compared to the baseline mean and baseline 95th percentile UTL. This allowed for the evaluation of the effectiveness and protectiveness of the CDF remedy during Year 12 performance monitoring. There were no PAHs or metal exceedances of the baseline 95th percentile UTL.

Metal concentrations detected in MW-06 are likely associated with a localized source, as dissolved copper and zinc were not detected or were detected at significantly lower concentrations in other shallow groundwater wells (MW-01, MW-02, and MW-10). The 2018 performance monitoring results indicate that the elevated zinc and copper concentrations detected in MW-06 remain localized and the higher levels at this one station are not a cause for concern since there are no statistically significant increases in chemical concentrations in groundwater flowing from the CDF. Consistent with baseline monitoring, elevated zinc and copper concentrations were not detected in other shallow performance monitoring wells, or in previous monitoring events of upgradient well MW-04, which no longer sampled.

Anthracene was detected at concentrations close to the reporting limit at MW-02. This is within the range of concentrations detected during baseline monitoring and previous monitoring, along with additional PAHs. However, seven PAHs were detected at MW-10. These results will be evaluated with future monitoring results to assess PAHs concentration trends at MW-10. 2-Methlynaphthalene was detected for the first time in deep wells MW-08 and MW-12, at relatively low-level concentrations, and naphthalene was detected in MW-08 for the first time since baseline monitoring, and in MW-12 for the first time since 2010 performance monitoring.

This comparison of long-term post-construction groundwater quality to baseline conditions indicates that no contaminants are being transported in groundwater from the CDF at concentrations that are expected to pose a potential threat to surface water quality at the point of compliance. No statistically significant increases in contaminant concentrations relative to the established groundwater baseline 95th percentile criteria have been observed where these comparisons can be made. This evaluation indicates that baseline concentrations are not exceeded in the surface water outside of the CDF, confirming the remedy is performing as intended and remains protective. Based on the 2018 monitoring, no response actions are proposed at this time. The next round if groundwater and surface water monitoring will be conducted in 2023.

Habitat Mitigation and Enhancement Areas

Results of the 2018 monitoring indicated that most of the habitat mitigation and enhancement areas are in excellent condition. The North Beach Habitat was noted as being in fair condition, as active construction occurring adjacent to this area limited the ability for the City of Tacoma to water new plantings during the very dry summer. The SR 509 Esplanade Riparian Habitat was noted to be in fair to good condition primarily due to human impacts in this area, which is located adjacent to a public park. Very few follow-up actions were identified during the 2018 site inspections, primarily due to the City's ongoing stewardship and maintenance of these sites. Follow-up maintenance activities that were identified are discussed in more detail in the Habitat PFM and are summarized in Table 4-1. In general, follow-up maintenance activities include removing invasive plant species and trash at all of the habitat

mitigation and enhancement areas, with more significant coordination of cleanup from encampment activity required at the Puyallup River Side Channel and the Middle Waterway Tideflat Habitat. All large woody debris should have the anchors checked and tightened periodically. At the four mitigation sites, any remaining stakes and irrigation system components can be removed. Finally, supplemental plantings installed at the Puyallup River Side Channel in a continued effort to eliminate social trails and prevent transient activity. Planting also occurred at the Hylebos Creek Mitigation site to help shade out invasive reed canary grass.

TABLE 4-1. SUMMARY OF CITY OF TACOMA MAINTENANCE ACTIVITIES FOR THEA FOSS AND WHEELER-OSGOOD WATERWAYS HABITAT MITIGATION AND ENHANCEMENT AREAS

North Beach Habitat	• Minor weeding • Minor trash removal • Check and tighten anchors on large woody debris, as needed
Middle Waterway Tideflat Habitat	• Lock/chain gate mid-site • Remove irrigation shed and other stakes and remaining irrigation system • Minor weeding • Coordinate removal of transient camp mid-site • Check and tighten anchors on large woody debris, as needed
Puyallup River Side Channel	• Minor weeding • Coordinate transient access & camp removal measures/trash removal • Continue to evaluate the need for supplemental planting on any remaining pathway/bare areas on the old levee caused by transient use
Hylebos Creek Mitigation Site	• Minor weeding • Check and tighten anchors on large woody debris, as needed • Consider planting willow stakes over time to help shade out reed canary grass
Johnny's Dock Habitat Enhancement	• Check and tighten anchors on large woody debris, as needed
Head of Thea Foss Shoreline Habitat	• Minor weeding • Check and tighten anchors on large woody debris, as needed
SR 509 Esplanade Riparian Habitat	• Minor weeding • Cut weeds around plants
Log Step Habitat Enhancement	• Spot spray blackberry in adjacent area • Check and tighten anchors on large woody debris as needed

Routine maintenance is performed on an ongoing basis throughout the year in the habitat mitigation and enhancement areas and is a key component of the City of Tacoma's habitat maintenance and monitoring program. The City of Tacoma maintains a contract with the Washington Conservation Corps (WCC) to provide a crew to perform these routine maintenance activities in the various mitigation and

enhancement areas. The crew picks up garbage, waters vegetation, tightens large woody debris cables/anchors, pulls or cuts weeds, and replants on an as-needed basis. In addition, the City currently contracts with NRC Environmental Services Inc. as needed to clean up homeless encampments in the habitat areas when they are discovered. No Trespassing signs have been posted with the intent of discouraging settlement in these sensitive locations. A summary of WCC's work performed during each quarter of the past year has been provided to EPA in the quarterly progress reports. As indicated in Table 4-1, very few maintenance activities were identified in the mitigation and enhancement areas during the 2018 site evaluations. Work performed by the WCC since these site evaluations primarily has included removal of invasive plant species and trash in all of the areas. Spot spraying of invasive blackberry at the Log Step Habitat Enhancement occurred in August 2018. Remaining maintenance activities identified in Table 4-1 were conducted in fall 2018, and updates were provided to EPA in the quarterly progress reports.

Slope Rehabilitation Areas

The first low-tide visual inspections within the slope rehabilitation areas located in the Wheeler-Osgood Waterway were first conducted in 2018. The only issue found was a slight milky blue sheen observed on the sediment and water surface in the lower portion of the intertidal beach slope along the northern shoreline. This was generally in locations where water was observed pooling in uneven elevations on the beach surface. One of the largest areas where this sheen was observed was at the base of the slope adjacent to and west of the slope cap area, referred to as the Sheen Source Removal Area. A similar sheen was observed within this area during previous inspections performed in this slope cap area in 2013 and 2016. The other areas with sheen observed along the northern shoreline tended to be smaller, isolated spots. The source of the sheen could not be determined. The sheen may be biological in nature. There was no odor associated with this sheen. At the request of EPA, two samples containing a similar observed sheen were collected from the Wheeler-Osgood Waterway's northern slope during low-tide conditions in August 2018 and were submitted for analysis of PCBs, TPH, PAHs, and total organic carbon (TOC). During the August sample collection, the sheen was not as obvious nor as widespread as on the previous field inspection. HPAHs were detected at concentrations slightly greater than the practical quantitation limit. No other concerns were identified during the 2018 inspection. The slope rehabilitation areas, including the Wheeler-Osgood Waterway sheen area, will continue to be inspected during future LTMP slope rehabilitation inspections, with the next sampling event occurring in 2023.

Hylebos Waterway

Surface Sediment

Surface sediment samples were collected in 2017 from 62 stations at the Head of Hylebos Waterway (Segments 1 and 2), and each time composited into 19 samples for analysis. Each composite was analyzed for arsenic, mercury, zinc, phthalates, PAHs, SVOCs, DDT and PCBs. PCBs were the only contaminant for which concentrations that exceeded the SQO identified in the CB/NT ROD, which was consistent with the 2012 data. However, the 2012 data results showed that only three sample stations, CO-6b, CO-10, and CO-11, had PCB concentrations that exceeded the SQO identified in the CB/NT ROD while the 2017 data results show that those stations were below the SQOs and two other stations, CO-1b and CO-2b, now exceed the PCB SQO. All stations show higher concentrations for PCBs compared to the post-construction confirmation samples taken between 2004 and 2006, with the highest increases (greater than 10 times) occurring at stations CO-1b and CO-4b. However, only six stations had higher PCB concentrations in 2017 as compared to 2012 and only two 2017 samples, CO-1b and CO-9,

were higher than in 2012. All other contaminants were detected at concentrations less than half the SQOs identified in the CB/NT ROD.

Surface sediment samples were collected in 2016 from 33 stations offshore of the Occidental Chemical property. Each sample was analyzed for metals (arsenic, copper, nickel and zinc) and VOCs. None of the samples exceeded the SQOs identified in the CB/NT ROD. Porewater (surface and subsurface) and surface water sampling was also conducted and none of those samples exceeded the SQOs identified in the CB/NT ROD.

Surface sediment samples were collected from 40 stations at the Mouth of Hylebos Waterway (Segments 3, 4 and 5) in 2016. Each sample was analyzed for metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc), PAHs, phthalates, SVOCs, PCBs, benzyl alcohol, benzoic acid, dibenzofuran, hexachloroethane, hexachlorobutadiene, N-nitrosodiphenylamine, and DDT/DDD/DDE. Five sampling stations had contaminant concentrations that exceeded SQOs identified in the CB/NT ROD; PAHs (two stations), benzyl alcohol (one station), hexachlorobutadiene (two stations), and PCBs (two stations). These stations were resampled in 2019 and only hexachlorobutadiene was detected at concentrations greater than the SQO identified in the CB/NT ROD. Areas where the SQO exceedances occurred were localized to the following four MNR areas:

- Area 5016 (SMAs 5016c and 5016d) – post-dredge residual recovery: A large area contaminated with hexachlorobenzene was designated an MNR area. The concentrations of this contaminant in these samples show that the original exceedance area has now been reduced by more than 90 percent. Further, the 2005 CD also has a provision to override SQO identified in the CB/NT ROD with confirmatory biological testing. Post-construction sediment bioassay testing was previously performed in May 2004 at both stations OMMP-5 and OMMP-6. The lack of toxicity observed in bioassay indicate that hexachlorobutadiene concentrations in surface sediment as high as 79 μg/kg are likely non-toxic, meeting the SQO biological criteria and therefore protective. Confirmatory bioassays were again performed in 2019 at stations OMMP-5 and OMMP-6, and all tests passed SQO biological criteria identified in the CB/NT ROD.
- Targa Nearshore (SMA 421A) – buried subsurface deposit/no action area: During remedial design, buried deposits of PCB-contaminated sediments were identified in parts of SMA 421A, including areas adjacent to the Targa wharf overlain with cleaner sediments with COC concentrations below SQOs identified in the CB/NT ROD. While this area was not targeted for remedial action consistent with the ROD and 2000 ESD, expanding operations at the Targa facility resulted in the need to deepen the berthing area. Moreover, the 2016 OMMP monitoring data revealed that surface sediment PCB concentrations exceeding the SQOs identified in the CB/NT ROD were present at one station (OMMP-29) within the berthing area, likely due to vessel operations disturbing subsurface contaminated sediment. The berthing area was subsequently dredged by the property owner in 2017, concurrently removing the contaminated sediment deposit (disposed at a permitted off-site landfill) and managing dredge residuals. Surface sediment sampling performed in 2019 at station OMMP-29 verified that PCB concentrations in this area were successfully reduced to below SQOs identified in the CB/NT ROD. (Targa has subsequently sold the facility.)
- American Nearshore (SMA 421B) – post-dredge residual recovery: During Segment 4 dredging, a historical nearshore wharf structure was encountered within the dredge prism, necessitating removal of buried creosote-treated piling in this area. While multiple dredge passes were performed in this area, sediment concentrations exceeding PAHs SQOs identified in the CB/NT

ROD remained at three nearshore OMMP sampling stations (OMMP-26, -27, and -28). Results of the 2016 monitoring indicated that the extent of SQO exceedance had been substantially reduced such that only one station (OMMP-28) exceeded the SQOs identified in the CB/NT ROD for PAHs and benzyl alcohol. Based on updated lines of evidence summarized in the Final DMMP Clarification Paper (USACE, 2016), benzyl alcohol is no longer believed to be a contaminant of concern at the concentration measured in the sediment, even though it exceeds the SQO identified in the CB/NT ROD. Surface sediment sampling performed in 2019 at station OMMP-28 revealed that PAH and benzyl alcohol concentrations were reduced to below SQOs identified in the CB/NT ROD, consistent with natural recovery projections.

- Buffelen Intertidal (SMA 341) – recovery designated during design: During remedial design, this area was designated as an intertidal MNR area, as sources to this SMA were believed to have been controlled. However, the results of the 2016 monitoring data in this area (station OMMP-34) revealed that surface sediment PAHs and PCB concentrations in this area were largely unchanged from those measured during remedial design, exceeding SQOs identified in the CB/NT ROD. Field observations of the area at the time of sampling revealed that there is an eroding shoreline fill area with erosion threatening the stability of the adjacent warehouse structure. Shoreline stabilization measures in this area were subsequently performed by the property owner. Surface sediment sampling performed in 2019 at station OMMP-34 verified that PAH and PCB concentrations were reduced to below SQOs identified in the CB/NT ROD.

Pier 24/25 Cap

The Pier 24/25 cap was visually inspected at low tides (lower than -3 MLLW) in 2017 and 2019. The focus of the inspection was to document any visual evidence of potential cap erosion. Fixed photographic points were established to assess changes in capped areas over time. All inspected capped areas were intact and in good condition with no visible erosion. There was no observed damage, cracking, buckling, significant erosion, or seepage in shotcrete areas that could potentially compromise the cap. The placed cap armor materials were observed across the entire surface of the cap, providing further evidence of cap integrity and stability. The only notable observations are summarized as follows:

- A stormwater outfall equipped with a tide gate discharges between Bents 36 and 37 onto the shotcrete intertidal cap. The stormwater flow path is apparent in the adjacent gravel/cobble substrate below the outfall with intact armor stone on the sediment surface.
- Dark stained striations (aligned with the spacing between the wood planks in the decking above) were observed on the shotcrete cap in a few spots between Bents 60 and 69. Most of these striations are discoloring on the surface of the shotcrete; however, there was a minor groove observed between Bents 60 and 61.

The Port will continue to monitor these areas to further verify cap integrity in these and other areas. The next scheduled monitoring event is in 2020.

4.2.2 OU 01 Sediment and OU 05 Source Control Removal Actions

Since the fourth FYR (2014), activities for OUs 01 and 05 Removal Actions have been related to O&M monitoring of the remedy. Data in the following documents were evaluated:

- 2015 Olympic View Resource Area Monitoring Report
- 2015 Status Report No. 18 Groundwater Compliance Monitoring Blair Backup Property
- 2016 Olympic View Resource Area Monitoring Report

- 2017 Status Report No. 19 Groundwater Compliance Monitoring Blair Backup Property
- 2017 Pier 4 Phase I Time Critical Removal Action Completion Report
- 2018 Status Report No. 20 Groundwater Compliance Monitoring Blair Backup Property
- 2019 Puyallup Land Claim Hylebos Mitigation Site Evaluation Year 7 Report

4.2.2.1 Puyallup Land Claim Removal Actions

Mitigation Sites

The USACE, on behalf of EPA, evaluated the Hylebos Peninsula and Outer Hylebos mitigation sites per the requirements outlined in the Contingency Plan for the seventh year's performance in 2019. The upland vegetation in the Outer Hylebos no longer exists. The majority of tree and shrub species in the remaining eastern upland area have died and the remaining few are visibly stressed. Several invasive species and trash were noted at the site, but not in appreciable amounts (less than 10 percent). The goose exclusion system has been removed but does not seem to have had an effect on the plantings in this area. The goose excluder system at the Hylebos Peninsula in the intertidal planted area is in disrepair, with all of the ropes down. Vegetation in the intertidal area at the Peninsula site has not established as well, likely due to the lack of maintenance on the goose excluder system. The intertidal marsh and the upland area both have trash and invasive species present, but not in appreciable amounts. It appears that stewardship of the area is being conducted, but additional measures need to be taken.

Groundwater

Groundwater monitoring of the landfill at the Blair Backup Property was conducted in October 2016 and October 2018. Each monitoring well was inspected before sampling. With the exception of wells HC-11SR and HC-16S, the wells were generally in good condition with functioning j-plugs

preventing water from entering the wells. Several wells were repaired in 2016 and were in good condition in 2018. In 2014 and 2016, the water level at HC-11SR was noted to be relatively elevated compared to previous monitoring events and in 2016 the well was described as damaged. Groundwater recovery at well HC-16S in 2016 was noted to be anomalously slow. Attempts to redevelop the wells were made by Washington State licensed drillers in September 2018. While well HC-16S was able to be redeveloped, well HC-11SR was not due to an obstruction which prevented a 2-inch surge block from being used and due to significant accumulation of black fine-grained soil found at the bottom of the well. Groundwater samples were collected from seven of the eight groundwater monitoring wells. Samples were analyzed for metals (arsenic, copper, lead, nickel and zinc). A statistical analysis of the post-placement data to the pre-placement data (baseline) revealed that there is no statistically significant difference between the data sets for all analytes.

4.2.2.2 General Metals Removal Action

No data were collected from the General Metals cap since the last FYR to ensure that the cap integrity is maintained, and it continues to perform as designed.

4.2.2.3 Olympic View Removal Action

During the August 2015 visual inspection, remnants of filter fabric were observed at the surface of the cap in some areas, raising questions about whether sufficient material movement had occurred to impact cap thickness and remedy protectiveness. A survey was scheduled, as further discussed below. Another site visit was performed on May 9, 2016. It was noted that toward the western end of the site, there was a buildup of material with deposited gravels. Sand was noted on the upper slope at the eastern end of the

site, with graded cobble below. Erosion at the high tide line was also noted near the eastern end of the site and on the Foss Maritime property. Erosion has also been continuing to occur near the northwest corner of the Capital Lumber warehouse building over the past several years. A small depression was noted at the lower end of transect T4. At the lower portion of the site, there continues to be mud visible at the surface starting at approximate elevation 0 MLLW rather than the erosion protection material that was initially placed but promptly covered by fine sediment. With probing of the beach in this lower intertidal area, the presence of the erosion protection rock below the finer grained material was not apparent.

The 2016 survey data were compared to the 2003/2004 data, and results evaluated relative to the OVRA performance standards. The remedial cap in Areas A and C5 have experienced some erosion at levels exceeding the performance standards for the site. The thickness of the cap remaining in each of these areas is shown in the table along with the types and levels of contaminants which were present below the cap, as discussed in the Removal Action Completion Report. The 2016 survey data confirm the visual observations from August 2015 that some material loss has occurred in portions of the OVRA site.

4.2.2.4 Blair Waterway TBT Removal Action

Post-dredge confirmational sampling was conducted on January 4 and 5, 2016. Results indicated that additional dredging was necessary in some of the DMUs in order to removed sediment that exceeded the DMMP TBT bulk and porewater screening levels. Two more sampling events were conducted, and additional dredging was completed in both the DMUs and the perimeter areas. In coordination with USEPA and the DMMP, review of the results of the final sampling event, along with subsurface results from the previous sampling event conducted during additional dredging, indicated that a final dredge pass was needed, but that no additional sampling was required.

4.2.2.5 Occidental Removal Actions

No data were collected from the Occidental Removal Action area since the last FYR.

4.2.3 OU 02 Asarco Tacoma Smelter Facility

Since the fourth FYR (2014), activities for OU 02 have been related to O&M monitoring of the remedy that have been implemented thus far. Data in the following documents were evaluated:

- 2015 Point Ruston Annual Operation, Maintenance, and Monitoring Report
- 2016 Point Ruston Annual Operation, Maintenance, and Monitoring Report
- 2017 Point Ruston Annual Operation, Maintenance, and Monitoring Report
- 2018 Point Ruston Annual Operation, Maintenance, and Monitoring Report

On-Site Containment Facility

The OCF is a hazardous waste landfill consisting of a double composite bottom liner system, and a composite cover liner system. Two systems, the leachate collection and removal system (LCRS) and the leak detection, collection, and removal system (LDCRS), are present in the bottom liner. In 2017, Point Ruston pumped leachate from the LCRS four times into a 5,000-gallon polyethylene storage tank located at the toe of the OCF. Leachate collected in the storage tank is shipped to an off-Site disposal location. A total of 18,190 gallons of leachate was shipped off-Site in 2017. Prior to shipping, leachate in the storage tank is tested to determine disposal requirements. Leachate production in the OCF has dropped from approximately 350 gallons per day in 2006 to just under 52 gallons per day in 2017. The LDCRS or leak detection sump has remained dry since 2008, indicating that the primary liner is not

leaking. Even though the LDCRS leak detection sump has been dry for several years, the sump pump is turned on periodically throughout the year to ensure that it remains operational. The 2017 engineer's inspection concluded that the OCF leachate detection and collection systems, final cover, and survey benchmarks are generally in good condition and functioning as intended.

A comment from EPA was submitted to Point Ruston on the 2015 O&M Report which was concerned with ensuring proper leachate storage levels on the OCF primary liner system were being maintained (EPA, 2016). In response to this EPA comment, and to add clarity to OCF leachate monitoring efforts, a stage-storage curve was developed for the LCRS sump. This stage-storage curve determined that a LCRS transducer reading of 54 inches (4.5 feet) is equivalent to 12 inches (1 foot) of head over the primary liner system. Point Ruston O&M personnel record leachate levels in the LCRS and LDCRS sumps on a near-daily basis. During 2017, the leachate levels in the LCRS were maintained between 40.1 inches (3.34 feet) and 53.8 inches (4.48 feet). Using the stage-storage curve, these values correlate to leachate head levels ranging between 0 inches and 11.8 inches (0.98 feet) over the primary OCF bottom liner system. The 0-inch value indicating that leachate levels are low enough that leachate is only present in the LCRS sump and not over the primary liner system. Of 258 daily LCRS transducer readings taken in 2017, none exceeded the 54-inch (4.5 foot) maximum required by the OMMP for the OCF.

Smelter Site Cap

The Smelter Site Cap is comprised of one of the following configurations:

- Multi-Layered Soil Cap;
- Asphalt Concrete (AC) Pavement Cap; or
- Portland Cement Concrete (PCC) Pavement Cap.

In general, Point Ruston O&M personnel performed routine inspections of the Smelter Site Cap components for each completed remedial action phase on a quarterly, monthly, and at times, weekly basis throughout 2017.

The quarterly inspections included visual inspection of the streets, signage, streetlights, storm drains, sidewalks, landscaping, roundabouts, fencing, gates, Baltimore Street Bridge, and OCF slope. The July 2017 inspection reported new cracks and spalls in the rolled curb and gutter at Ruston Way station 31+50 on the north and south sides of the roundabout. Additional new cracks and spalls in stamped concrete for the crosswalk and rolled curb and gutter near station 32+25 were also reported. While these cracks and spalls were reported as new by the inspection, they are known to previously exist. This O&M monitoring confusion facilitated a refined pavement defect monitoring system which is discussed and implemented in this year's engineer's inspection of the Smelter Site Cap.

Monthly inspections of the Waterwalk Smelter Site Cap were conducted during 2017. Monthly inspections included visual observation of the landscaped areas, shoreline armoring, fencing, and the general condition of the hardscape features. Notable inspection and routine maintenance items from 2017 include the following:

- The January inspection noted balding areas along the gravel walk due to heavy traffic and rain, yellowing grass from pet activity, exposed slag on either side of the habitat cove, and that Scotch's Broom was removed from a portion of the Waterwalk fence line.
- The February inspection report noted slight ponding on the multi-use path near the playground, in addition to ponding in several areas along the gravel jogging path.

- The March inspection reported that gravel was added to bare spots and new stone was added to cover exposed slag.
- April inspection noted yellowing grass from pet activity. Signs were added in several locations along the Waterwalk informing the public not to throw rocks into adjacent Commencement Bay.
- The June inspection noted thinning rock in landscaped areas due to the public throwing rocks into the adjacent Commencement Bay. Inspection also noted a leaking sprinkler near the Phase 1 area.
- The August inspection noted yellowing grass adjacent to the Phase 1 and Phase 2 – Lot 2 areas.
- The September inspection noted a small area of exposed multi-layer cap marker layer geotextile at the Waterwalk/Shoreline Armoring interface. Inspection also noted a narrow strip of yellow grass due to fertilizer burn that runs along a significant portion of the Waterwalk.
- The October inspection noted that gravel was added near seating areas at stations 13+50 and 11+50 to fix previously noted erosion.
- The November inspection noted ponding water on the gravel jogging path near the habitat cove and erosion in three locations along the gravel jogging path. The inspection also noted that all shoreline level spreaders were cleaned.

The shoreline level spreader system is the terminus for a portion of the Point Ruston clean storm water system. The system is made up of 20 individual level spreader pipes, P1 through P20, which consist of a 60-foot length of 8-inch diameter perforated PVC pipe installed within a drain gravel encasement along the back of the shoreline armoring system. The level spreader system currently accepts storm water from Buildings 1A, 1C, 2A, 2B, the Grand Plaza, and the geomembrane temporary caps for Development Area 4 as well as portions of Areas 3 and 17. Informal monthly inspections of the level spreader system were conducted during 2017 by Point Ruston personnel. Cleanouts on either side of each level spreader pipe allowed Point Ruston O&M personnel to check for ponding storm water indicating an obstruction of the perforations. Two notable inspection items from 2017 follow:

- The January inspection reported less than 1 inch of sediment and water accumulation in shoreline level spreaders P8 through P13.
- The May inspection reported that trash was removed from shoreline level spreaders P8 and P9.

The Phase 1 area Smelter Site Cap is provided by Building 2A, 2B-West, and 2B-East building caps, AC Cap roadways and view corridors, concrete sidewalks and patios surrounding buildings, and a multi-layered cap with either a hardscape or landscaped surface finish. Monthly informal inspections of the Phase 1 Smelter Site Cap were conducted throughout 2017 by Point Ruston O&M personnel. These monthly inspections included visual observation of cap surfaces including grass landscaping as well as asphalt and concrete pavements, storm water conveyances, valve and vault lids that require periodic application of silicone sealant, and the parking garage for Building 2A. Notable inspection and routine maintenance items reported during 2017 include the following:

- The April inspection noted that joints in PCC sidewalk and curb and gutter need to be resealed in Bayview Corridor.
- The May inspection noted that drains in the Copperline parking garage have debris that needs to be removed.
- The July inspection reported that Crawford Services made needed repairs to joint sealant in sidewalk and curb and gutter PCC joints as well as cracks in the Copperline parking garage slab-on-grade. Inspection also noted areas of yellowing grass in the Copperline lawn adjacent to the Waterwalk.

- The August inspection reported that a moving truck got high-centered in Bay View Corridor and left a significant scar on the asphalt.
- The October inspection reported that drains in the Copperline parking garage were cleaned. Additionally, new cracks were noted near the dumpster area in the Copperline parking garage and small cracks were noted in PCC joints in the Phase 1 area.
- The December inspection noted ponding water near planters on the east side of the Copperline. The inspection also noted that PCC joints in the Phase 1 area were cleaned.

The Phase 2 – Lot 2 Smelter Site Cap is provided by Building 1A and 1C building caps; AC Cap roadways for Main Street, Grand Loop and Island View Corridor; small areas of PCC Cap on the northwest and southeast sides of Building 1A; and a multi-layered cap, under the Grand Plaza and surrounding the majority of Buildings 1A and 1C, with finished surfaces provided by landscaping, concrete sidewalks, or brick pavers. Monthly informal inspections of the Phase 2 – Lot 2 Smelter Site Cap were conducted throughout 2017 by Point Ruston O&M personnel. These monthly inspections included visual observation of cap surfaces including grass landscaping as well as brick pavers,

concrete sidewalks and patios, storm water conveyances, and valve and vault lids that require periodic application of silicone sealant. Notable inspection and routine maintenance items reported during 2017 include the following:

- The January inspection reported that a water meter vault in front of WildFin Grill needed to be resealed.
- The April inspection noted bare spots in the multi-layer cap grass cover on the northeast side of the Century Building.
- The May inspection noted an area of ponding water on the grass cover near the Century Building due to over-watering. The inspection also noted that reseeded bare spots had grass growing in them.
- The July inspection noted areas of yellowing grass in the Century Building lawn adjacent to the Waterwalk.

The Peninsula Park Smelter Site Cap is broken into two general areas; the breakwater slag peninsula and a private extension of Yacht Club Road. A multi-layered cap with a grassed cover surface provides the breakwater slag peninsula area cap. The Yacht Club Road cap is provided by the asphalt roadway and sidewalks as well as concrete curbs and gutter and sidewalks. Metro Parks Tacoma, owner of the breakwater peninsula, commenced construction activities on the breakwater peninsula in July 2016. These construction activities ended Point Ruston's O&M responsibility on the breakwater peninsula. Construction activities were completed in 2019 and Metro Parks will be required to conduct O&M on the breakwater peninsula starting in 2020.

Shoreline Armoring

The last shoreline armoring inspection was conducted in 2016. Point Ruston routinely inspects the shoreline armoring during its inspections of the Waterwalk and no issues or problems were noted. A review of the Coastal Marine Automated Network shows that no extreme wind events occurred during 2017. During a 2019 unscheduled site inspection, the EPA RPM noted that the upper shoreline armoring was thinning, mainly due to human activity (people throwing the rock into the water). At EPA's request, the City of Tacoma, who now owns this area of the waterwalk and shoreline property, prepared a repair procedure and installed larger two-man rock along the upper slope. The next shoreline armoring inspection should be scheduled for 2021, when tides are less than -1 MLLW.

Temporary Storm Water Controls and Caps

Weekly/monthly inspections of the temporary caps and storm water controls were conducted throughout 2017. Weekly/monthly inspections included visual observation of the geomembranes, sandbags, anchor edge berms, and drainage off the temporary caps and active construction areas. The main issue has been maintenance of the contaminated soil stockpiles as winds continually damage the plastic cover. Point Ruston applies tackifier to any areas where the temporary cap has been removed to conduct work to ensure that contaminated soils are not transported out of the containment zones.

Stack Hill Temporary Grass Cap

The annual O&M Inspection for erosion on Stack Hill was performed in December 2017. A review of inspection photos indicated that the grass cover is in excellent condition with no observed erosion at the time of the inspection. The silt fence at the base of Stack Hill and storm water drains are all in good condition as well. In addition, completed residential development appears to add to the stability of the Stack Hill cover system.

Inspection and Cleaning of Parking Garage Structures

The Building 2A parking garage slab-on-grade inspection was conducted in August 2017. The inspection noted that the garage slab appears to be well taken care of and continues to be cleaned on a regular basis. One item was noted for continued monitoring: Differential settlement of the Building 2A footings and parking garage slab.

4.2.4 OU 03 Tacoma Tar Pits

Since the fourth FYR (2014), activities at the Tacoma Tar Pits OU have been related to inspection, operations, and maintenance of the remedy and groundwater monitoring. Data in the following documents were evaluated:

- 2014-2018 Inspection and Maintenance (I&M) Reports
- Water quality monitoring reports (2014-2018; 2018 3rd-4th QTR after GWET System upgrade)[8]
- Treatment System discharge reports (2014-2018)
- Final Asphalt Testing Plan (July 2018)
- Asphalt Permeability Results (2018-2019)

Groundwater Extraction and Treatment (GWET) System Performance

Review of the water quality and discharge reports indicates that the GWET system is functioning as intended, and that the benzene plume in the Sand Aquifer is generally being contained by the extraction and treatment system (DOF 2019e). By 2016 declining pumping rates appeared to be allowing some benzene to migrate around or between the wells downgradient of the north OU boundary. To address this issue, the following actions were performed in 2017:

- Replaced the existing treatment plant.

[8] Preliminary groundwater data through September 2019 was discussed with the PRP and is incorporated into this 5YR review report as appropriate.

- Designed the replacement treatment plant to handle increased flows to provide future flexibility. The existing treatment plant was designed to handle 25 gpm (36,000 gpd). The replacement treatment plant was designed to handle up to 40 gpm (57,600 gpd).
- Designed the replacement treatment plant to accommodate four new wells (two for the North Branch[9] and two for the East Branch), also to provide future flexibility (see below).
- Similar to the existing system, provided ports for liquid phase carbon if additional treatment is necessary to meet the City of Tacoma discharge criteria.

A new replacement system was designed (DOF 2017d), permitted and installed by November 2017 (DOF 2019a) that increased pumping rates and improved containment. Monitoring is being conducted to assess the degree of containment.

A major goal of replacing the treatment plant was to increase average pumping rates. Analysis of existing data indicate that after this is accomplished, benzene concentrations likely will meet the ROD criterion at the OU boundary. If additional pumping volumes are needed to meet the criterion, a preliminary review of the existing North Branch wells and pumps indicate it is feasible to replace the well pumps with pumps of higher pumping capabilities. As a fallback, increased pumping volumes could be derived from replacing or adding wells (but would need to be permitted by Tacoma). The replacement treatment system design accommodates both additional wells and treating higher volumes, if necessary.

System Operation. From March 2015 to September 2019, the system operated approximately 96 percent of the time at an average pumping rate of approximately 7.5 gallons per minute (gpm). These estimates reflect the combined operation of the original and replacement treatment system.

Routine maintenance activities included the following:

- Weekly bag filter changes
- Monthly air stripper tray cleaning (necessary to meet benzene discharge criteria)
- A replacement blower motor was installed on December 21, 2018.

The treatment system experienced an emergency shutdown on December 5, 2018 while the wells continued to pump, causing an overflow of the equalization tank. Approximately 3,000 gallons overflowed onto the treatment skid and into DB#1. Pumping was shut down before any off-site discharge of untreated water occurred. Released water was collected and pumped into a storage tank. Subsequently, the stored water was pumped back into the equalization tank, treated, and discharged to the Tacoma's sewer system. The cause of the overflow was traced to errors in the software controlling the replacement treatment system (Programmable Logic Unit – PLC) and faulty wiring of a float-switch that was supposed to shut down the entire system in the event of an overflow. The PCL was reprogrammed, and the float switch was hard-wired to the primary power supply to shut- down the entire system, if water is detected in the skid. Consistent with the discharge permit, the overflow was reported to Tacoma and a "Treatment System Upset Report" (December 2018) was prepared and submitted to the City and EPA after the repairs were made. A copy of this report is included in the Water Quality Monitoring Report, September and December 2018 (June 2019).

[9] The North Branch pumps most (+85 percent) of the water being treated by the containment system.

Discharge Volume. The discharge permit limit for flow is 20,000 gallons per day (gpd). Approximately 18,000,000 gallons were treated and discharged to the Tacoma system between March 2015 and September 2019. The average daily flow rate between March 2015 and September 2017, while the original plant was operating, was 8,825 gallons per day (gpd). Flows increased to an average of 13,700 gpd between October 2017 and September 2019 after the replacement system began operating. No single day discharge exceeded the permit limit.

Reducing Need for Containment. Significantly reducing the need for containment is not considered feasible. The source of the benzene is coal tar derived material that migrated thought the Fill Aquifer and Upper Aquitard into the Sand Aquifer. Logging of borings indicate the oily dense non-aqueous phase liquid (DNAPL) has migrated to depths of up to 40 feet and could not be removed during the past remedial efforts, which is the primary reason why hydraulic containment was required by EPA.

Discharge Permit Renewal. The City of Tacoma reviews and renews PSE's Industrial Wastewater Discharge Permit every five years. The current discharge permit No. TAC-031-2022 was renewed on April 11, 2017 and expires on April 10, 2022. The permit will need to be renewed during the next FYR cycle.

Groundwater Monitoring Results

Influent and Effluent Benzene Concentrations. Influent samples were obtained from the North and East Branch pumping systems on a quarterly basis from March 2015 to August 2019. The samples were analyzed for pH, benzene, toluene, ethylbenzene, xylenes (BTEX), oil & grease, and total petroleum hydrocarbons, consistent with the discharge permit. All concentrations were below permit limits.

Average influent sample benzene concentrations are summarized below in Table 4-2. Influent concentrations were within the range historically observed. All effluent concentrations were below discharge criteria.

TABLE 4-2. OU 03 INFLUENT/EFFLUENT BENZENE CONCENTRATIONS (µg/L)

Period	Avg. North Branch Influent (FM1)	Average East Branch Influent (FM2)	System Effluent (Range)[1]
2015 to August 2019	512	1150	<0.42 to 310[2]

Notes:

1. Discharge limit is 500 ug/l benzene;
2. Most concentrations were less than 5 ug/l.

Groundwater Trends and Compliance with Performance Criteria. Overall, post-remediation data collected after 1994 indicate the following:

- The ROD criteria for lead, PCBs, and PAHs are met at the site boundary in surface water and groundwater. Lead and PCBs are no longer analyzed as part of the monitoring program, except semi-annually sampling for lead (and cadmium) at surface water location SW.
- The benzene criterion is met in surface water and in groundwater within the Fill and Lower Aquifers.
- Benzene concentrations exceed the ROD criterion along two portions of the OU boundary including the East Branch Area and North Branch Area (Figure 4-1). Benzene concentrations in these areas are being contained by the pump and treat containment system.

- The primary possible receptor via benzene migration in groundwater is the Puyallup River. Groundwater monitoring data indicate that no benzene has migrated to the river at concentrations approaching the ROD criterion. Downgradient detections in wells located between OU 03 and the river have been intermittent near the analytical reporting limit (0.2 ug/l).
- Benzene concentration trends at OU 03 have been affected by remedial construction impacts, seasonal precipitation recharge and operation of the containment system (since 2002).

Benzene concentration trends were assessed using time series plots and the Mann- Kendall statistical technique (by GSI in the US Air Forces "MAROS: A Decision Support System for Optimizing Monitoring Plans" 2003). The concentration time series plots include data from the early 1990s or starting when the wells were installed. Mann-Kendall analyses were completed using the last five years of validated data (September 2013 to December 2018) to provide insight concerning recent groundwater trends. The focus of the analyses were the East and North Branch areas.

East Branch Area (TTP-3M Area). The East Branch area is defined as the area generally between wells TTP-12M and DOF-36M. Groundwater level measurements within the East Branch area indicate that groundwater flows in a southeasterly direction. Buried sanitary sewer lines trend along the OU boundary.

This area lies within the former tar pit area (AGI 1987). Overall, data for the reporting period indicate the benzene concentration patterns and trends are similar to previous years. The Mann-Kendall analyses suggest stable or no trend for wells TTP-2M, DOF-25M, DOF-26M and DOF-34M. Increasing trends were suggested for sample concentrations in wells TTP-3M and DOF-24M.

Wells TTP-2M, DOF-35M and DOF-36M are located along the buried sewer lines in the direction of the Puyallup River. Concentrations were below the ROD criterion, based on preliminary results from samples obtained in September 2019.

Wells DOF-19M and DOF-20M are located southeast of and immediately adjacent to the OU boundary/sewer lines. In the past, generally only trace amounts of benzene (near the reporting limit) have intermittently been detected in samples from these wells. In September 2019 (preliminary results), benzene was not detected in a sample from DOF-19M (<0.03 ug/l) and was detected in the sample from DOF-20M at 0.04 ug/l. Data from these wells indicate that benzene is not migrating above the ROD performance criterion beyond or along the buried sewer to a significant degree.

Analysis of historic data from well TTP-2M indicate that benzene concentrations were impacted by remedial construction. Benzene concentrations as high at 800 ug/l have been detected in samples from this well. Concentrations have remained well below the ROD criterion since approximately July 2009, the longest period since remedial construction in the early 1990s. Based on these data, it appears that construction impacts have dissipated along this portion of the site boundary.

North Branch (TTP-18M Area). The North Branch area is located on the north part of the site and generally lies between wells AGI-14M(R) and TTP-5M. Groundwater level measurements made during non-pumping periods indicate that groundwater flows in a generally northeastward direction beneath this portion of the site depending on tidal stage when the measurements are made. There is a reversal in the flow direction at a high tidal stage between the Puyallup River and the northeast site boundary. Historic benzene concentration patterns divide the higher benzene concentrations into two lobes including those centered on TTP-18M/DOF-31M and DOF-33M. Samples from these wells are used to determine compliance with the ROD groundwater criteria.

The benzene criterion is met in samples from ARI-14M, DOF-32D, TTP-5M, and TTP- 18M. Benzene concentrations in samples from the compliance wells at the beginning and end of the 5YR cycle are listed in Table 4-3 below. Concentrations have declined to below the ROD criterion in samples from TTP-18M. Concentrations in samples from wells DOF-31M/D and DOF-33M are still above the ROD criterion but have declined on the order of approximately 40 to 65 percent. The Mann-Kendall analyses indicate decreasing trends in samples from TTP-18M, DOF- 31M and DOF-33M.

TABLE 4-3. OU 03 CHANGE IN BENZENE CONCENTRATIONS AT NORTH SITE BOUNDARY (µg/L)

Date	TTP-18M	DOF-31M/D	DOF-33M
December 2014	130	340	210
September 2019	0.04	120	120

Wells DOF-27M and DOF-28M are located downgradient of the North Branch area between OU 03 and the Puyallup River. Generally, benzene has not been detected in samples from these wells or only in trace amounts.

Water Quality Summary. In general, the benzene concentrations in the monitoring wells at OU 03 vary considerably, but the shape of the benzene plume (areas with concentrations greater than 53 µg/L and greater than 1,000 µg/L) are generally similar to the shape of plume in December 2014 and December 2018.

Benzene is not migrating beyond the eastern OU boundary (East Branch Area) and buried sewer lines, or along the sewer lines themselves. Available data indicate that the benzene plume is being contained and the remedy remains protective of the Puyallup River.

Compliance wells (TTP-18M, DOF-31M/D and DOF-33M) are located just beyond the north site boundary because of access issues. In the past benzene concentrations have exceeded the ROD criterion in these wells. Benzene concentrations in samples from well TTP-18M are well below the ROD criterion. Concentrations in samples from wells DOF-31M/D and DOF-33M exceed the ROD criterion but appear to be declining as a result of the increased pumping volumes from the containment system and possibly because construction impacts are waning. Additional monitoring is required to assess groundwater trends in the North Branch Area.

The Puyallup River is located downgradient of the North Branch area. Monitoring of wells between OU 03 and the river continue to indicate that the benzene plume has not migrated to the river. Overall, the remedy remains protective of the river.

4.2.5 OU 04 Asarco Off-Property (Ruston/North Tacoma Study Area)

Since the fourth FYR (2014), activities for OU 04 have been related to O&M monitoring of the remedy. Data in the following document was evaluated:

- 2019 Tacoma Smelter Plume: EPA 5-year Survey

EPA, Ecology, and TPCHD partner every five years to study whether residents in the Tacoma Smelter Plume EPA Study Area are educated about current and ongoing CPMs regarding soil contamination on their property and actions they can take to decrease exposure to heavy metals in their soil. A paper and electronic survey of the 2,694 residents within the Study Area was conducted in June 2019. Residents returned 457 surveys, constituting a 17 percent response rate. Comparing 2014 and 2019 survey results, 59 percent of respondents were aware of the CPMs while 71 percent were aware in 2019. Half of the

respondents were aware that their soil had been tested and only 20 percent were aware that contaminated soil in their yard had been removed and replaced with clean soil.

4.2.6 OU 06 Asarco Groundwater and Sediment

Since the fourth FYR (2014), activities for OU 06 have been related to O&M monitoring of the remedy that has been implemented thus far. Data in the following documents were evaluated:

- 2016 Baseline Sediment Cap Monitoring Report
- 2018 Year 2 Sediment Cap Chemical Monitoring Report

Physical monitoring included an underwater diver survey and a shoreline low-tide visual inspection of the Sediment Cap surface and to determine sediment sampling locations for chemical monitoring. One area in the shoreline armoring was identified where slag is beginning to be re-exposed. This area will be inspected more thoroughly during the next monitoring event in 2020. Sea life observed in the Moderately Impacted Area samples included small crabs, hermit crabs, anemones, tube worms, sea cucumbers, snails, geoducks, urchins, shrimp, razor clams, kelp, and algae. Sea life observed in the capped area samples included hermit crabs, a living clam, starfish, tube worms, sea cucumbers, shrimp, barnacles, small fish, isopods, kelp, and algae (seaweed).

Chemical sampling of the sediment cap was conducted in August 2018. Twenty-five surface sediment samples were collected from the site during the sampling event. Eight surface sediment samples were collected from the sediment cap: five samples from the offshore sand/silt cap, one sample from the sand/gravel cap, and two samples from the riprap cap. Five of the samples were located in approximately the same area as the 2016 baseline samples. Ten sediment samples were collected from the Moderately Impacted Area offshore of the sediment cap. Six discretionary samples were collected at the following specific locations of interest: the North Outfall, the former South Outfall, areas directly adjacent to the mounded area, the footprints of the former copper dock and ore dock, and the uncapped area immediately adjacent to the City of Tacoma Outfall. Five of these samples were in the same location as baseline samples. Little to no fine-grained material was observed at the toe of the shoreline armoring along the entire site during the low-tide visual inspection; therefore, no samples were collected within the toe depositional areas.

All samples were analyzed for metals (arsenic, cadmium, chromium, copper, lead, silver and zinc), PAHs, chlorobenzenes, phthalates, phenols, benzyl alcohol, benzoic acid, hexachlorobutadiene, and PCBs. All samples collected in the capped areas were below the cleanup goals. Samples SCCM-180809-1 and SCCM-180809-2 in the Moderately Impacted Area contained pieces of slag material. Arsenic, copper, lead, and zinc concentrations in these samples were one to two orders of magnitude greater than the CSLs. Arsenic was also detected in sample SCCM-180809-09 at a concentration greater than the CSL. Arsenic also exceeds SMS SQS criteria in sediment collected from beneath the discretionary area/City of Tacoma Outfall (SCCM-180809-26), where no sediment cap currently exists.

4.3 SITE INSPECTIONS

This section summarizes the site inspections that were conducted for this FYR.

4.3.1 OU 01 Sediment and OU 05 Source Control

Head of Thea Foss Waterway

The inspection of the Head of Thea Foss Waterway was conducted on 5/20/2019. In attendance were Kristine Koch (EPA RPM), Jackie Wetzsteon (PacifiCorp), Senda Ozkan and Gary Braun (Tetra Tech, Inc). The objectives of the site inspection were to:

- Observe the general condition of the waterway slopes exposed at low tides;
- Observe the general condition of the scour protection apron at the head of the waterway;
- Monitor the former SR-509 seep areas for evidence of sheens;
- Observe the cap conditions near Outfall #243 after a truck accidentally went into the waterway on April 26, 2017, noted in 2017 (Year 13 of the OMMP);
- Observe the conditions at the Former American Plating upland remediation site completed in 2012;
- Observe the slope area where the derelict pier was removed on the west bank;
- Observe the conditions of the walking path along the west bank slopes noted in 2013 (Year 9 of the OMMP);
- Observe the general condition of wing walls and outlet protection of Outfall#235;
- Briefly document observed site conditions during a low daytime tide.

The shoreline cap was generally in good condition. There was one area on the western shoreline where it appeared that a vessel had run into the cap and displaced the riprap material, but the cap was still intact. This damage was repaired later in 2019 to prevent erosion of the underlying cap material.

The condition of the scour protection apron at the head of the waterway was in good condition and functioning as intended. No sheens were observed at the site.

The damage to the cap area near Outfall 243 has smoothed out with time and wave action and there was almost no indication of tire ruts observed during the site visit.

Observations of the former American Plating remediation site along the top of the east slope of the waterway showed that the capped area was nicely grassed. Restoration of the capped portion of the site adjacent to the shoreline in the habitat enhancement area at and above the OHW line has been completed with native plantings and was in good condition, although, several non-native/invasive species were observed during the site visit in this area.

The demolition of the derelict pier did not cause any notable erosion or scour impact to the sediment cap in the area of the pier removal.

At Outfall #235, both wing walls are separating from the outfall head wall. The separation has been observed and measured since 2008. The general conditions of the wing walls showed that the separation between the wing walls has increased, indicating additional movement. Overall conditions of the outfall protection indicate that the outfall has experienced some high flows. There continues to be an approximately 2-foot-deep pool with mostly a rocky bottom of approximately similar to the typical observations from previous years. The pool dimensions were about 6 feet by 8 feet, wrapped by outfall protection rock piles of 3 to 4 feet height at north side. No undercutting or deep scour under the concrete outfall apron was observed.

Mouth of Hylebos Waterway – Pier 24/25

The inspection of the Mouth of Hylebos Waterway Pier 24/25 was conducted on 6/5/2019. In attendance were Kristine Koch (EPA RPM), Port (Stan Sasser), and Anchor QEA (Nik Bacher). The objectives of the site inspection were to:

- Confirm that cap performance standards are achieved by the remedial action;
- Confirm that subsurface contamination has not been exposed through physical processes such as storms or ship scour; and
- Confirm the effectiveness of the constructed cap.

All inspected capped areas were intact and in good condition with no visible erosion. Notable observations are summarized as follows:

- A stormwater outfall equipped with a tide gate discharges between Bents 36 and 37 onto the shotcrete intertidal cap. The stormwater flow path is apparent in the adjacent gravel/cobble substrate below the outfall with intact armor stone on the sediment surface.
- Dark stained striations (aligned with the spacing between the wood planks in the decking above) were observed on the shotcrete cap in a few spots between Bents 60 and 69. Most of these striations are discoloring on the surface of the shotcrete; however, there was a minor groove observed between Bents 60 and 61.
- The site is free of trash and debris due to a boom deployed at the outer edge of the piers, which is proving to be an excellent BMP for both protection of the cap and for reduced maintenance.

St. Paul Waterway

The inspection of the St. Paul Waterway was conducted on 8/1/2019. In attendance were Kristine Koch (EPA RPM), Justine Barton (EPA), Dave McEntee (Simpson), Tom Richardson (International Paper), and Karl Schumacher (West Rock). The objectives of the site inspection were to:

- Confirm that cap performance standards are achieved by the remedial action;
- Confirm that subsurface contamination has not been exposed through physical processes such as storms or ship scour; and
- Confirm of the effectiveness of the constructed cap.

The inspection occurred at a -4 MLLW tide. At this tide, the majority of the cap is above water and was in excellent condition. The adjacent Puyallup River has deposited fine-grained sediment on a portion of the cap and there was a healthy population of moon snails, clams and worms. A kelp bed associated with larger rocks that were placed on top of the subtidal cap was still present and healthy.

4.3.2 OU 03 Tacoma Tar Pits

The inspection of the Site was conducted on April 10, 2019. In attendance were Tamara Langton (previous USEPA RPM 2014-2019) and Piper Peterson (current RPM), from EPA, Region 10. The purpose of the inspection was to assess the protectiveness of the remedy.

A site walk was conducted to see where asphalt permeability testing was conducted, to ensure the surface water drainage system was not obstructed, to ensure that mowing of the capped stabilized waste pile was being conducted regularly and without damaging the cap, and to observe the upgraded Groundwater Treatment System.

Table 4-4 summarizes the facilities and areas that were inspected during this fifth FYR period and indicates the status as of 2019.

TABLE 4-4. OU 03 AREAS SUBJECT TO I&M AND CURRENT CONDITIONS

Areas covered by I&M plan	Current condition
Capped stabilized waste pile, which is waste material capped by geosynthetic fabrics, compacted soil, and a vegetative layer	The site was mowed in 2014-2019 and no substantial settlement or erosion was noted. Some minor soil scraping and rutting were observed, similar to past years. Past soil scraping and rutting have not been observed to adversely affect the soil cover, and the grass cover quickly re-establishes after mowing. Brush was removed from the rocked drainage channels on the stabilized waste pile.
Stabilized waste materials covered by low permeability asphalt – former construction water treatment area located between the covered stabilized waste pile and Detention Basin No. 1 (DB#1)	In 2019, the asphalt-covered area between DB#1 and the capped waste pile was observed to be in good condition. Simon Metals (as of October 2019, Metro Metals) used the area for truck and trailer parking. The treatment plant currently lies within the eastern portion of this area and is surrounded with a chain-link fence that minimizes the possibility of inadvertent damage from vehicle traffic. Cracks were observed in 2019 near DB #1 and DB #2. Asphalt cores indicate that the cracks are surficial in nature. Permeability tests in 2018-2019 all met the permeability standard of <1.0E-7.
Concrete and asphalt covers (paving) in the Simons operating area	In October 2014, a 30x30 foot area behind the granulator was damaged. Due to a variety of timing and contractor difficulties, a temporary cap was placed over the damaged asphalt in March 2017. EPA approved final design modifications in August 2016 and Asphalt Patch Systems made the repair in September 2017. Otherwise, little change was evident from previous inspections, and the operating area drainage system continues to operate as designed. Some asphalt gouging, concrete raveling along joints, and concrete cracking and gouging were observed in 2014-2019. The observed “wear and tear” damage to the paving was expected, and, in the opinion of DOF, did not significantly affect the capping function of the paving. DOF conversations with Simon Metals’ staff indicated that the metal recycling operating area continues to drain well during periods of heavy precipitation. The concrete and asphalt repair sections of the 1995 I&M Report were updated (DOF 2019)
Box culverts, lined ditch, and DB#1 that drain the stabilized waste pile	The box culverts and drainage ways leading to and from the detention basins continue to operate as designed. Some sediment/soil/debris has accumulated in the bottom of some portions of the culverts without restricting flow to the detention basins. Drainage ways into detention basin DB#1 remain clear. The east (outflow) end of the BNSF Ditch was clear. Some cracked asphalt was identified in the detention basins, primarily DB#1. Asphalt cores were collected for permeability testing in 2019 and confirmed that the cracks did not extend through the full asphalt thickness. In summer of 2019, sediment from the manhole control structures was removed using a vac-truck. Asphalt curbing along DB#1 was repaired as well. In 2020, asphalt sealant will be applied.

TABLE 4-4. OU 03 AREAS SUBJECT TO I&M AND CURRENT CONDITIONS	
Areas covered by I&M plan	**Current condition**
Catch basins and DB#2, which are storm drainage facilities for the Simons (Metro Metals) operating area. The catch basins, and for the most part DB#2, are maintained by Simons.	Simons cleaned the catch basins annually (last in 2019); storm water was discharged to the BNSF ditch through a control structure under an industrial stormwater discharge permit with Ecology. Flow from DB#2 is restricted to 1.0 cfs. Storm water is treated to remove oils and metals prior to discharge. A portion of DB#2 basin also acts as a settling basin using berms installed by Simons in 2006.
The BNSF ditch that drains both detention basins	Vegetation continues to grow in the BNSF ditch, particularly at the east end where discharge occurs to a buried culvert. Observations during heavy precipitation indicate the vegetation does not cause water to back- up in the ditch, and it likely acts as a biofiltration swale. During late summer/early fall, vegetation is removed from the east end of the ditch so that flow is not restricted.
Signs and fencing	With the exception of DB#1, remedial components are enclosed with fencing or an ecology block wall. Simons (Metro Metals) maintains access to the site from East River Street. An internal gate restricts access to the covered waste pile and the treatment plant area that is also maintained by Simons. The treatment plant is enclosed by additional fencing. Signs and fencing were observed to be in place and in acceptable condition during the site visit.

In general, site observations made by DOF from 2014-2019 indicate that the remedial systems installed at the Tacoma Tar Pits site are in acceptable condition and are functioning as intended. DOF updated the1995 Inspection and Maintenance Manual in December 2019.

5 TECHNICAL ASSESSMENT

This section provides a technical assessment of each OU to determine the protectiveness of the remedy.

5.1 OU 01 SEDIMENT AND OU 05 SOURCE CONTROL

QUESTION A

Is the remedy functioning as intended by the decision documents?

OU 01 and OU 05 Remedial Action

Answer: Yes.

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD, as modified by the ESDs. The stabilization and capping of contaminated soils and sediments has achieved the remedial objectives to minimize the migration of contaminants to groundwater and surface water and prevent direct contact with, or ingestion of, contaminants in soil and sediments. However, there are still at least two major sources in the Hylebos Waterway (the Arkema property and the Occidental property) where upland sources have yet to be controlled. Further, surface sediment concentrations of PCBs in the Hylebos Waterway have increased since the implementation of the remedy and are nearing the cleanup goals, although data in the head of the waterway indicate that there is a decreasing trend in the concentrations since 2012. Additional monitoring will be required to determine if the sediment concentrations remain stable or continue to increase. Buried contaminated sediments are known to exist in some areas where remedial dredging did not occur. To remain protective, these areas need to be mapped and ICs need to be implemented to prevent re-exposure of contamination. Active tugboat operations, both existing and proposed, or future maintenance dredging in areas where contamination remains at depth could bring contaminated sediment to the surface.

In August 2019, bank sloughing was observed along the Arkema southeast shoreline. A subsequent investigation by the Port determined that the sloughing was occurring away from the Arkema subtidal cap and the sloughing was not impacting the performance of either the subtidal cap or the intertidal cap. The Port in concert with Ecology and the EPA will evaluate the need for repairs. Ongoing monitoring will be required to determine if the caps remain stable.

Operation and maintenance of the sediment caps and mitigation areas has, on the whole, been effective. Some minor repairs were needed to caps in the Thea Foss Waterway; however, this is effectively covered under the OMMPs. There are many mitigation areas that do not have OMMPs, which will be needed for the long-term success of these areas. However, the failure to meet the mitigation requirements for the site does not affect the potential for release of contaminants and does not affect protectiveness for the site.

O&M annual costs are consistent with original estimates and there are no indications of any difficulties with the remedy.

There were no opportunities for groundwater system optimization observed during this review as the monitoring system is already limited. The monitoring well network provides sufficient data to assess the potential for leaching of contaminants from the several confined disposal facilities and maintenance on the caps is sufficient to maintain its integrity.

The fish tissue collected from the site to evaluate whether the fish and shellfish advisory is to continue has not been completed. The fish have been collected, but the tissue have not yet been analyzed. However, as long as the fish and shellfish advisory stays in place, the remedy remains protective.

The ICs that are in place include prohibitions on the use or disturbance of groundwater until cleanup levels are achieved, and prohibitions on excavation activities, disturbance of the caps, and any other activities or actions that might interfere with the implemented remedy. No activities were observed that would have violated the ICs. The caps and the surrounding area were undisturbed, and no new uses of groundwater were observed. The fenced areas of the site were intact and in good repair. However, not all ICs have been implemented in the Hylebos and Sitcum Waterways and confined disposal facilities. This needs to be put in place to protect the remedy. It is not known whether the ICs for all sources are in place and will need to be evaluated to protect sources from recontaminating the sediment at the Site.

OU 01 and OU 05 Removal Actions

Answer: Yes.

The removal actions are complete or being conducted under other legal orders and performance monitoring data show that performance standards were met. Operation and maintenance of the OVRA sediment cap has, on the whole, been effective. However, the cap has thinned in some areas triggering the need for repairs. The City of Tacoma is working on a design expected to be implemented in 2020. In the meantime, the cap remains protective and containment of contaminants continues. The General Metals cap and Puyallup Land Claim mitigation areas do not have OMMPs, which will be needed for the long-term success of these areas. It is not known whether the General Metals cap remains protective. The failure to meet the mitigation requirements for the site does not affect the potential for release of contaminants and does not affect protectiveness for the site. Some ICs are in place to address the OVRA site-related constituents that are at levels that do not allow for unrestricted use/unrestricted exposure. Those ICs are properly implemented and effective in preventing exposure and protecting the remedy. However, additional controls need to be verified or implemented for OU 05.

QUESTION B

Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

OU 01 and OU 05 Remedial Action

Answer: Yes.

Changes in Standards and To Be Considered. ARARs cited in the ROD were reviewed to evaluate changes in the ARARs, if any, since the fourth FYR. There are no To Be Considered criteria (TBCs) and no newly promulgated standards that might be ARARs that affect the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics. The ROD described current and future land uses and identified likely exposure pathways; at the time of this review, the descriptions of land use remain accurate for the Site conditions, and there are no actual or potential changes in exposure pathways that have occurred. There have been no changes in the toxicity criteria for the COCs that affect the protectiveness of the remedy.

The USACE, in anticipation of maintenance dredging, sampled the five sediment shoals in the federally authorized navigation channel of the Hylebos Waterway in 2013 to determine their potential suitability of material dredged for open-water disposal. TBT, dioxins, and dieldrin were detected at concentrations

greater than the Dredged Material Management Program (DMMP) requirements for open-water disposal, but do not have cleanup levels in the ROD. Currently, there is very limited data for these contaminants in sediment or other media. Additional data would be needed to determine whether the contamination is site-related, and action is warranted due to newly identified contamination.

During 2014/2015 planning for berth deepening and other upgrades to the Port's Tacoma Marine Terminal in the Blair Waterway (leased from the Port by Georgia-Pacific Gypsum), dioxins/furans were detected in subsurface sediment from the berthing area at concentrations that exceeded the DMMP bioaccumulation trigger for disposal at the Commencement Bay nondispersive open-water site. The source of the dioxins/furans is unknown. Federal, state, and local permits for the terminal development project were received in 2015. In 2016, approximately 16,900 cubic yards of sediments that were unsuitable for open-water disposal were dredged and disposed at a permitted upland landfill. Additionally, approximately 8,550 cubic yards of clean underlying sediment were dredged and disposed at the Commencement Bay open water non-dispersive DMMP site.

The USACE also sampled the Blair Waterway in 2019 in anticipation of deepening the waterway. Dioxin/furans and hexachlorobutadiene were detected at concentrations greater than the DMMP requirements for open-water disposal within the nearshore areas of middle sections of the waterway. If this material is not removed under this program, additional data would be needed to determine whether the contamination is site-related, and action is warranted due to newly identified contamination.

Changes in Land Use. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Remedial Action Objectives. The RAOs from the ROD are still valid and protective for the site.

OU 01 and OU 05 Removal Actions

Answer: Yes.

Changes in Standards and To Be Considered. ARARs cited in the Action Memos were reviewed to evaluate changes in the ARARs, if any, since the fourth FYR. There are no TBCs and no newly promulgated standards that might be ARARs that affect the protectiveness of the remedies.

Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics. The Action Memorandums described current and future land uses and identified likely exposure pathways; the descriptions are accurate for the site conditions at the time of this review. Changes in Land Use. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Remedial Action Objectives. The RAOs from the Action Memorandums are still valid for the site.

QUESTION C

Has any other information come to light that could call into question the protectiveness of the remedy?

OU 01 and OU 05 Remedial Action

Answer: No.

OU 01 and OU 05 Removal Actions

Answer: No.

5.2 OU 02 ASARCO TACOMA SMELTER FACILITY

QUESTION A

Is the remedy functioning as intended by the decision documents?

Answer: No, due to the shoreline cap failure on the Breakwater Peninsula. In other areas of the OU, the remedy is functioning as intended by the decision documents.

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicates that the remedy is mostly functioning as intended by the ROD, as modified by the ESDs, with the exception of an area of the shoreline armoring on the breakwater peninsula. The stabilization and capping of contaminated soils and sediments has achieved the remedial objectives to minimize the migration of contaminants to groundwater and surface water and prevent direct contact with, or ingestion of, contaminants in soil and sediments. However, site remediation is ongoing as Point Ruston LLC continues to redevelop the site with condominiums, retail space, parking areas, etc. Their construction monitoring plans, and other associated redevelopment plans are updated periodically, reviewed and approved by EPA, and contain measures to ensure that the intent of the remedy is being met as the site is redeveloped. In the interim until construction/redevelopment is complete, exposure pathways that could result in unacceptable risks are being prevented because the site has temporary controls being used by the developer.

The O&M responsibilities of Point Ruston LLC are explained in the 2019 OMMP which cover the Smelter site cap, the shoreline armoring, and site utilities. The obligations of the OMMP are incorporated as ICs in the Covenants, Conditions and Restrictions (CCRs) for the site. Property management will be conducted by either Point Ruston LLC or the Point Ruston Homeowners Association (HOA). The HOA will then assume O&M activities; however, Point Ruston LLC remains responsible for the completeness and accuracy these activities.

A section of the shoreline armoring of the breakwater peninsula has eroded into the bay and slag is currently exposed to the environment. Exposed slag has high concentrations of arsenic, lead and copper that is being released into the environment and potentially recontaminating the offshore sediment cap and posing unacceptable risk to natural resources in Commencement Bay. Commencement Bay is critical habitat for endangered species, including salmon, and is within the usual and accustomed fishing area of the Puyallup and Muckleshoot Tribes. Since the upland part of the site where the failure has occurred has opened as a park, the public may also be exposed to unstable armor rock and slag. EPA has prepared a repair for the shoreline and it will be implemented as soon as funding is available.

The ICs that are in place include prohibitions on the use or disturbance of groundwater until cleanup levels are achieved, and prohibitions on excavation activities, disturbance of the caps, and any other activities or actions that might interfere with the implemented remedy. No activities were observed that would have violated the ICs. The caps and the surrounding area were undisturbed, and no new uses of groundwater were observed. EPA is currently working with Point Ruston, LLC to implement a EUCA Covenant on the OCF property to ensure that the remedy remains protective in the future.

QUESTION B

Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Answer: Yes.

Changes in Standards and To Be Considered. ARARs cited in the ROD were reviewed to evaluate changes in the ARARs, if any, since the fourth FYR. There are no TBCs and no newly promulgated standards that might be ARARs that affect the protectiveness of the remedy.

Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics. The ROD described current and future land uses and identified likely exposure pathways; the descriptions are accurate for the site conditions at the time of this review.

Changes in Land Use. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy. Point Ruston LLC is redeveloping the site with oversight by EPA to ensure that the intent of the remedy is being met as the site is redeveloped.

Remedial Action Objectives. The RAOs from the ROD are still valid and protective for the site.

QUESTION C

Has any other information come to light that could call into question the protectiveness of the remedy?

Answer: No.

5.3 OU 03 TACOMA TAR PITS

QUESTION A

Is the remedy functioning as intended by the decision documents?

Answer: Yes. The remedy is functioning as intended by the decision documents based on a review of site data, interviews, and on observations made during the site inspection.

Soil and Surface Water (Capped Areas and Drainage Systems)

The cap and surface drainage features continue to be generally in good condition and routinely inspected and repaired when required to maintain their intended functions. Surface water cleanup criteria identified in the ROD have been achieved as measured at the site boundary in the BNRR ditch.

DOF, the PRP's remediation contractor conducted asphalt permeability coring and testing in 2018 and 2019 and repaired cracks in the detention basins. DOF revised the 2006 Asphalt Repair/Maintenance Plan for the Detention Basins and the 1995 Inspection and Maintenance Manual.

Groundwater

Site groundwater has been monitored quarterly since 1991, and the GWET system has been in operation since 2002 and optimized in 2017. Monitoring data indicates that ROD cleanup criteria have been achieved for all indicator contaminants in two of the site aquifers (the Fill and Lower Aquifers). The ROD cleanup criteria for lead, PCBs and cPAHs have also been achieved in the Sand Aquifer; only benzene exceeds the ROD criterion of 53 µg/L. As such, benzene in the Sand Aquifer continues to be the focus of the groundwater monitoring program.

Benzene concentrations in the monitoring wells at the Tacoma Tar Pits site vary considerably, but the shape of the benzene plume (areas with concentrations greater than 53 µg/L and greater than 1,000 µg/L) in December 2018 appears generally similar to the shape of plume in December 2019.

The East Branch site boundary wells, the TTP-3M, DOF-24M, DOF-25M, and DOF-34M have mixed results for benzene concentrations and trends; however, all are within the capture zone of this Branch. Site boundary well TTP-2M, also within the capture zone, has non-detect concentrations of benzene or

levels significantly below the ROD criterion during this FYR period. Of the two East Branch boundary wells installed near the sewer lines (DOF-35M and DOF-36M), concentrations were well below the ROD criterion during the FYR period. Downgradient wells DOF-19M and DOF-20M benzene concentrations were either non-detect or significantly below the ROD criterion. The Puyallup River is located downgradient from all of the aforementioned wells and there are no indications that the benzene plume from the East Branch is reaching the River.

Contaminant concentrations in North Branch wells located just outside the site boundary in well TTP-18M are well below the ROD criterion. Concentrations in samples from wells DOF-31M and DOF-33M are just above the ROD criterion but appear to be decreasing. Although there are concerns about benzene exceedances, these site boundary wells are within the North Branch capture zone and groundwater in this area is estimated to flow west towards extraction wells A and B and the site's interior. Downgradient wells east of the North Branch boundary wells between OU 03 and the river have generally been non-detect for benzene. The Puyallup River is located downgradient from all of the aforementioned wells and there are no indications that the benzene plume from the North Branch is reaching the River.

While the ROD groundwater cleanup criterion for benzene in the Sand Aquifer has not yet been achieved at the Tacoma Tar Pits site, the groundwater remedy component (GWET system) is functioning as intended by containing the majority of the contaminated groundwater plume such that exposures are under control and human and ecological receptors are not impacted. The GWET system was optimized in 2017. Specific recommendations to address the site-wide benzene issue are provided in Table 7-1.

Institutional Controls

Institutional controls, such as restrictions on the use of site groundwater, are in place across the OU and protect the remedy.

QUESTION B

Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Answer: No.

Changes in Standards and To Be Considered (TBCs). ARARs cited in the ROD were reviewed to evaluate changes since the fourth FYR. There were no changes during the this FYR period; consequently, there were no changes that affect protectiveness.

Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics. There have been no changes in exposure pathways (site receptors, sources) during this FYR period. In January 2017 EPA finalized a risk assessment for benzo(a)pyrene that included a revised assessment of cancer potency, and also included an assessment of noncancer toxicity. The revised assessment found that cancer potency via oral exposure is lower than previously thought, and slightly greater risk than previously though via inhalation exposure. The new oral slope factor is 1 per mg/kg-day versus the previous assessment of 7.3 per mg/kg-day. The revised inhalation unit risk is 0.0006 per $\mu g/m^3$ versus 0.00011 per $\mu g/m^3$. As inhalation exposure to semi-volatile contaminants in soil do not contribute significantly to over risk (less than one percent for PAHs), the cleanup goals used in the ROD remain protective.

Changes in Land Use. There have been no changes in land use that would affect the protectiveness of the remedy.

Remedial Action Objectives (RAOs). The RAOs in the 1987 ROD were not defined in explicitly descriptive terms for the Tacoma Tar Pits OU. The previous FYR stated that "…the ROD groundwater remedy component did not appear to consider groundwater restoration." However, this issue was addressed in the ROD (implicitly addressed in a groundwater containment remedy evaluated by the nine criteria) and restoration was determined to be technically impracticable. Numerical maximum allowable contaminant concentrations for indicator contaminants and affected media served as the "RAOs" and are the cleanup levels for the OU. The cleanup remedy focused on excavation, treatment and containment (EPA 1987; ROD Table 2).

The numerical cleanup levels for soil, surface water and groundwater in all the aquifers, with the exception of the Sand Aquifer, have been met and remain valid. Recommendations to optimize the GWET system and the groundwater monitoring systems were implemented in 2017 and on-going monitoring is being conducted to determine if additional optimization – new wells, or increased pumping – is necessary to reduce benzene concentrations.

QUESTION C

Has any other information come to light that could call into question the protectiveness of the remedy?

Answer: No.

5.4 OU 04 ASARCO OFF-PROPERTY (RUSTON/NORTH TACOMA STUDY AREA)

QUESTION A

Is the remedy functioning as intended by the decision documents?

Answer: Yes.

The review of documents, ARARs, risk assumptions indicates that the remedy is functioning as intended by the ROD. Soil not covered by hardscape or buildings has been sampled at all properties within the Study Area, with the exception of 12 refusal properties which are landscaped. Site remediation is complete except for six yards where the property owners refused, vegetated steep slopes, and wetland areas. ICs (CPMs) are being used to manage areas where waste remains. The removal of contaminated soils and implementation of ICs has achieved the remedial objectives to prevent exposure to arsenic and lead.

CPM activities are being conducted by Ecology through a Cooperative Agreement with EPA. Ecology has an agreement with the TPCHD to implement the CPMs required in the ROD. Implementation of the CPMs has generally been effective; however, there is some confusion amongst the landowners regarding the cleanup conducted under EPA oversight and the enhanced cleanup being conducted under Ecology oversight.

QUESTION B

Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Answer: Yes.

Changes in Standards and To Be Considered. The review of documents, ARARs, and risk assumptions indicates that the remedy is functioning as intended by the ROD.

Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics. The ROD described current and future land uses and identified likely exposure pathways; the descriptions are accurate for the site conditions at the time of this review.

Changes in Land Use. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Remedial Action Objectives. The RAOs from the ROD are still valid and protective for the site.

QUESTION C

Has any other information come to light that could call into question the protectiveness of the remedy?

Answer: No.

5.5 OU 06 ASARCO GROUNDWATER AND SEDIMENT

QUESTION A

Is the remedy functioning as intended by the decision documents?

Answer: Yes.

The nearshore sediments have been capped, and the remedy is functioning as intended in this area. However, there are exceedance of metals in the Moderately Impacted Area outside the capped area indicate that either the area is not recovering naturally or that erosion of the OU 02 shoreline cap has released contamination into this area. The sediment remedy has not yet been implemented for the Yacht Basin sediments. Groundwater monitoring wells have not been installed.

QUESTION B

Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Answer: Yes.

Changes in Standards and To Be Considered. The review of documents, ARARs, and risk assumptions indicates that the remedy is functioning as intended by the ROD.

Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics. The ROD described current and future land uses and identified likely exposure pathways; at the time of this review, the descriptions of land use remain accurate for the Site conditions, and there are no actual or potential changes in exposure pathways that have occurred. There have been no changes in the toxicity standards for the COCs that affect the protectiveness of the remedy.

Changes in Land Use. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Remedial Action Objectives. The RAOs from the ROD are still valid and protective for the site.

QUESTION C

Has any other information come to light that could call into question the protectiveness of the remedy?

Answer: No.

6 ISSUES/RECOMMENDATIONS

This section provides the issues and recommendations identified in the FYR.

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 01/05	Issue Category: Institutional Controls			
	Issue: Not all ICs are in place.			
	Recommendation: Ensure that all appropriate ICs for Source Control, areas where waste has been left in place, and for all mitigation sites.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	12/29/2023

OU(s): 01/05	Issue Category: Institutional Controls			
	Issue: The ROD did not specify specific ICs for the remedy.			
	Recommendation: Ensure that all ICs necessary for Source Control, areas where waste has been left in place, and mitigation sites have appropriate ICs in place.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	12/29/2023

OU(s): 01/05	Issue Category: Operations and Maintenance			
	Issue: Monitoring and maintenance plans are not in place and monitoring is not being conducted at parts of the Site where the remedy is in place.			
	Recommendation: Ensure that LTMPs are in place for Source Control, areas where waste has been left in place, and for all mitigation sites.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/29/2023

OU(s): 01	Issue Category: Monitoring			
	Issue: The OMMP for the St. Paul cap only requires monitoring after certain environmental events and may not inform the protectiveness of the cap for the next five-year review.			
	Recommendation: EPA inspect the St. Paul cap in early 2024.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	6/28/2024

OU(s): 01	Issue Category: Monitoring			
	Issue: Post-dredge PCB concentrations have increased in the Hylebos Waterway since 2006. Current PCB concentrations exceed cleanup goals (SQOs) in some samples. There are no trend data to indicate whether or not current concentrations are stable.			
	Recommendation: Conduct a comprehensive round of sampling for PCBs in the Hylebos Waterway, including source investigation.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA	12/29/2023

OU(s): 01	Issue Category: Monitoring			
	Issue: The USACE Hylebos Waterway shoal sediment characterization study in 2014 identified TBT, dioxins, and dieldrin that exceeded the DMMP requirements for open water disposal, but do not have SQOs identified in the CB/NT ROD. Dioxins had concentrations of several hundred ppt TEQ. Currently, there is very limited data for these contaminants in sediment or other media.			
	Recommendation: Analyze 2019 fish for dioxins. Conduct a comprehensive round of sampling for TBT, dioxins and dieldrin in the Hylebos waterway to determine whether the contamination is site-related and action is warranted due to newly identified contamination.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA	12/29/2023

OU(s): 01	Issue Category: Monitoring			
	Issue: It is unknown how the remedy has affected the PCB concentrations in fish and shellfish.			
	Recommendation: Complete analysis of the fish tissue collected in 2019.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	6/30/2020

OU(s): 01	Issue Category: Remedy Performance			
	Issue: Removal Actions at General Metals and OVRA left waste in place under caps that need LTMPs.			
	Recommendation: Incorporate these actions into removal actions through an ESD to the ROD.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/31/2021

OU(s): 05	Issue Category: Other Incomplete Source Control Actions			
	Issue: Source Control in the Hylebos Waterway is not complete. Major sources include the Arkema site and the Occidental site. Buffelen shoreline needs repair.			
	Recommendation: Complete Source Control actions to ensure that the sediments are not recontaminated and cleanup goals (SQOs) are achieved to reduce benthic risks.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	No	PRP	State	12/29/2023

OU(s): 02	Issue Category: Institutional Controls			
	Issue: The current IC for the OCF will not be protective in the long-term.			
	Recommendation: Complete the EUCA Covenant for the OCF to ensure protectiveness.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	Other BFPP	EPA/State	6/30/2020

OU(s): 02	Issue Category: Remedy Performance			
	Issue: An area of the shoreline cap on the breakwater peninsula has eroded into the adjacent bay leaving contamination exposed to the environment posing unacceptable risk to natural resources in Commencement Bay and the public may also be exposed to unstable armor rock and slag.			
	Recommendation: Repair the shoreline cap.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	EPA/State	EPA	12/31/2021

OU(s): 03	Issue Category: Operations and Maintenance			
	Issue: Benzene concentrations in the groundwater plume are contained at portions of the OU boundary. Pumping levels were increased and monitoring results are pending. Elevated benzene concentrations are not reaching the Puyallup River.			
	Recommendation: Continue to monitor groundwater and optimize the GWET.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	2/28/2025

OU(s): 04	Issue Category: Operations and Maintenance			
	Issue: O&M of CPMs are currently being conducted by the State through a cooperative agreement.			
	Recommendation: Need to implement a State Superfund contract to ensure CPM implementation continues.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	6/30/2021

OU(s): 06	Issue Category: Monitoring			
	Issue: The groundwater is not being monitored.			
	Recommendation: Complete the groundwater monitoring plan and install monitoring wells.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	Other BFPP	EPA	12/31/2021

OU(s): 06	Issue Category: Monitoring			
	Issue: The sediment in the Yacht Basin has not been monitored in decades. Contaminants in the Moderately Impacted Area outside the capped area exceed cleanup goals and are not recovering naturally.			
	Recommendation: Conduct remedial design sampling of the sediment in the Yacht Basin and Moderately Impacted Area outside the capped area to inform remedial action.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	EPA	EPA	12/31/2022

OU(s): 06	Issue Category: Remedy Performance			
	Issue: Cleanup Levels for Marine Sediment in Nearshore/Offshore, Northshore, Moderate Impact Zone, and Contaminant Effects Areas are unclear as they cite to a Preponderance-of-Evidence Approach.			
	Recommendation: Change the Cleanup Levels for Marine Sediment in Nearshore/Offshore, Northshore, Moderate Impact Zone, and Contaminant Effects Areas to numeric cleanup levels consistent with the Yacht Basin Cleanup Levels.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	PRP	EPA	12/29/2023

OU(s): 06	Issue Category: Institutional Controls			
	Issue: Legally enforceable Institutional Controls have not yet been developed and implemented for OU 06 sediment.			
	Recommendation: Implement legally enforceable ICs.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/29/2022

OTHER FINDINGS

In addition, the following are recommendations that were identified during the FYR (Table 6-1) and may improve performance of the remedy, reduce costs, improve management of O&M, accelerate site close out, conserve energy, promote sustainability, etc., but do not affect current and/or future protectiveness:

TABLE 6-1. ACTION ITEMS THAT DO NOT AFFECT REMEDY PROTECTIVENESS

OU # Name, FYR Section	Action Item	Responsible Party	Oversight Agency	Planned Completion Date
OU 03 Tacoma Tar Pits	Renew the City of Tacoma Industrial Wastewater Discharge Permit for the GETS system every five years.	PSE	City of Tacoma	April 2022
OU 03 Tacoma Tar Pits	Continue to Update Water Quality Monitoring Program Plan based on outcome of optimization evaluation.	PSE	EPA	Annual GW Monitoring Report
OU 03 Tacoma Tar Pits	Include the Northwest Detention Facility on the City of Tacoma's GOV.ME GIS website.	EPA	City of Tacoma	October 2022

7 PROTECTIVENESS STATEMENTS

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
01/05	Will be Protective
Protectiveness Statement:	
The remedy at OU 01/05 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.	

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
02	Not Protective
Protectiveness Statement:	
The remedy at OU 02 is not protective because the shoreline cap on the breakwater peninsula has eroded into Commencement Bay. Repair of the cap needs to be implemented to ensure protectiveness. Signs have been posted to warn humans not to trespass this area.	

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
03	Protective
Protectiveness Statement:	
The remedy at OU 03 is protective of human health and the environment and exposure pathways that could result in unacceptable risks are being controlled.	

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
04	Protective
Protectiveness Statement:	
The remedy at OU 4 is protective of human health and the environment and exposure pathways that could result in unacceptable risks are being controlled."	

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
06	Will be Protective
Protectiveness Statement:	
The remedy at OU 06 is expected to be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.	

8 NEXT REVIEW

The next FYR report for the CB/NT Superfund Site is required five years from the completion date of this review.

FIGURES

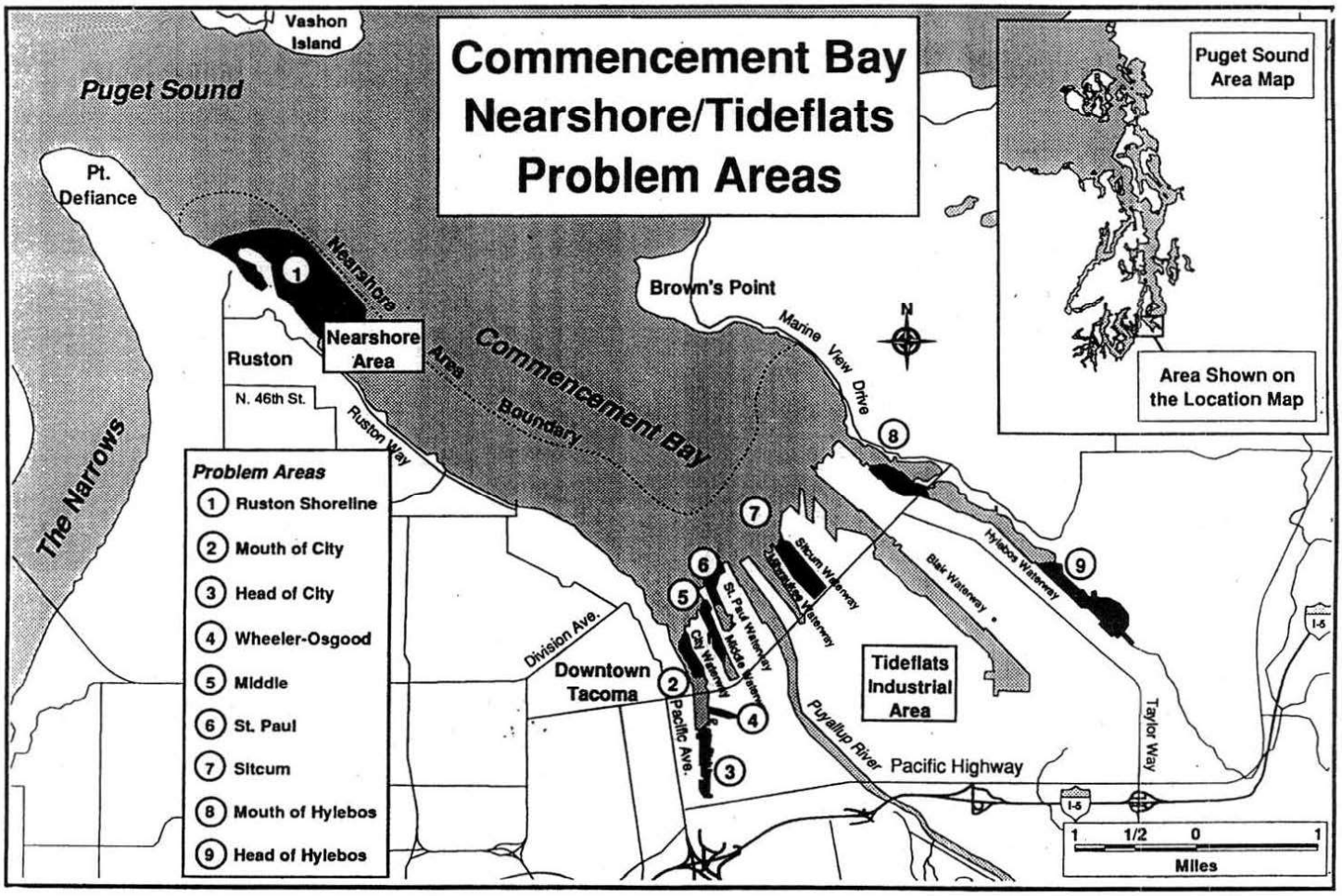
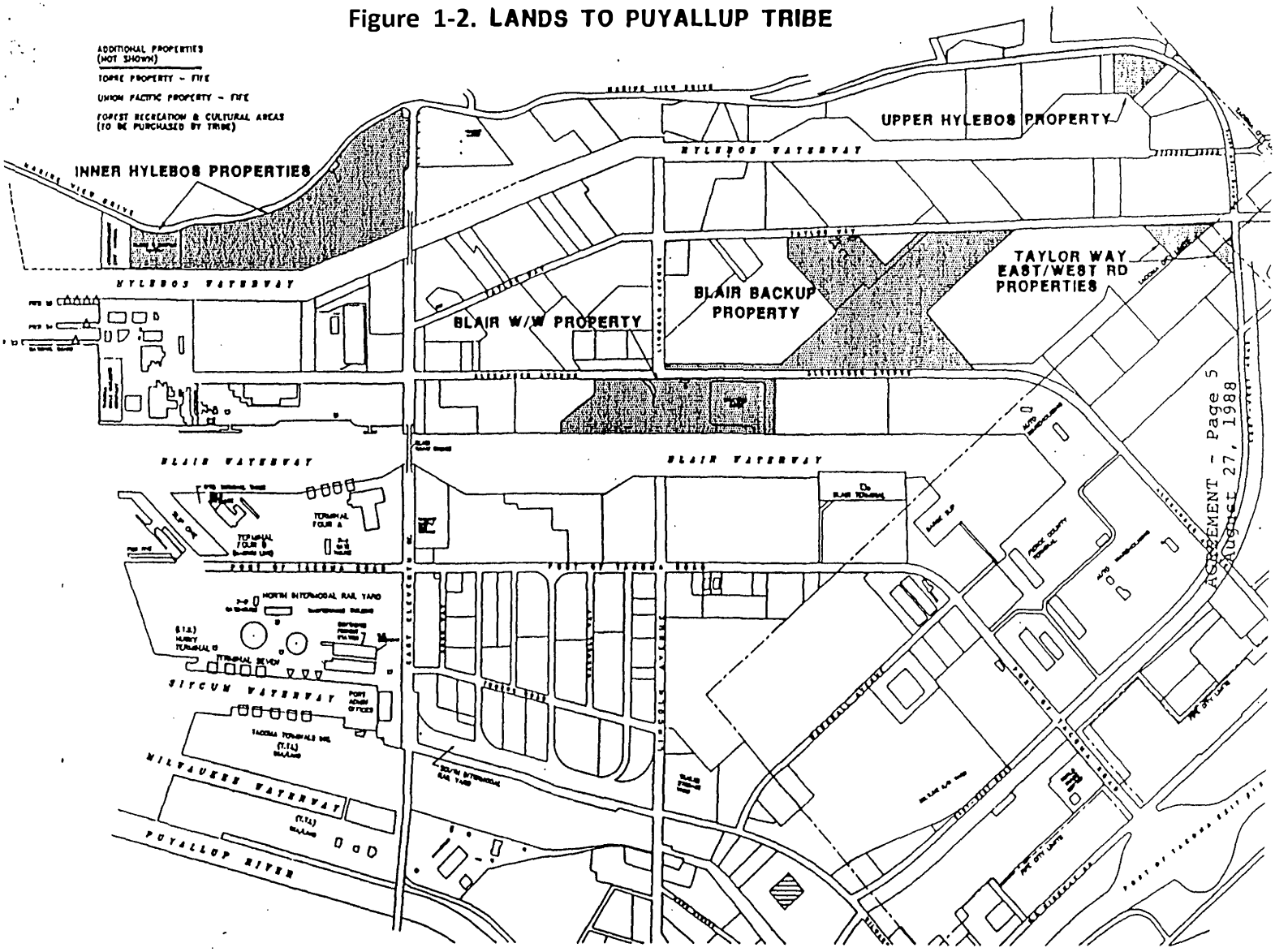


Figure 1-1. Commencement Bay Nearshore/Tideflats Vicinity Map (Source: Environmental Protection Agency, 1989)

Figure 1-2. LANDS TO PUYALLUP TRIBE



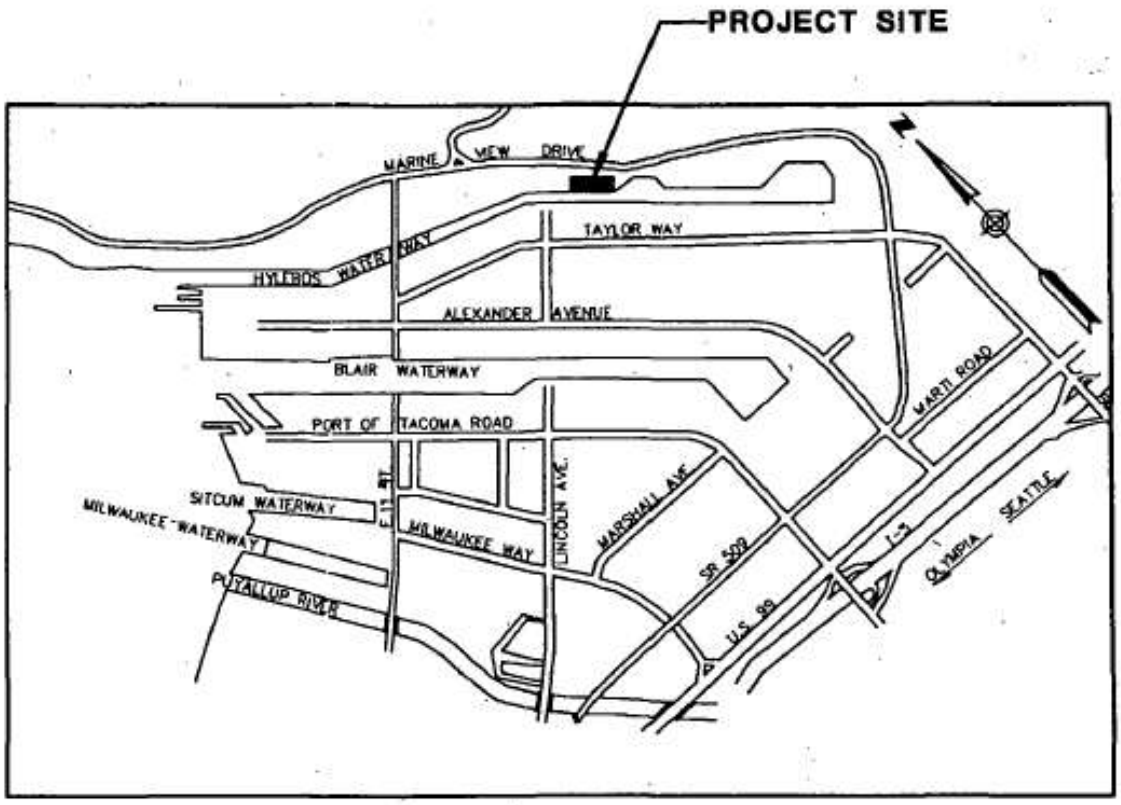


Figure 1-3. Map of General Metals Removal Action

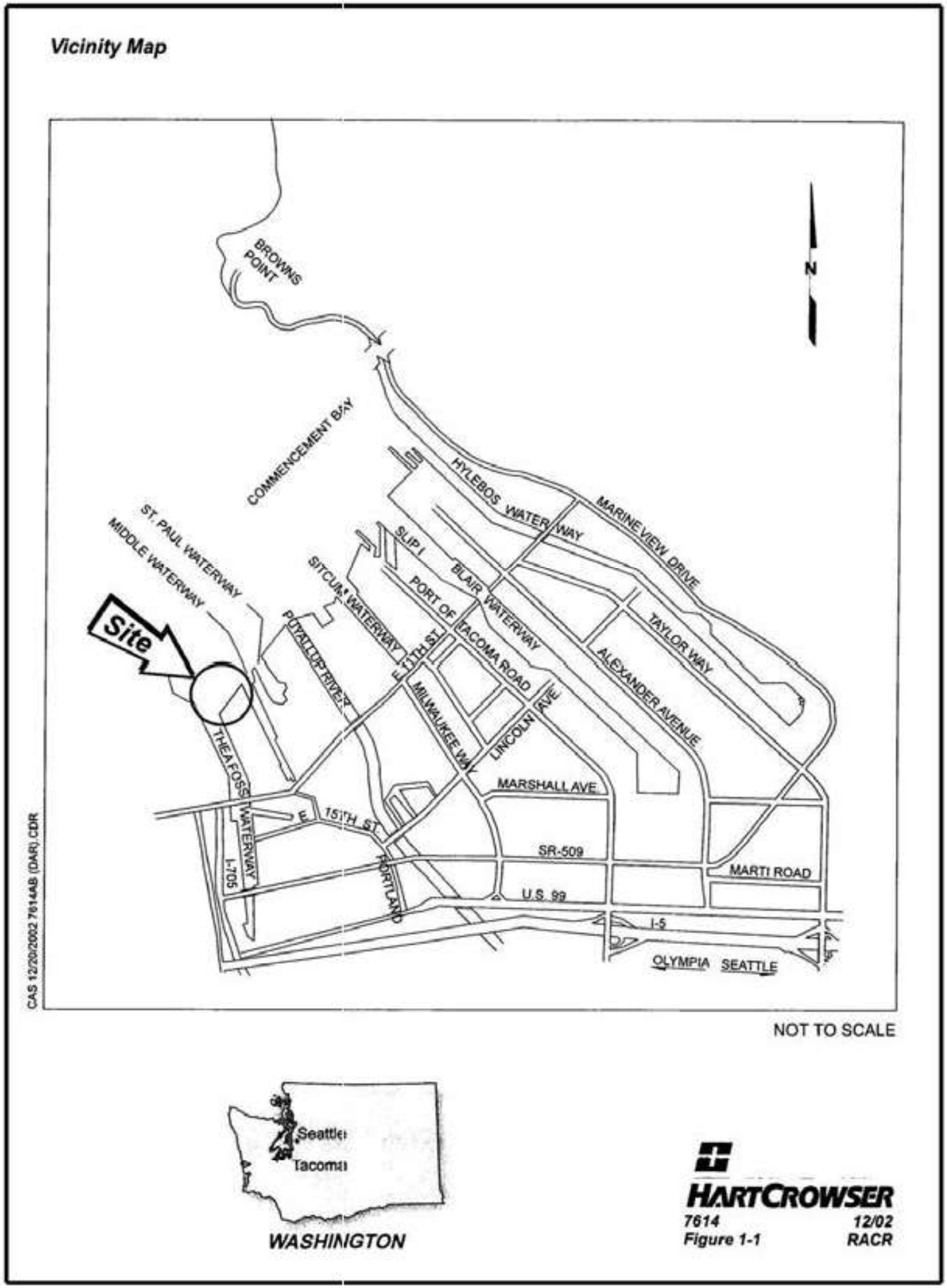
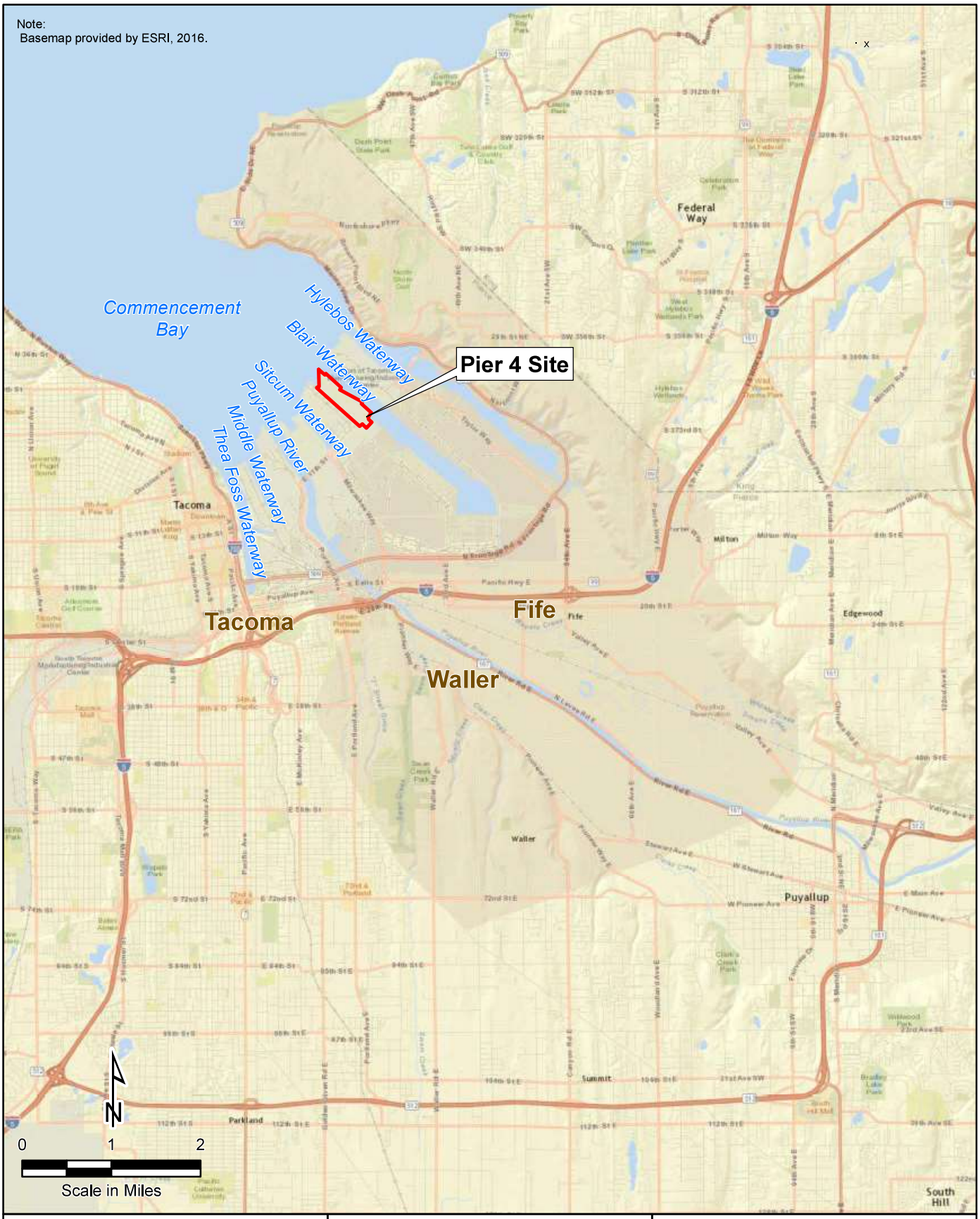


Figure 1-4. Olympic View Resource Area (Site) (Source: EPA 2009)



Port of Tacoma FLOYD | SNIDER strategy • science • engineering	**Time Critical Removal Action Completion Report Pier 4 Phase 1 Removal Action Project Tacoma, Washington**	Figure 1.1 Site Vicinity Map

I:\GIS\Projects\POT_Pier_4\MXD\Task 9040\Figure 1.1 Site Vicinity Map.mxd
5/13/2016

Figure 1-5. Location of Blair TBT Removal Action. (Source: Floyd Snider 2016)

ANCHOR QEA

Feet
0 1,250 2,500

Figure 1
Site Vicinity Map
Occidental Chemical Tacoma Groundwater Site

Figure 1-6. Location of Occidental Chemical (Source: Anchor 2016)

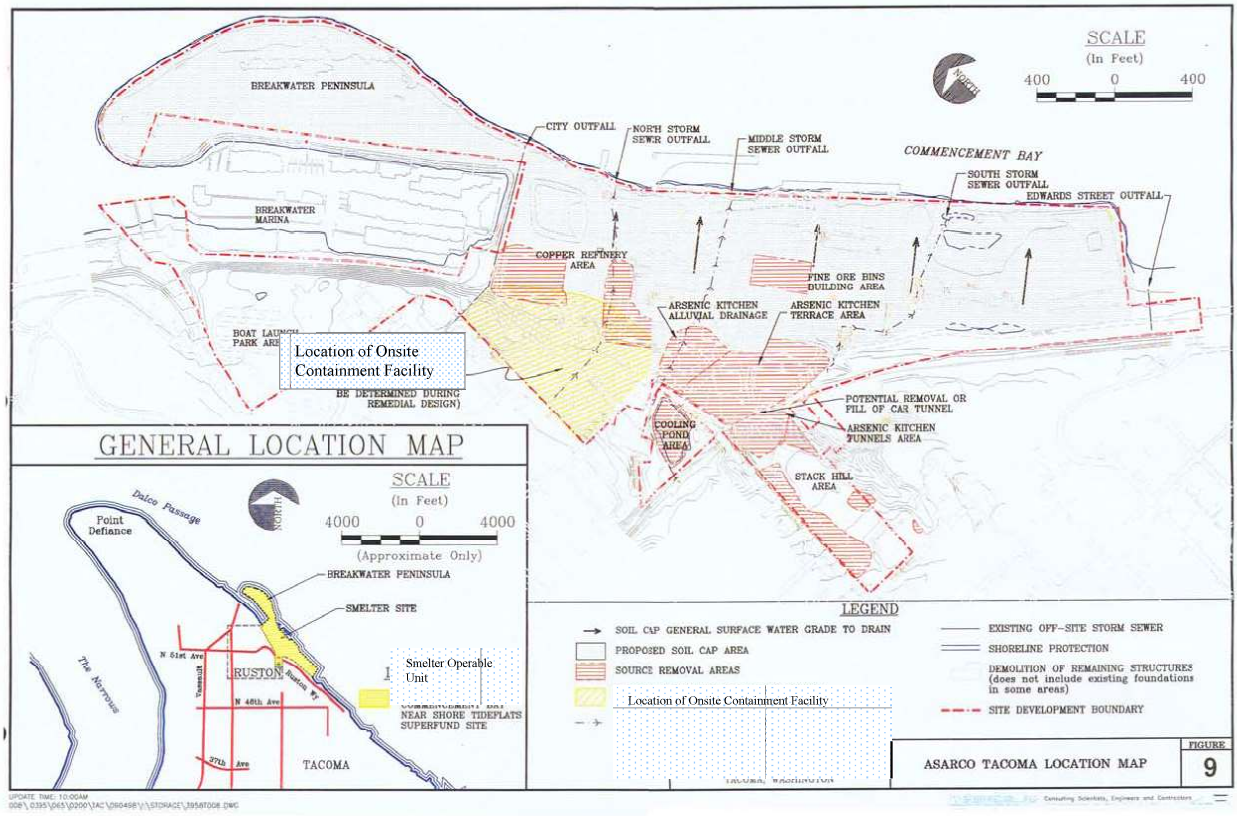


Figure 1-7. Location of the Former Asarco Smelter Facility

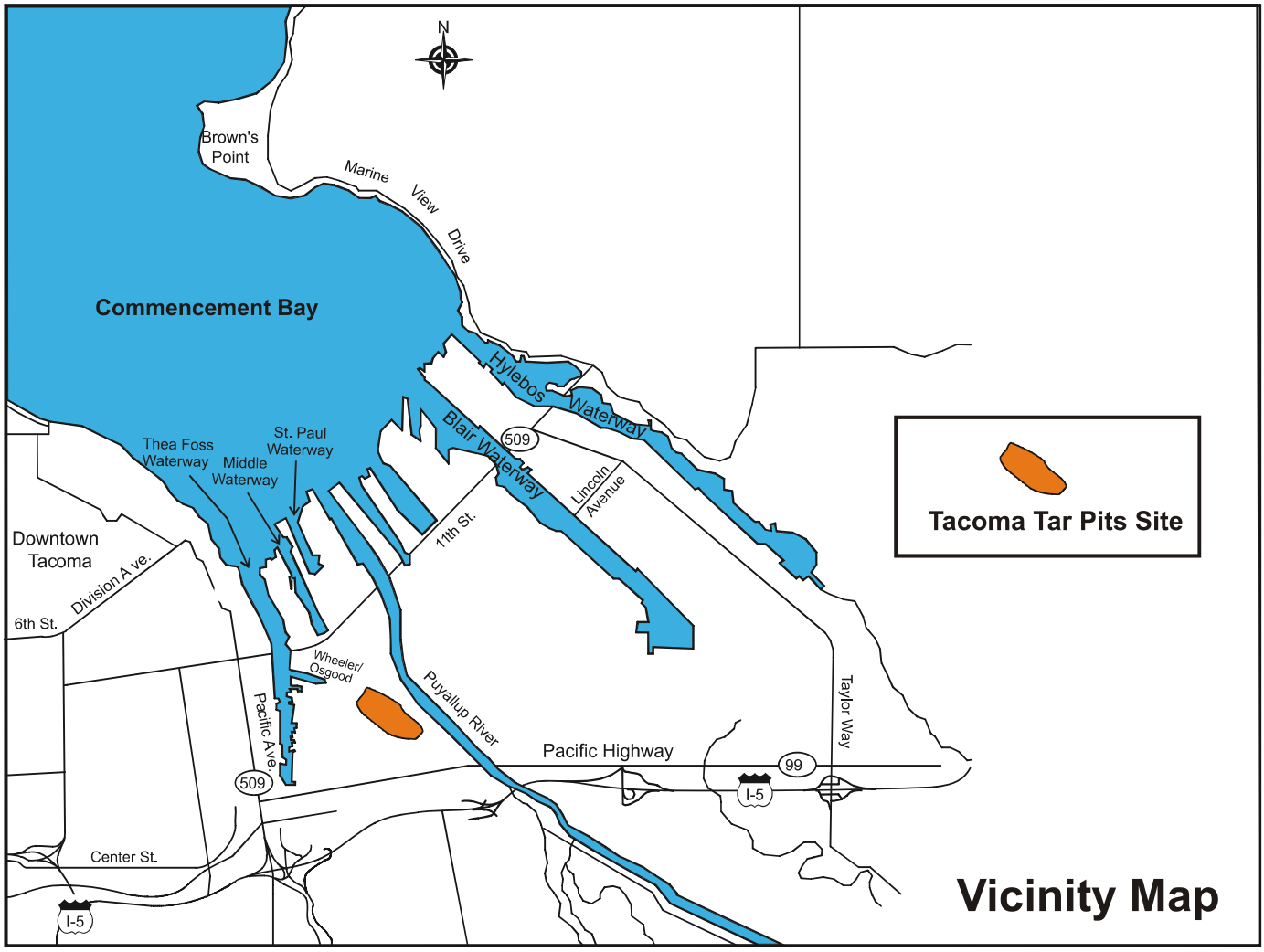


Figure 1-8. Tacoma Tar Pits Site Vicinity Map (Source: EPA 2009)

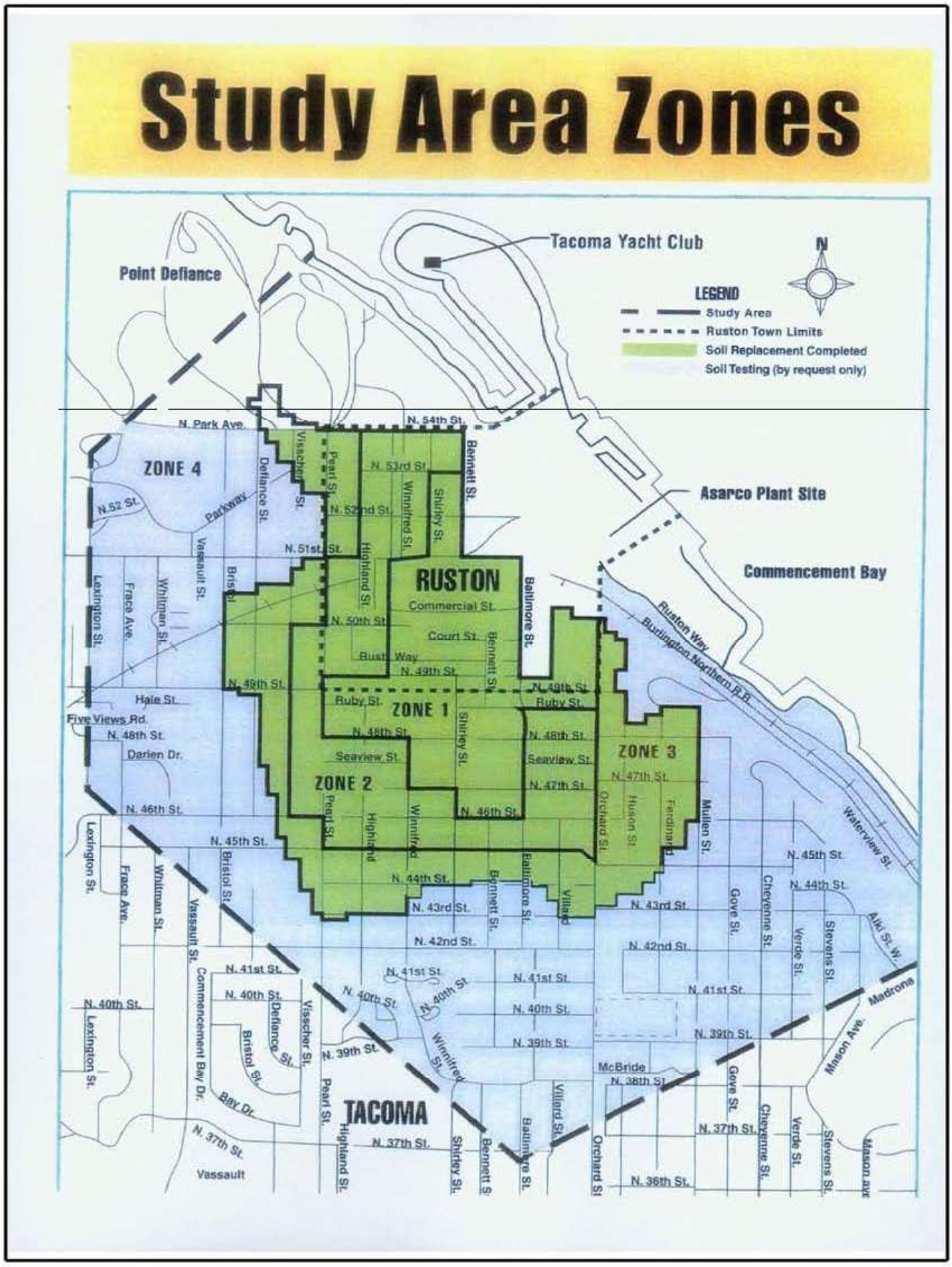


Figure 1-9. Map of Ruston/North Tacoma Study Area Zones (Source EPA 2014)

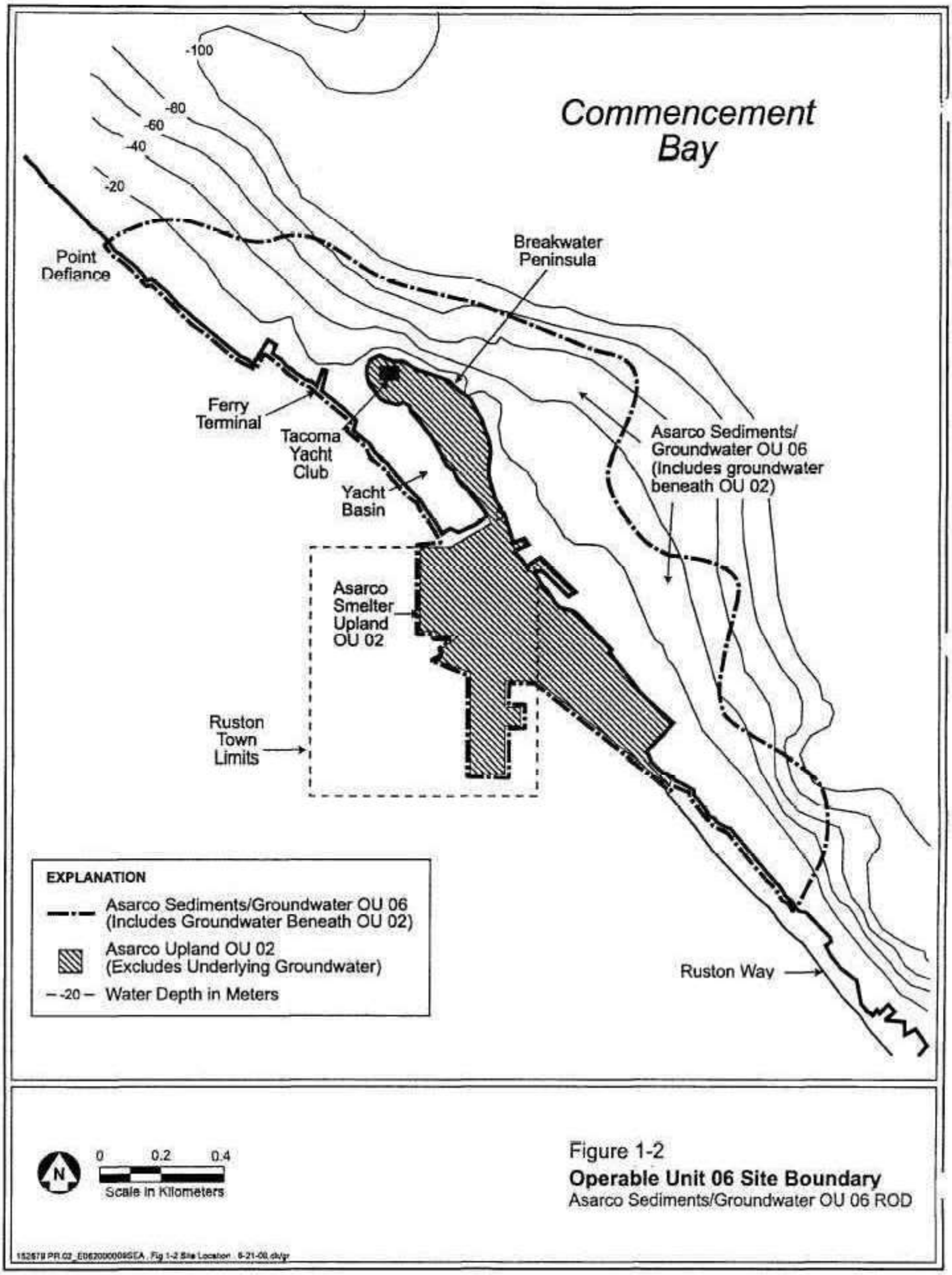


Figure 1-10. Location of OU 06 Asarco Sediment

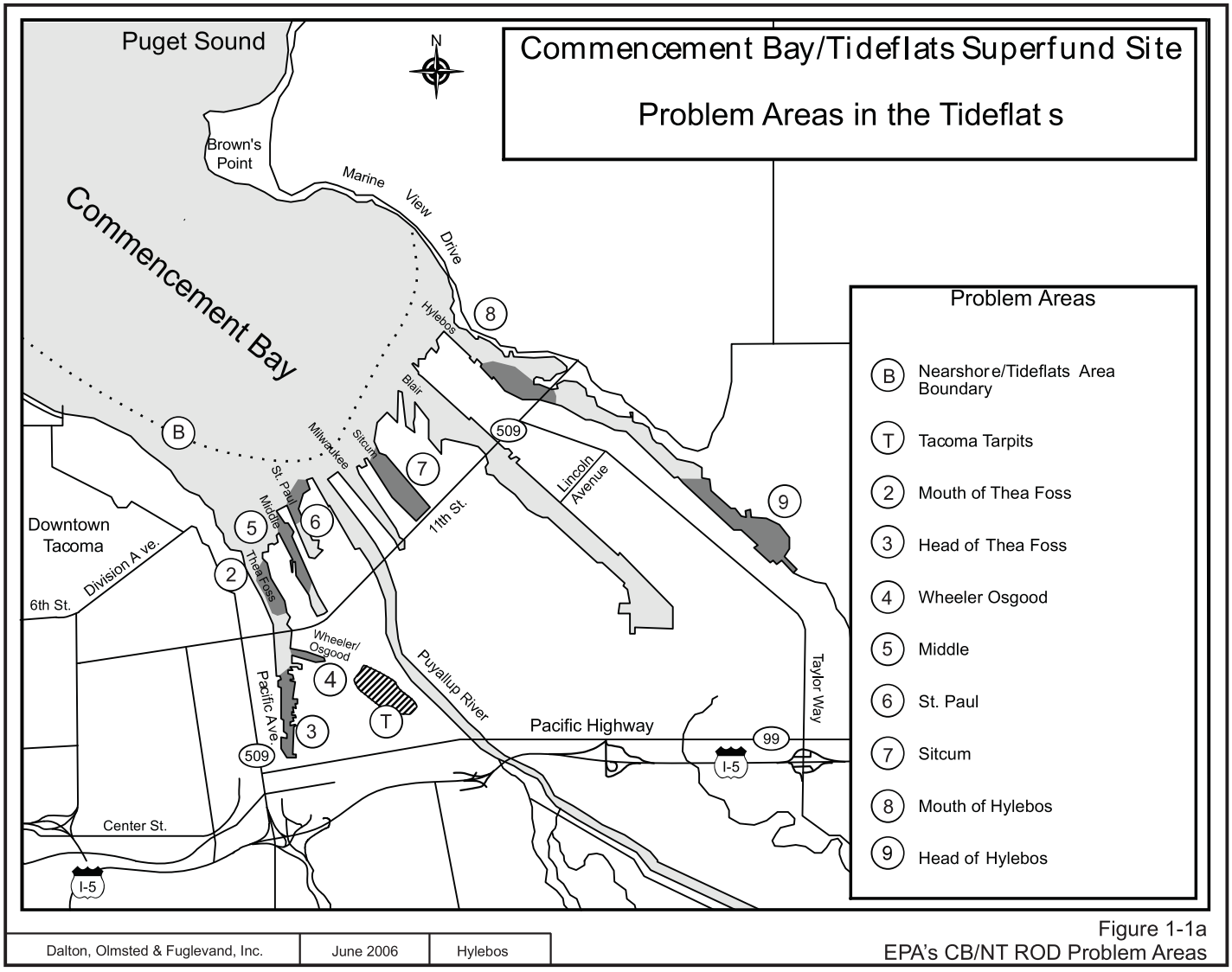


Figure 2-1. Commencement Bay Nearshore/Tideflats Problem Areas (Source: DOF 2011)

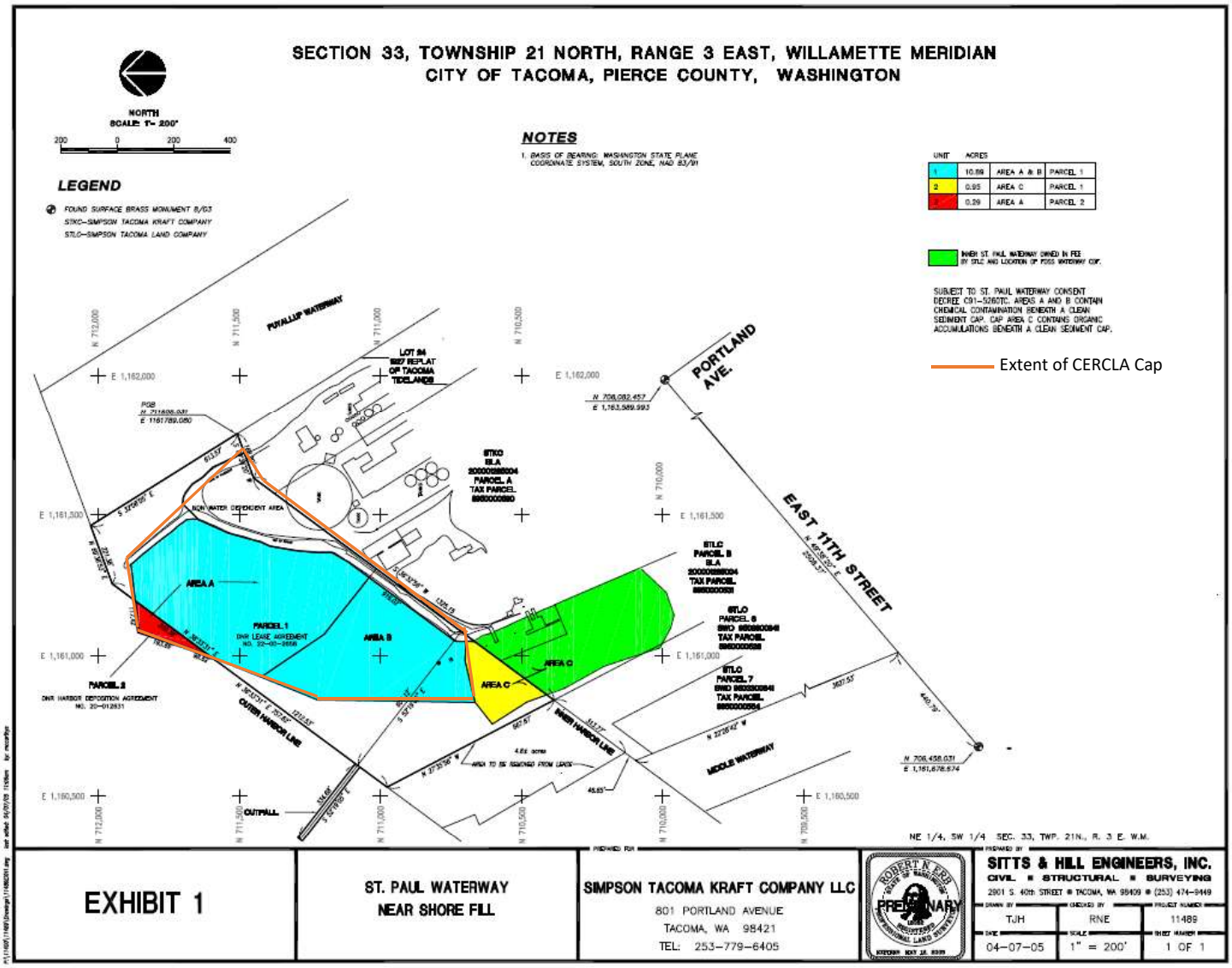
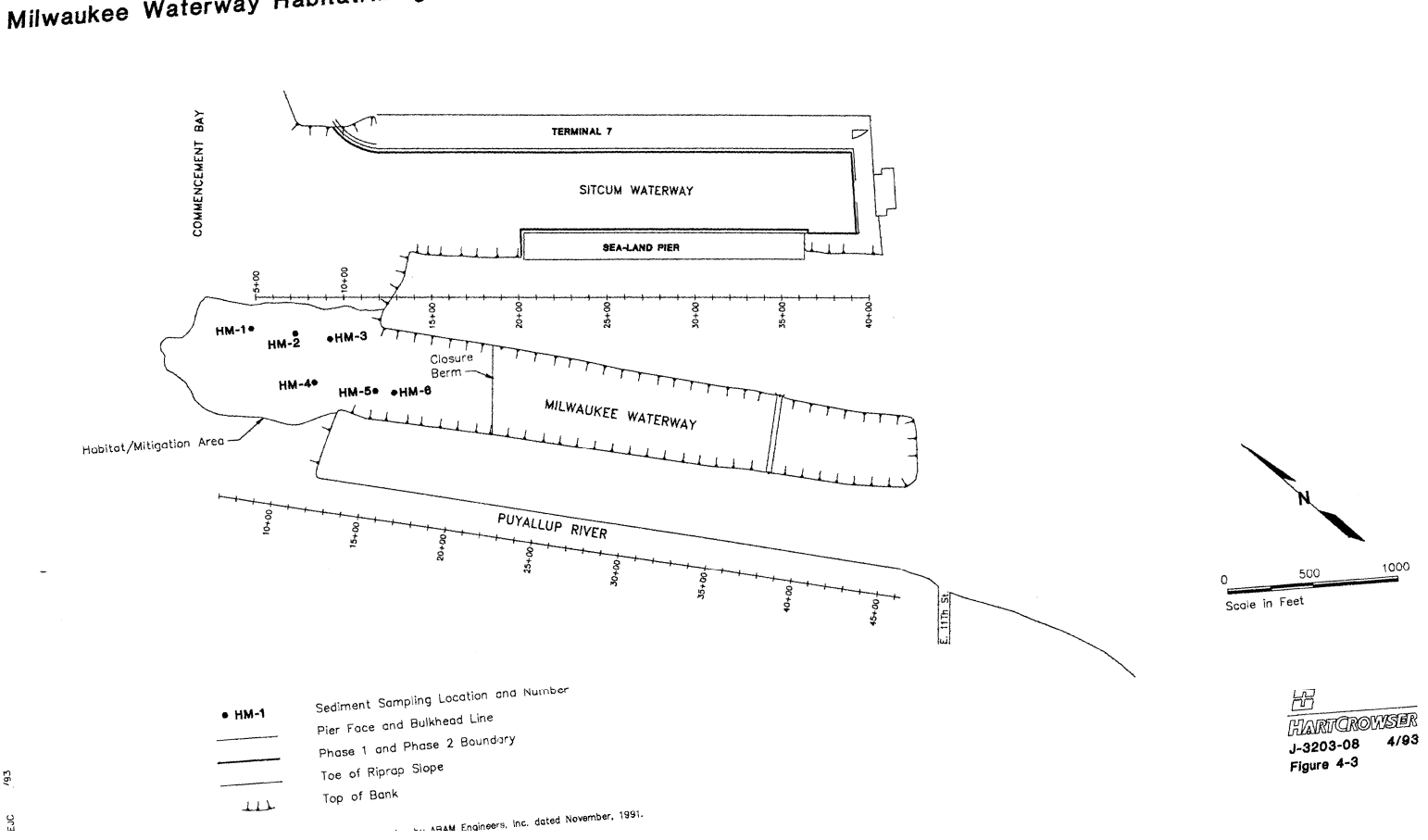


Figure 2-2. St. Paul Cap

Figure 2-3. Milwaukee Confined Disposal Facility and Habitat Mitigation
(Source: Hart Crowser 1993)



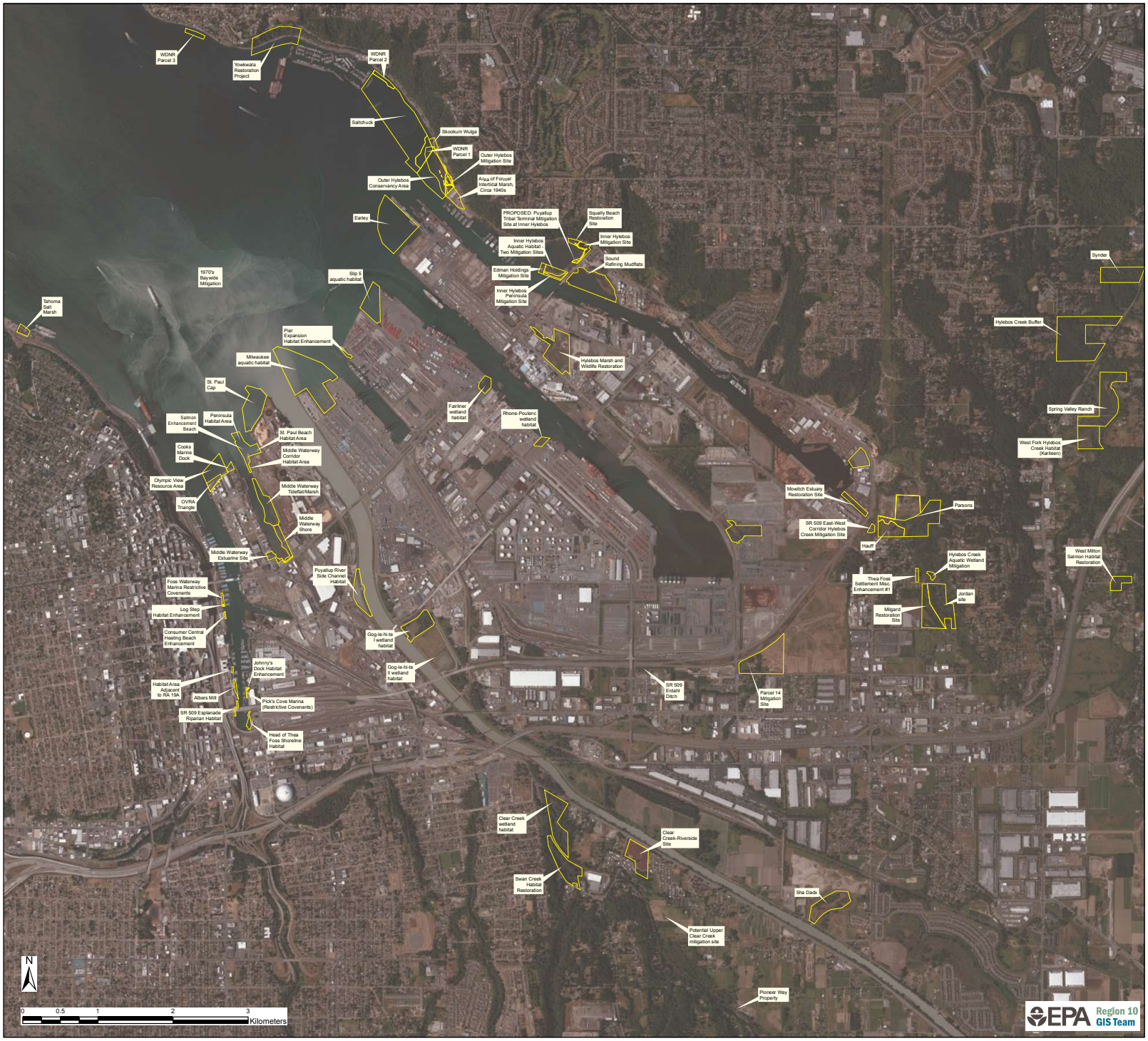
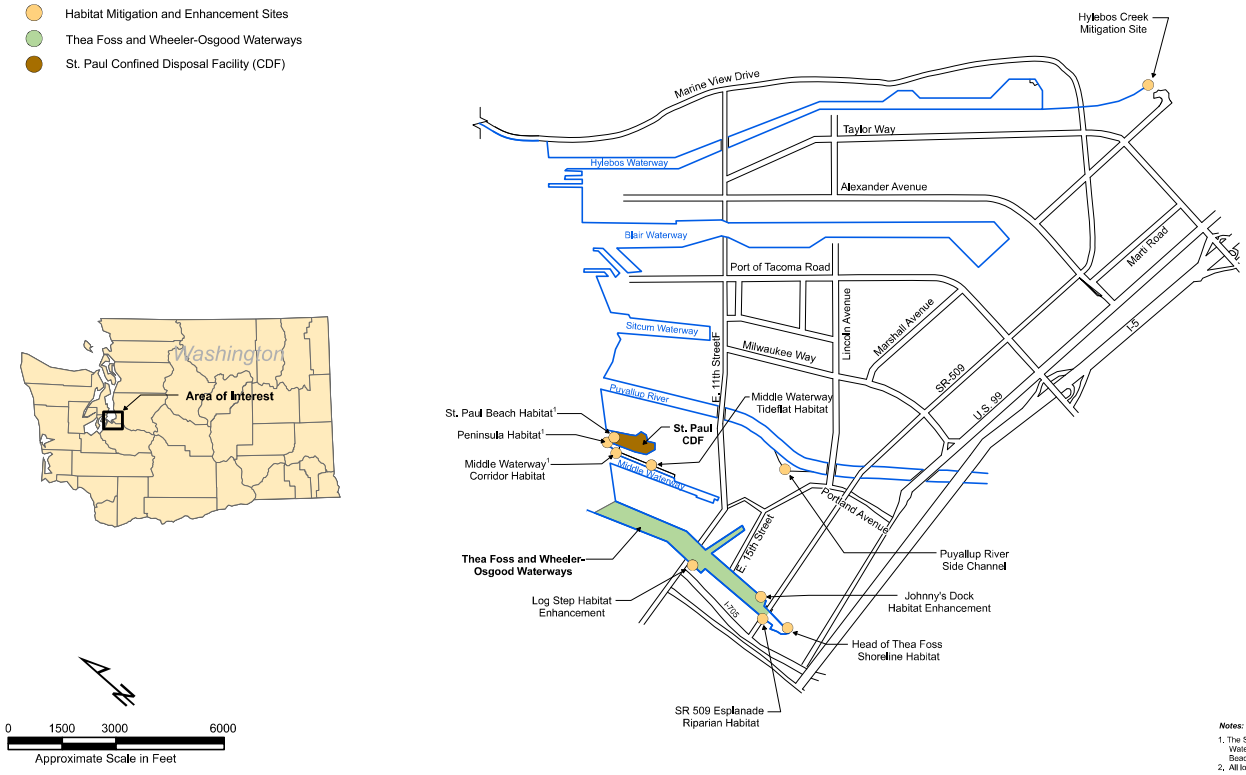


Figure 2-4. Mitigation and Restoration Projects (Source: EPA Region 10 GIS Team)



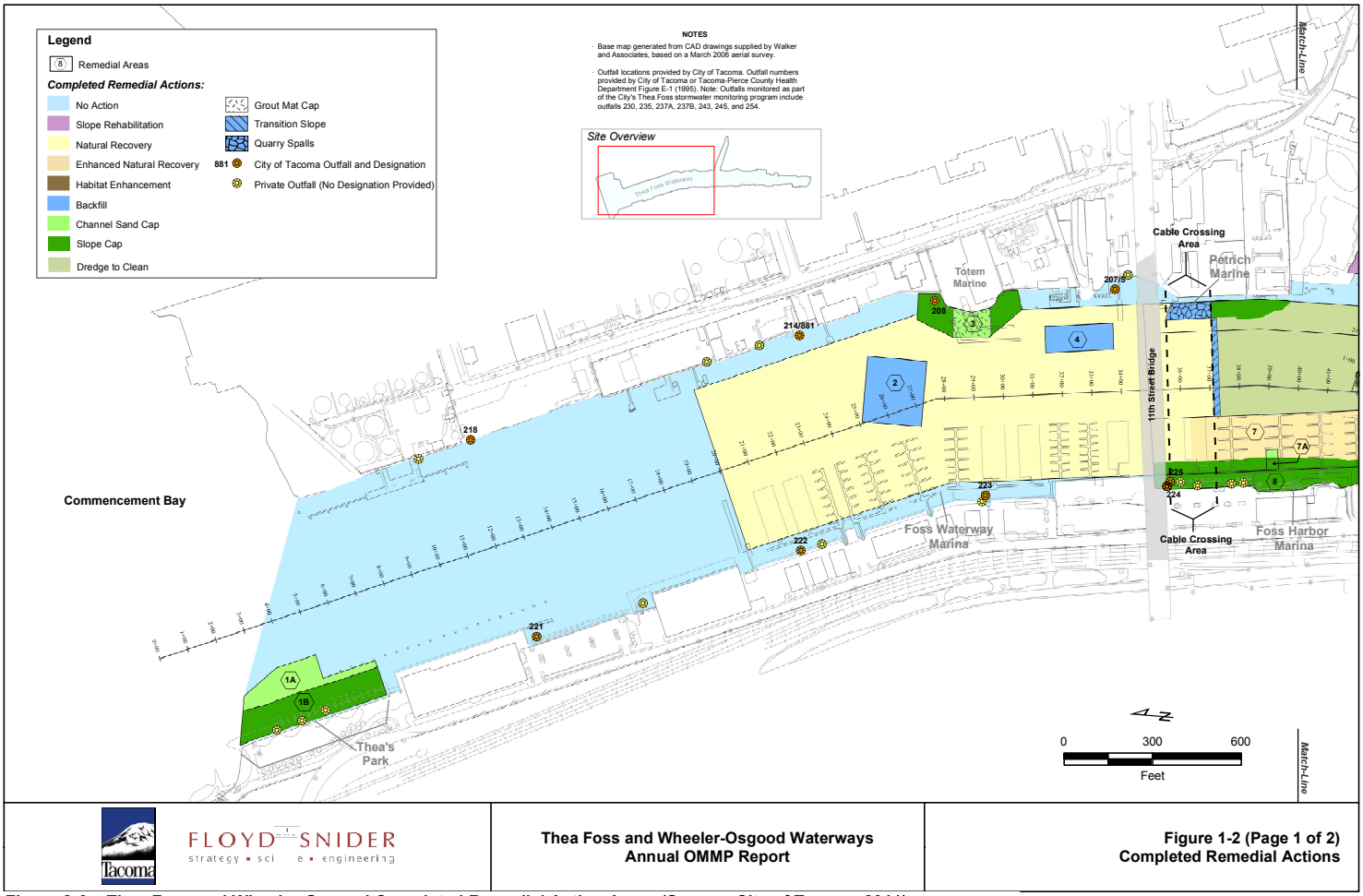
FLOYD | SNIDER
strategy • science • engineering

Thea Foss and Wheeler-Osgood Waterways
LTMP

Figure 1-1
Project Location Map

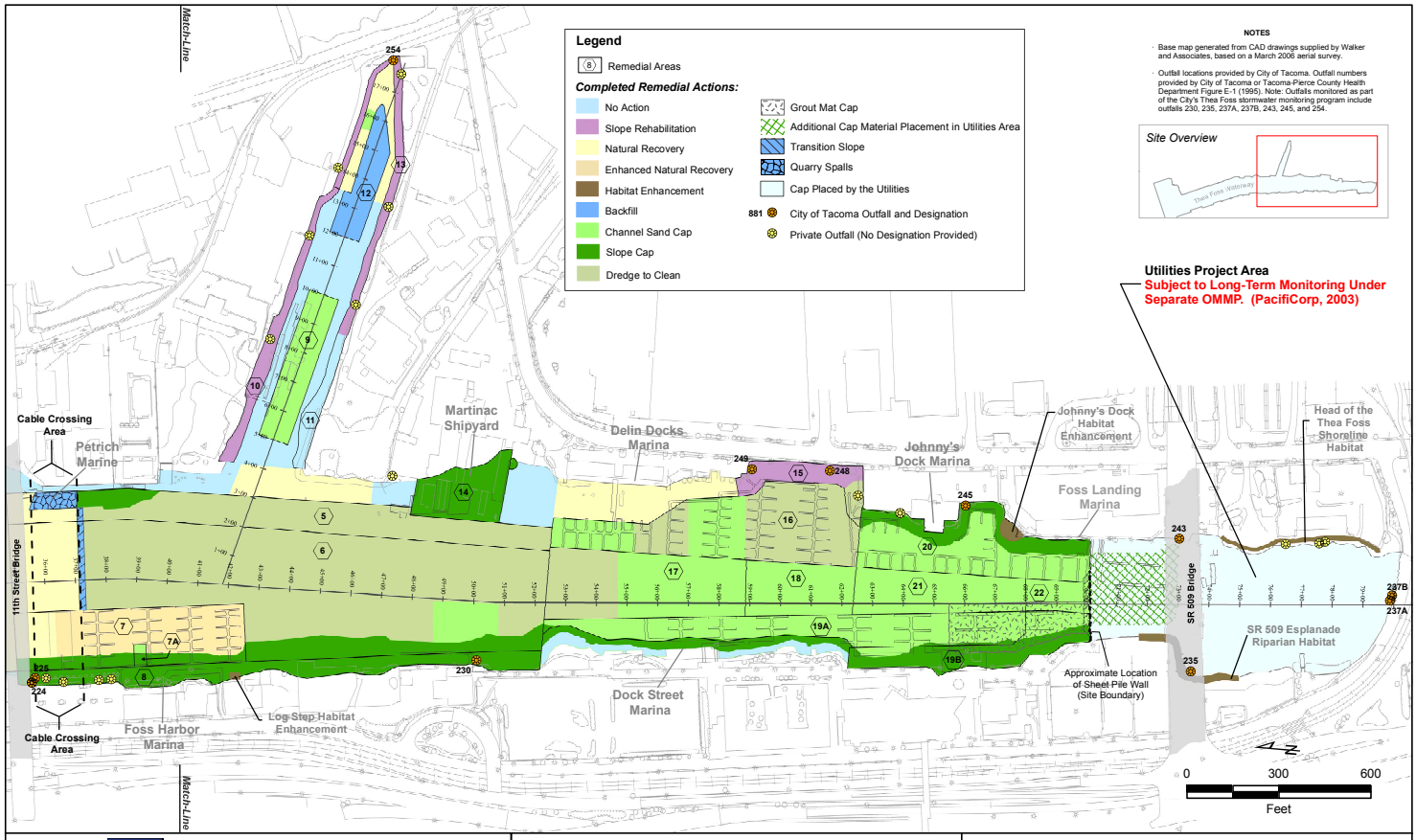
I:\GIS\Projects\CDT_ON_CALL\MXD\2017 LTMP\Figure 1-1 Project Location Map.svg
3/30/2017

Figure 2-5. Location of Mouth of Thea Foss and Wheeler-Osgood Waterways Remedial Action, Habitat Areas, and St. Paul CDF



Tacoma / FLOYD|SNIDER strategy • science • engineering	Thea Foss and Wheeler-Osgood Waterways Annual OMMP Report	Figure 1-2 (Page 1 of 2) Completed Remedial Actions

Figure 2-6a. Thea Foss and Wheeler-Osgood Completed Remedial Action Areas (Source: City of Tacoma 2011)



FLOYD | SNIDER
strategy • sci e • engineering

Thea Foss and Wheeler-Osgood Waterways
Annual OMMP Report

Figure 1-2 (Page 2 of 2)
Completed Remedial Actions

Figure 2-6b. Thea Foss and Wheeler-Osgood Completed Remedial Action Areas (Source: City of Tacoma 2011)

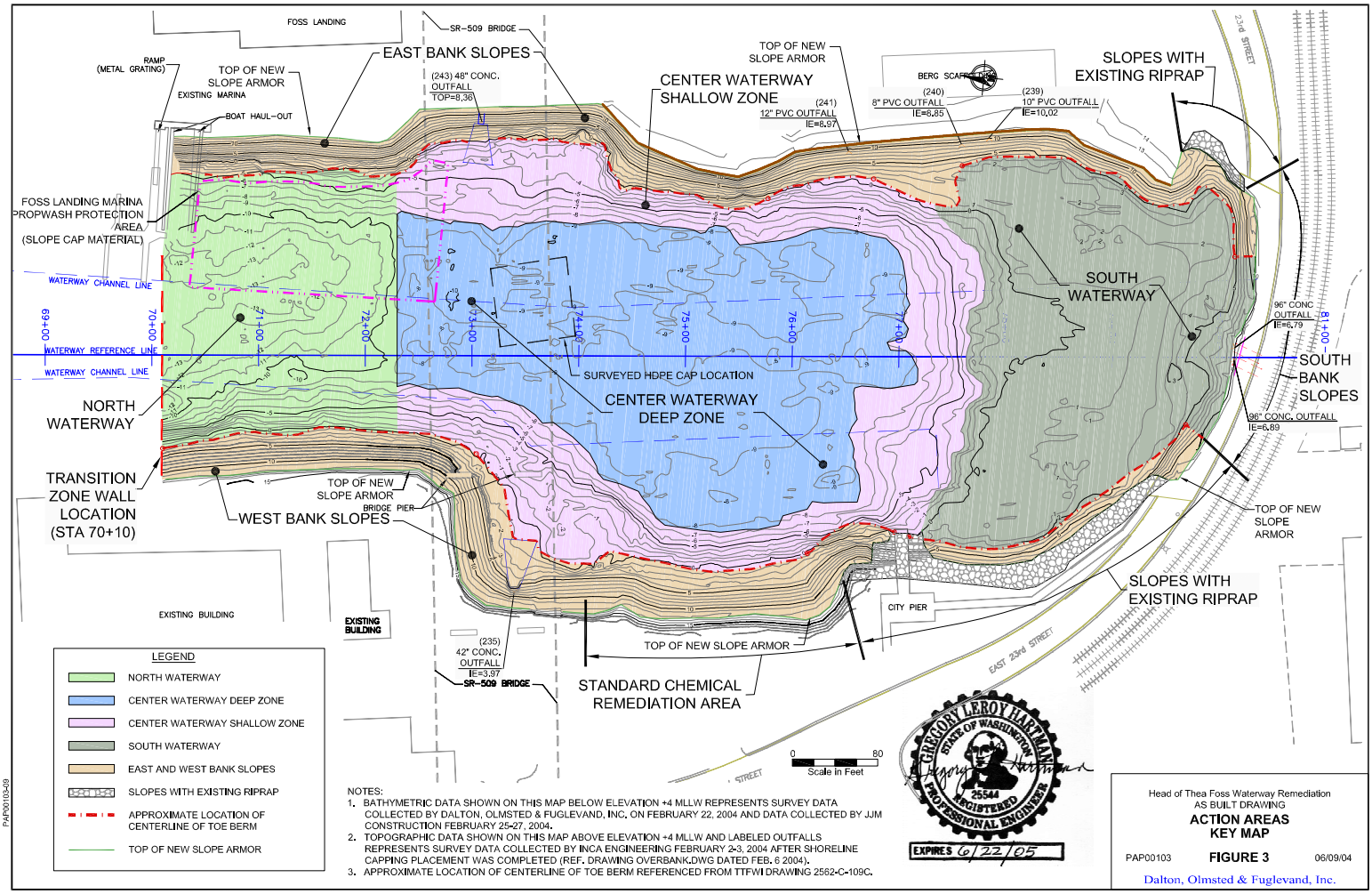


Figure 2-7. Head of Thea Foss Remedial Action (Source: DOF 2008)

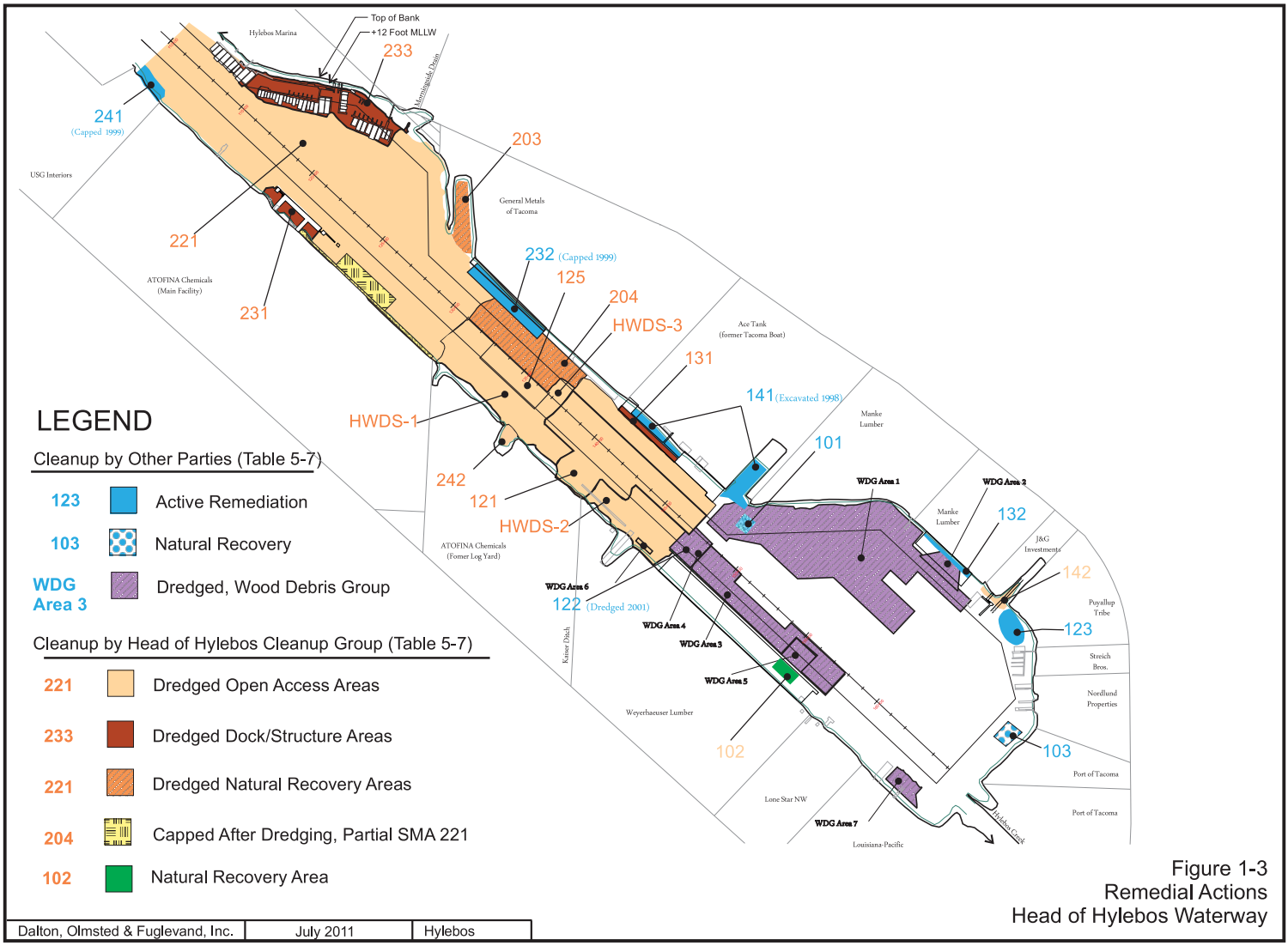


Figure 2-8. Head of Hylebos Remedial Actions (Source: DOF 2011)

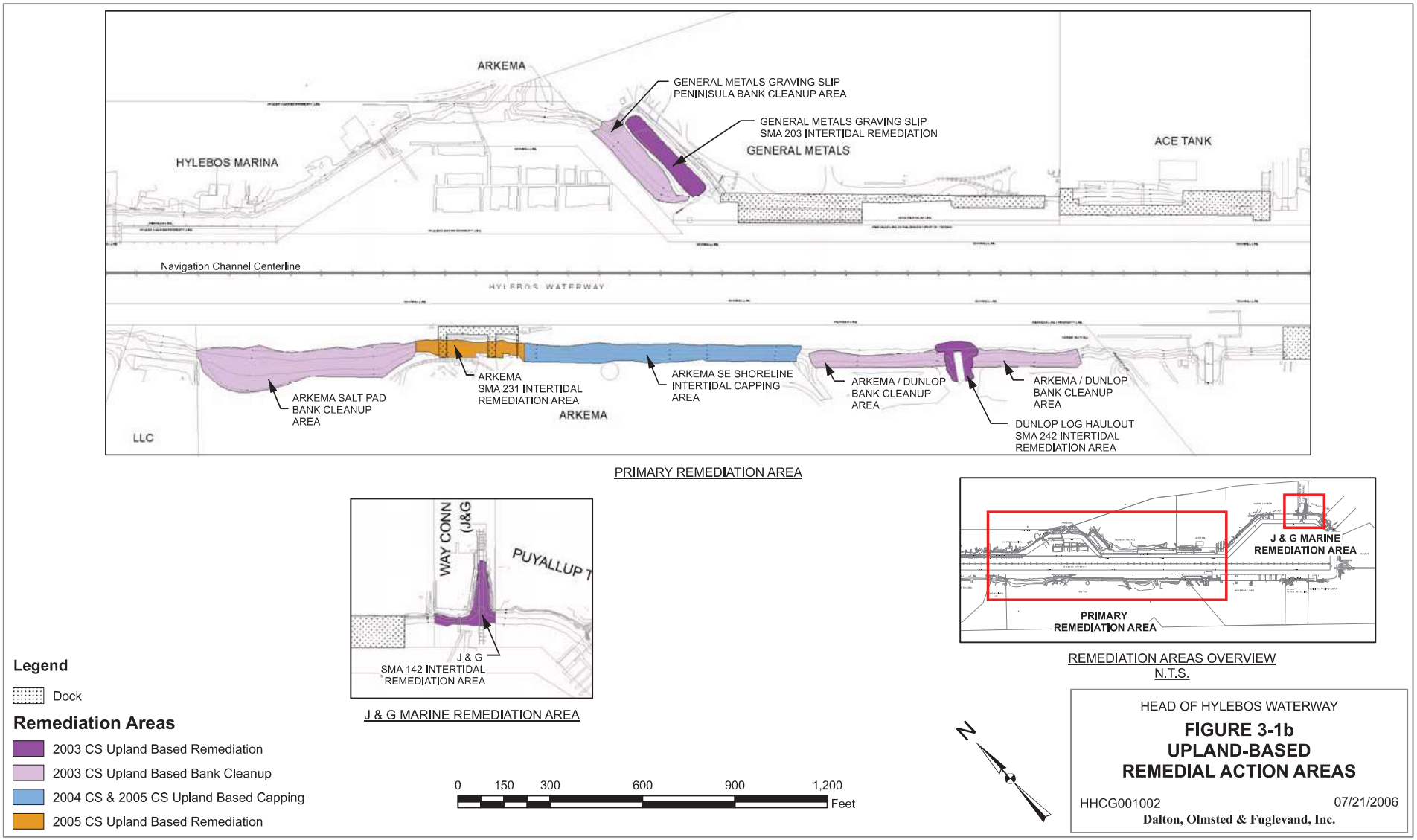
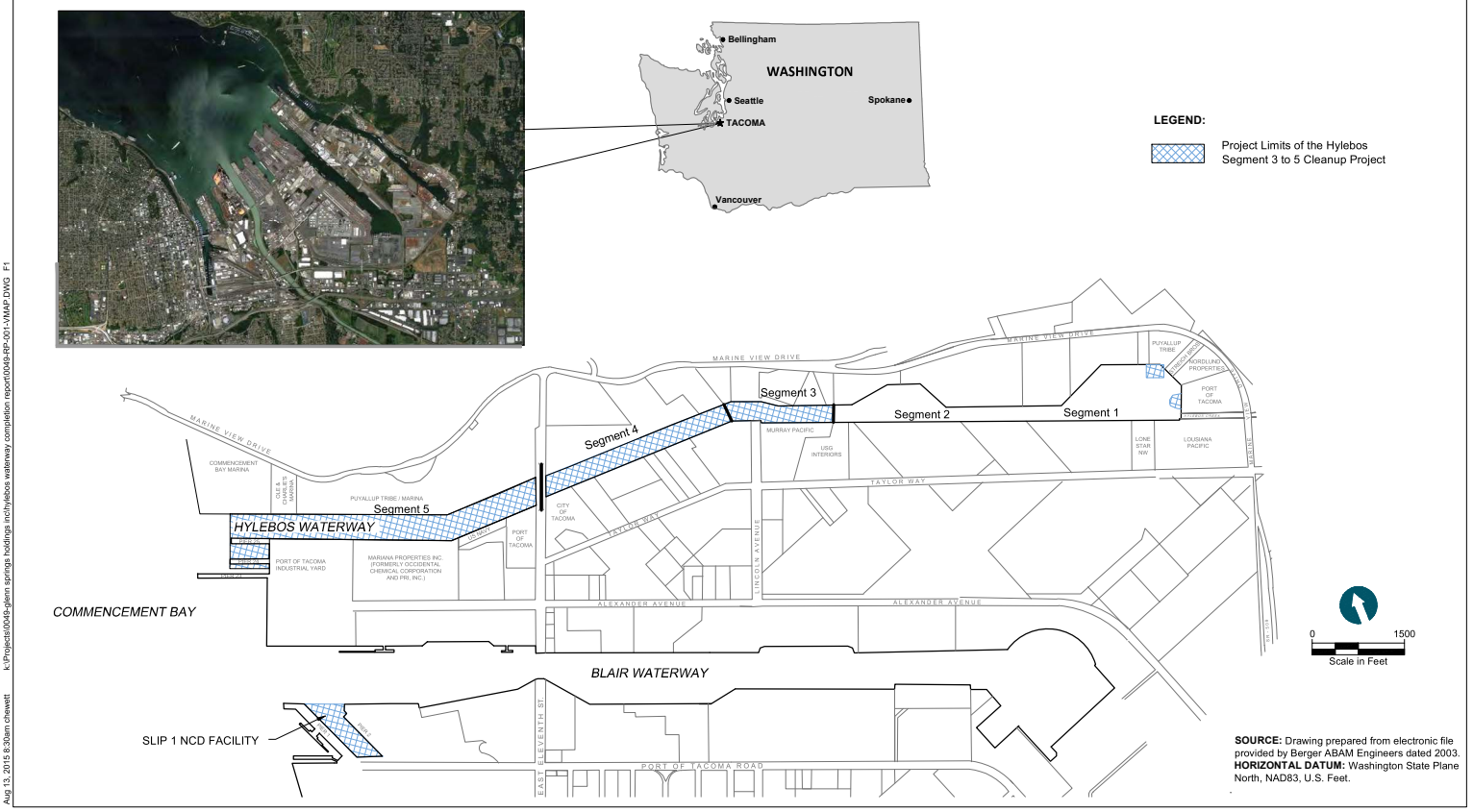


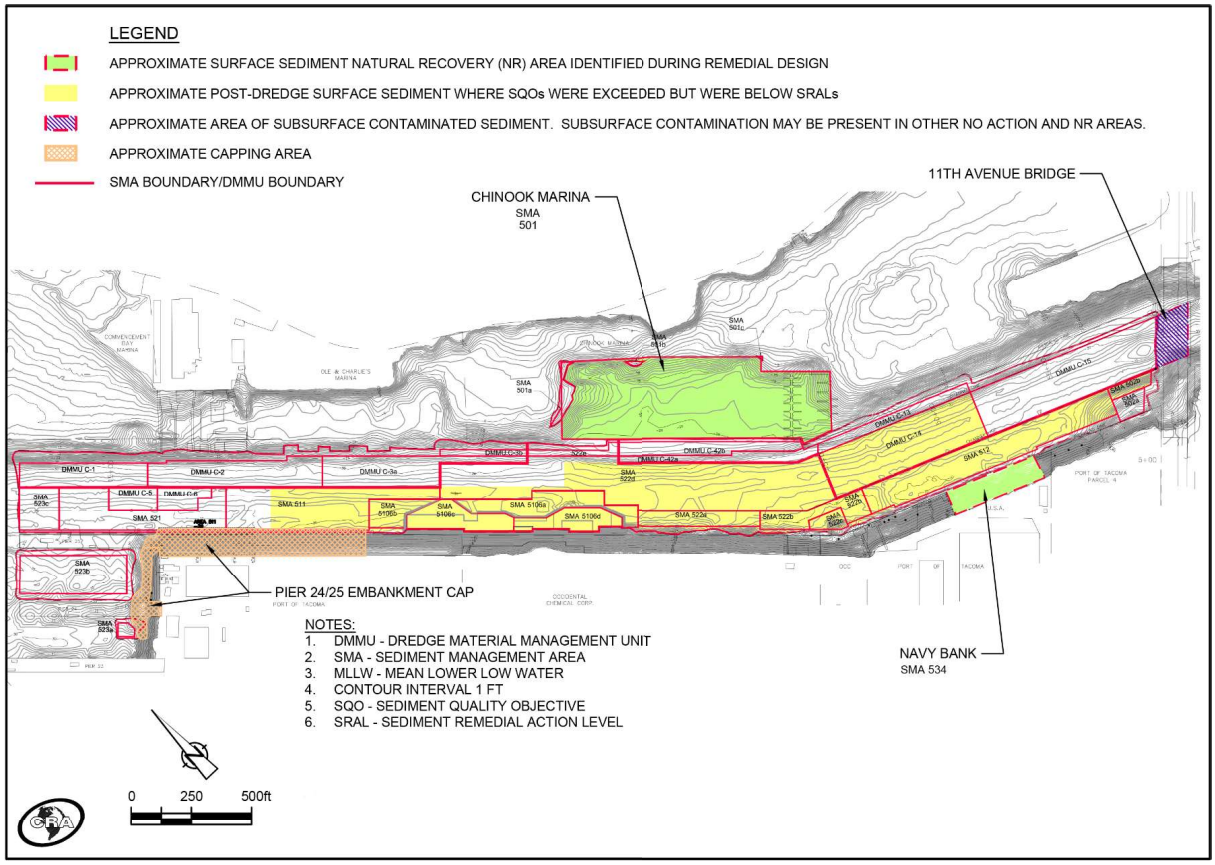
Figure 2-9. Arkema Cap (Source: DOF 2006)



Aug 13, 2015 8:30am chewett k:\Projects\0049-glenn springs holdings inc\hylebos waterway completion report\0049-RP-001-VMAP.DWG F1

Figure 2-10. Head of Hylebos and Blair Slip 1 NCDF Location (Source: Anchor 2015)

Figure 1
Vicinity Map
Mouth of Hylebos Waterway (Segments 3, 4, and 5)

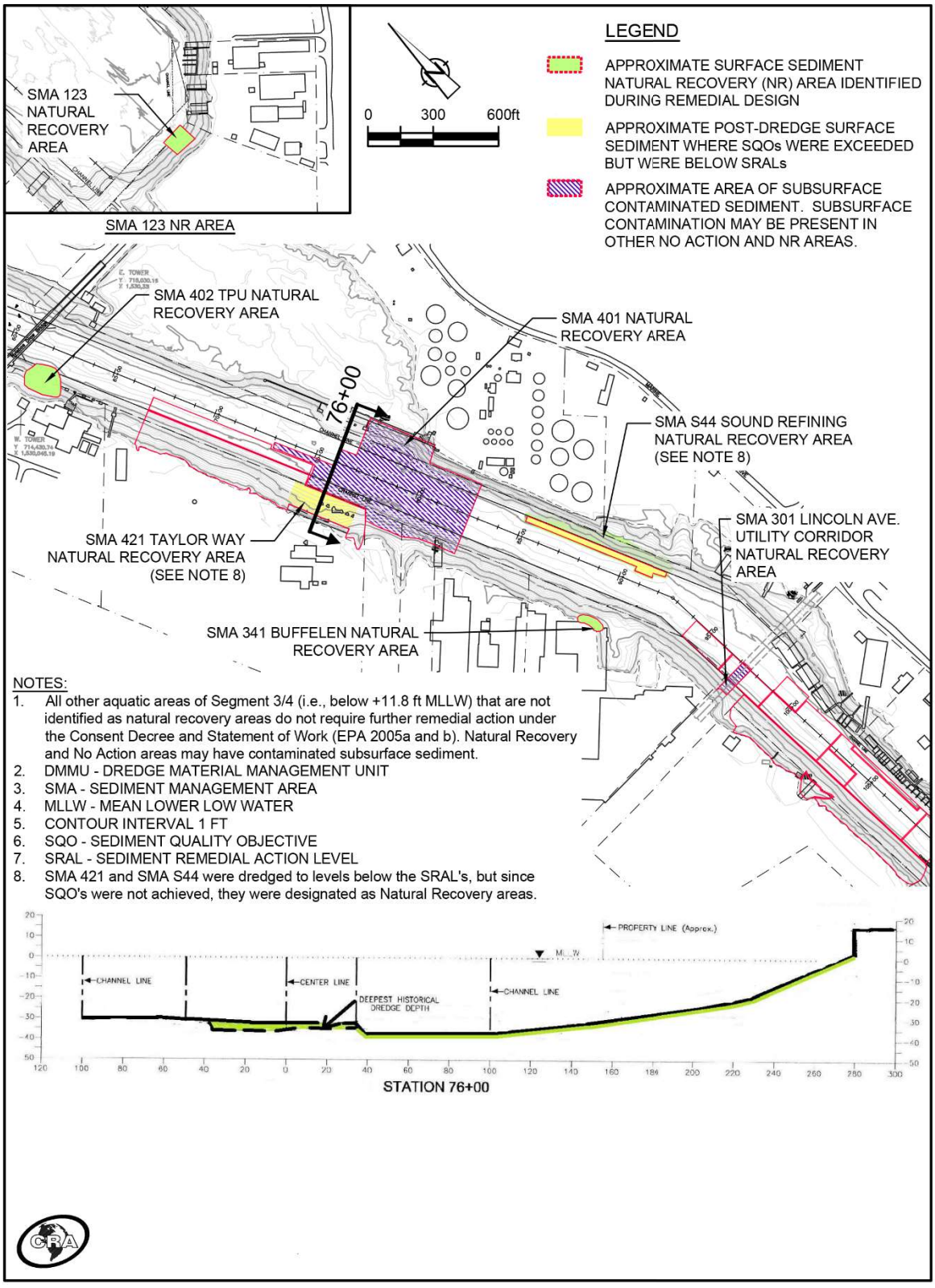


Source: Occidental and Port 2015b

Figure 2
Post-Construction Sediment Overview – Segment 5
Data Summary Report
OMMP – Mouth of Hylebos Waterway

ANCHOR QEA

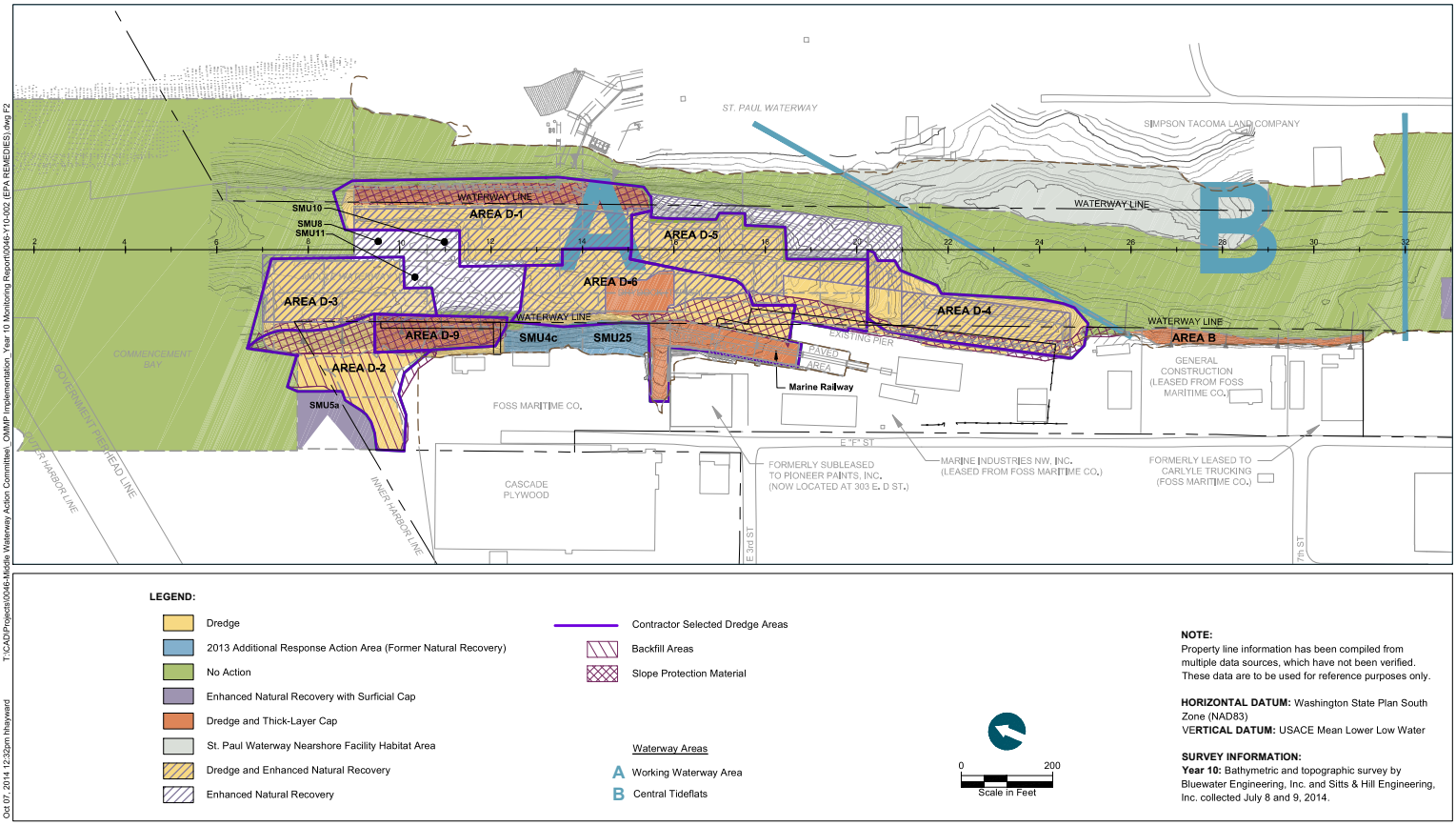
Figure 2-11a. Mouth of Hylebos Remedial Action (Source: Anchor 2015)



Source: Occidental and Port 2015b

Figure 3
Post-construction Sediment Overview – Sedment 3/4
Data Summary Report
OMMP – Mouth of Hylebos Waterway

Figure 2-11b. Mouth of Hylebos Remedial Action (Source: Anchor 2015)



LEGEND:

- Dredge
- 2013 Additional Response Action Area (Former Natural Recovery)
- No Action
- Enhanced Natural Recovery with Surficial Cap
- Dredge and Thick-Layer Cap
- St. Paul Waterway Nearshore Facility Habitat Area
- Dredge and Enhanced Natural Recovery
- Enhanced Natural Recovery
- Contractor Selected Dredge Areas
- Backfill Areas
- Slope Protection Material

Waterway Areas

A Working Waterway Area

B Central Tideflats

0 200

Scale in Feet

NOTE:
Property line information has been compiled from multiple data sources, which have not been verified. These data are to be used for reference purposes only.

HORIZONTAL DATUM: Washington State Plan South Zone (NAD83)
VERTICAL DATUM: USACE Mean Lower Low Water

SURVEY INFORMATION:
Year 10: Bathymetric and topographic survey by Bluewater Engineering, Inc. and Sitts & Hill Engineering, Inc. collected July 8 and 9, 2014.

T:\CAD\Projects\0046-Middle Waterway Action Committee_OMMP Implementation_Year 10 Monitoring Report\0046-Y10-002 (EPA REMEDIES).dwg F2
Oct 07, 2014 12:32pm hsayward

ANCHOR QEA

Figure 2-12. Middle Waterway Areas A and B Remedial Action (Source: Anchor 2014)

Figure 2
Final EPA-Approved Remedies Applied to Areas A and B
Middle Waterway Problem Area
Year 10 Monitoring Report

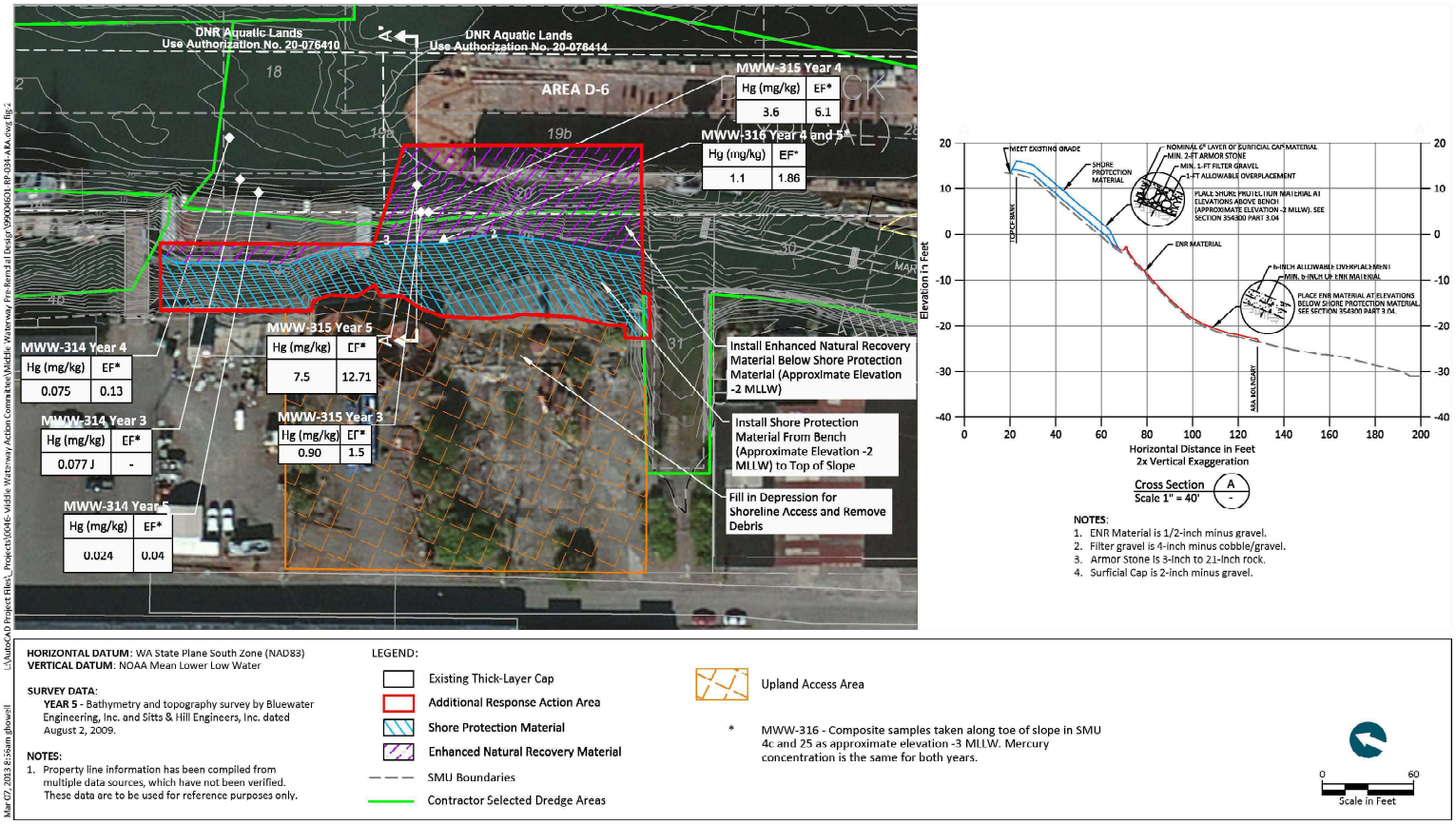


Figure 2-13. Additional Response Actions in Middle Waterway, Area A (Source: Anchor QEA 2013a)

Figure 1
Additional Response Action Area
Middle Waterway Problem Area - Areas A and B

Site Plan
Middle Waterway Problem Area C

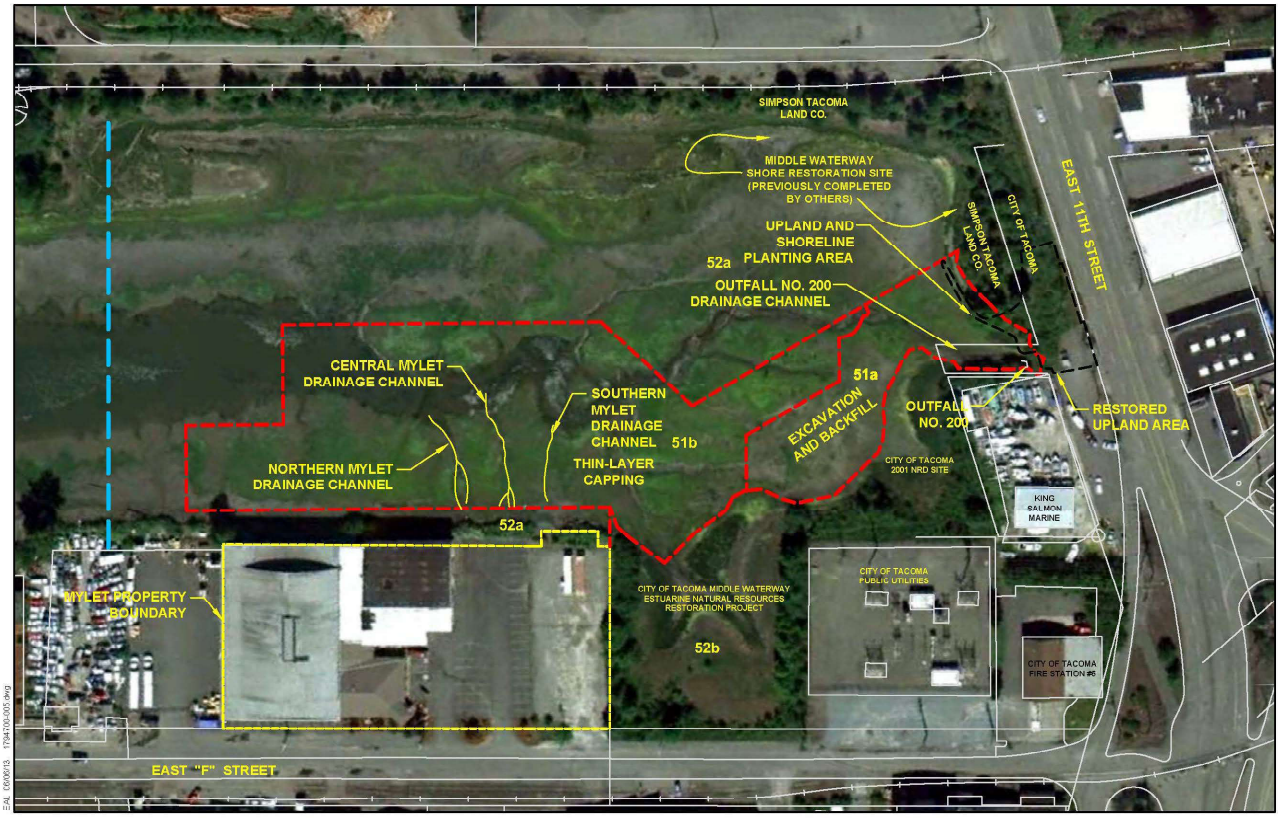
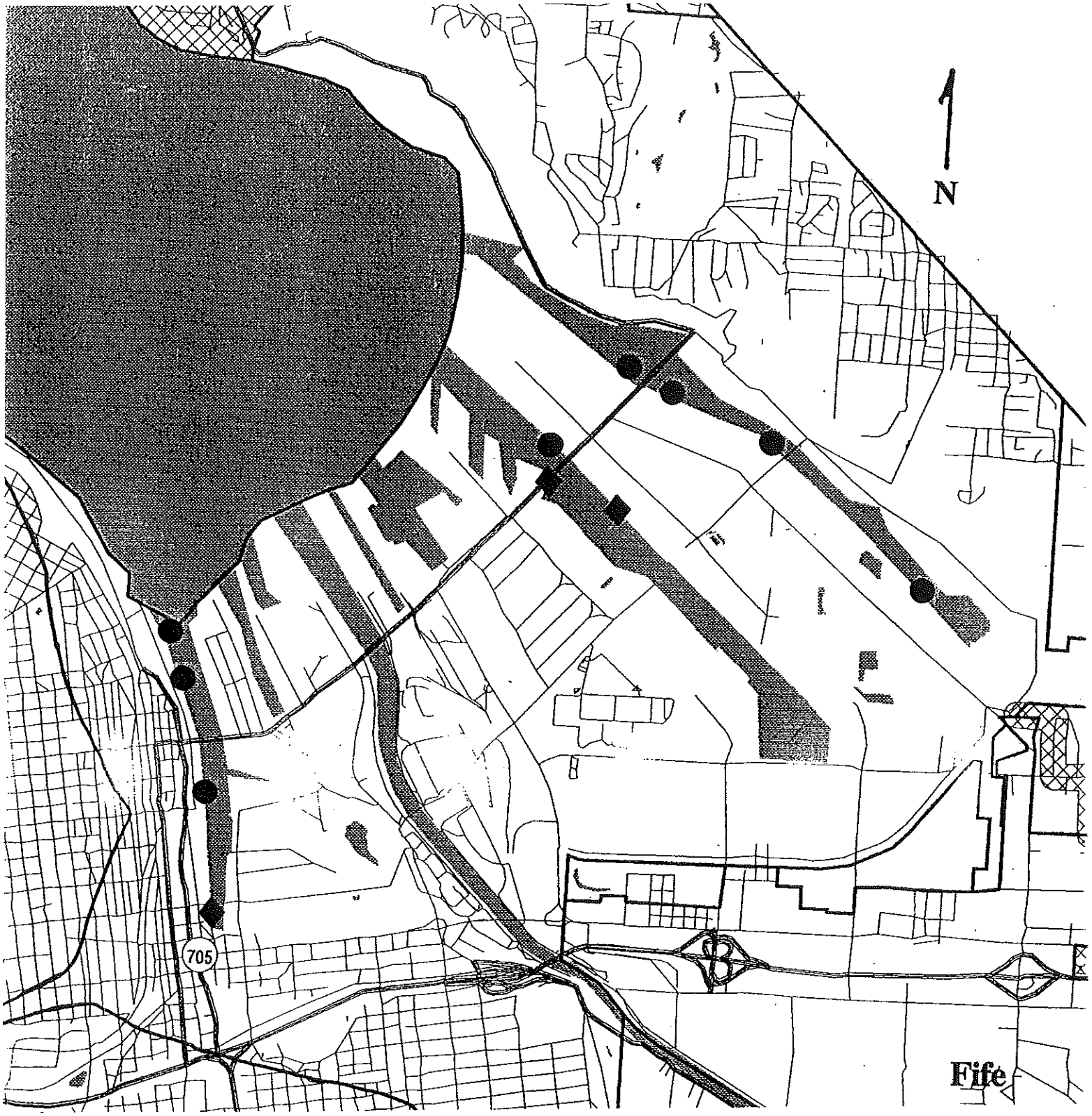


Figure 2-14. Remedial Actions Completed in Middle Waterway, Area C (Source: HartCrowser 2013b)



Map of the Fish Consumption Warning Sign Locations in the Waterways of Commencement Bay, October 18, 1996.

- ● New multi-lingual sign
- ◆ Old warning sign, in english only (these signs weren't replaced because they are in good condition, difficult to get to, and/or are in industrial areas that don't have public access).

Figure 2-15. Location of Current and Historic Fish Advisory Signs

RECORD OF SURVEY
FOR DNR EASEMENT #51-093012
A PORTION OF THE S.W. ¼ OF THE N.E. ¼, SECTION 33, TOWNSHIP 21 NORTH, RANGE 3 EAST, W.M.
CITY OF TACOMA, PIERCE COUNTY, WASHINGTON

LEGAL DESCRIPTION

A PORTION OF THE BEDLANDS OF COMMENCEMENT BAY AND HARBOR AREA AS SHOWN ON THE MAP OF TACOMA HARBOR APPROVED SEPTEMBER 5, 1894 LYING IN FRONT OF FIRST CLASS TIDELANDS BLOCKS 24, 25, 26, AND 27 OF THE 1927 REPLAT OF A PORTION OF THE TACOMA TIDELANDS APPROVED BY THE COMMISSIONER OF PUBLIC LANDS ON DECEMBER 9, 1927 SITUATE IN THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 33, TOWNSHIP 21 NORTH, RANGE 3 EAST OF THE WILLAMETTE MERIDIAN, CITY OF TACOMA, COUNTY OF PIERCE, STATE OF WASHINGTON, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE MOST NORTHERLY CORNER OF BLOCK 24, 1927 REPLAT OF TACOMA TIDE LANDS IN THE NORTHEAST QUARTER OF SAID SECTION 33;

THENCE ALONG THE INNER HARBOR LINE AS SHOWN ON THE SURVEY OF TACOMA HARBOR BY THE WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES RECORDED UNDER AUDITOR'S FEE NUMBER 200006295005 AND NORTHWESTERLY LINE OF SAID BLOCK 24, SOUTH 69°38'20" WEST 54.99 FEET TO THE POINT OF BEGINNING;

THENCE, CONTINUING ALONG SAID INNER HARBOR LINE AND NORTHWESTERLY LINE OF SAID BLOCK 24, SOUTH 69°38'20" WEST 113.21 FEET TO AN ANGLE POINT IN SAID INNER HARBOR LINE;

THENCE, CONTINUING ALONG SAID INNER HARBOR LINE, SOUTH 36°32'56" WEST 144.37 FEET TO THE OUTER EDGE OF AN EXISTING CLARIFIER TANK;

THENCE, ALONG SAID OUTER EDGE, SOUTH 80°52'54" WEST 23.01 FEET;

THENCE, CONTINUING ALONG SAID OUTER EDGE, SOUTH 58°42'55" WEST 46.01 FEET;

THENCE, CONTINUING ALONG SAID OUTER EDGE, SOUTH 36°32'56"WEST 46.01 FEET;

THENCE, CONTINUING ALONG SAID OUTER EDGE, SOUTH 14°22'57"WEST 46.01 FEET;

THENCE, CONTINUING ALONG SAID OUTER EDGE, SOUTH 07°47'02"EAST 23.01 FEET TO THE AFOREMENTIONED INNER HARBOR LINE;

THENCE, ALONG SAID INNER HARBOR LINE, SOUTH 36°32'56" WEST 985.14 FEET;

THENCE NORTH 19°53'04" WEST 74.46 FEET;

THENCE NORTH 32°36'46" WEST 146.18 FEET;

THENCE NORTH 51°42'44" EAST 98.23 FEET;

THENCE NORTH 00°55'07" EAST 570.82 FEET;

THENCE NORTH 21°56'22" EAST 377.51 FEET TO THE OUTER HARBOR LINE AS SHOWN ON THE AFOREMENTIONED SURVEY OF TACOMA HARBOR BY THE WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES RECORDED UNDER AUDITOR'S FEE NUMBER 200006295005;

THENCE NORTH 21°56'22" EAST 98.62 FEET;

THENCE NORTH 18°26'18" EAST 193.69 FEET TO THE MOST WATER-WARD ANGLE POINT IN DEPARTMENT OF NATURAL RESOURCES DEPOSITION AGREEMENT AREA NUMBER 20-012631;

THENCE, ALONG SAID DEPOSITION AGREEMENT AREA AND THE NORTHEASTERLY EXTENSION THEREOF, NORTH 83°01'49" EAST 229.66 FEET;

THENCE NORTH 21°30'00" WEST 46.51 FEET;

THENCE SOUTH 87°22'03" EAST 39.54 FEET;

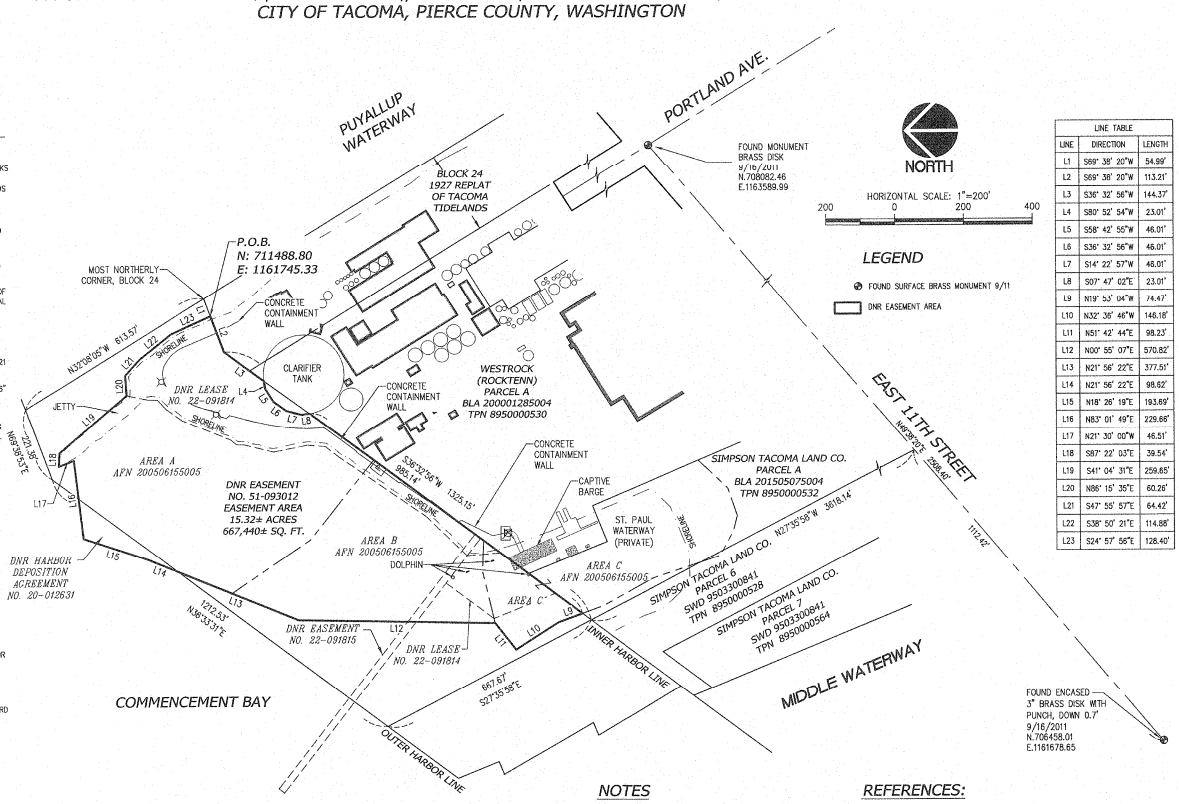
THENCE SOUTH 41°04'31" EAST 220.05 FEET;

THENCE NORTH 86°15'35" EAST 60.26 FEET;

THENCE SOUTH 47°55'57" EAST 64.42 FEET;

THENCE SOUTH 38°50'21" EAST 114.88 FEET;

THENCE SOUTH 24°57'56" EAST 128.40 FEET TO THE POINT OF BEGINNING.



LEGEND

- FOUND SURFACE BRASS MONUMENT 9/11
- DNR EASEMENT AREA

LINE TABLE		
LINE	DIRECTION	LENGTH
L1	S69° 38' 20"W	54.99'
L2	S69° 38' 20"W	113.21'
L3	S36° 32' 56"W	144.37'
L4	S80° 52' 54"W	23.01'
L5	S58° 42' 55"W	46.01'
L6	S36° 32' 56"W	46.01'
L7	S14° 22' 57"W	46.01'
L8	S07° 47' 02"E	23.01'
L9	N19° 53' 04"W	74.47'
L10	N32° 36' 46"W	146.18'
L11	N51° 42' 44"E	98.23'
L12	N00° 55' 07"E	570.82'
L13	N21° 56' 22"E	377.51'
L14	N21° 56' 22"E	98.62'
L15	N18° 26' 19"E	193.69'
L16	N83° 01' 49"E	229.66'
L17	N21° 30' 00"W	46.51'
L18	S87° 22' 03"E	39.54'
L19	S41° 04' 31"E	259.65'
L20	N86° 15' 35"E	60.26'
L21	S47° 55' 57"E	64.42'
L22	S38° 50' 21"E	114.88'
L23	S24° 57' 56"E	128.40'

EASEMENT AREA TABLE		
DESCRIPTION	ACRES	SQ. FT.
TOTAL EASEMENT AREA	15.32±	667,440±
HARBOR AREA	14.98±	652,683±
BEDLANDS	0.34±	14,757±

NOTES

1. BASIS OF BEARING: WASHINGTON STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD 83/91
2. FIELD WORK PERFORMED IN JULY 2014 AND AUGUST 2015.
3. FIELD EQUIPMENT USED: TOPCON QS ROBOTIC TOTAL STATION
4. THIS SURVEY WAS PERFORMED BY FIELD TRAVERSE WITH THE FINAL RESULTS EXCEEDING THE ACCURACY REQUIREMENTS CONTAINED IN W.A.C. 332-130-090.

REFERENCES:

1. RECORD OF SURVEY AFN 200506155005
2. RECORD OF SURVEY AFN 200305275001
3. RECORD OF SURVEY AFN 200006295005
4. RECORD OF SURVEY AFN 9809085001
5. 1927 REPLAT OF TACOMA TIDE LANDS

AUDITOR CERTIFICATE

AUDITOR'S CERTIFICATE $157.00

FILED FOR RECORD THIS 26th DAY OF January 2016

AT THE REQUEST OF MICHAEL McEVILLY 12:46 p.m.

AUDITOR'S FEE NUMBER 201601265003

J. Macumber DEPUTY

Julie Anderson COUNTY AUDITOR

SURVEY CERTIFICATE

SURVEYOR'S CERTIFICATE

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE SURVEY RECORDING ACT AT THE REQUEST OF SIMPSON IN AUGUST 2015.

MICHAEL A. McEVILLY
WASHINGTON STATE REGISTRATION No. 44639

PREPARED FOR

RECORD OF SURVEY
FOR
SIMPSON TACOMA KRAFT COMPANY, LLC
TACOMA, WA 98421

MICHAEL A. McEVILLY STATE OF WASHINGTON 44639 REGISTERED PROFESSIONAL LAND SURVEYOR 1/26/2016

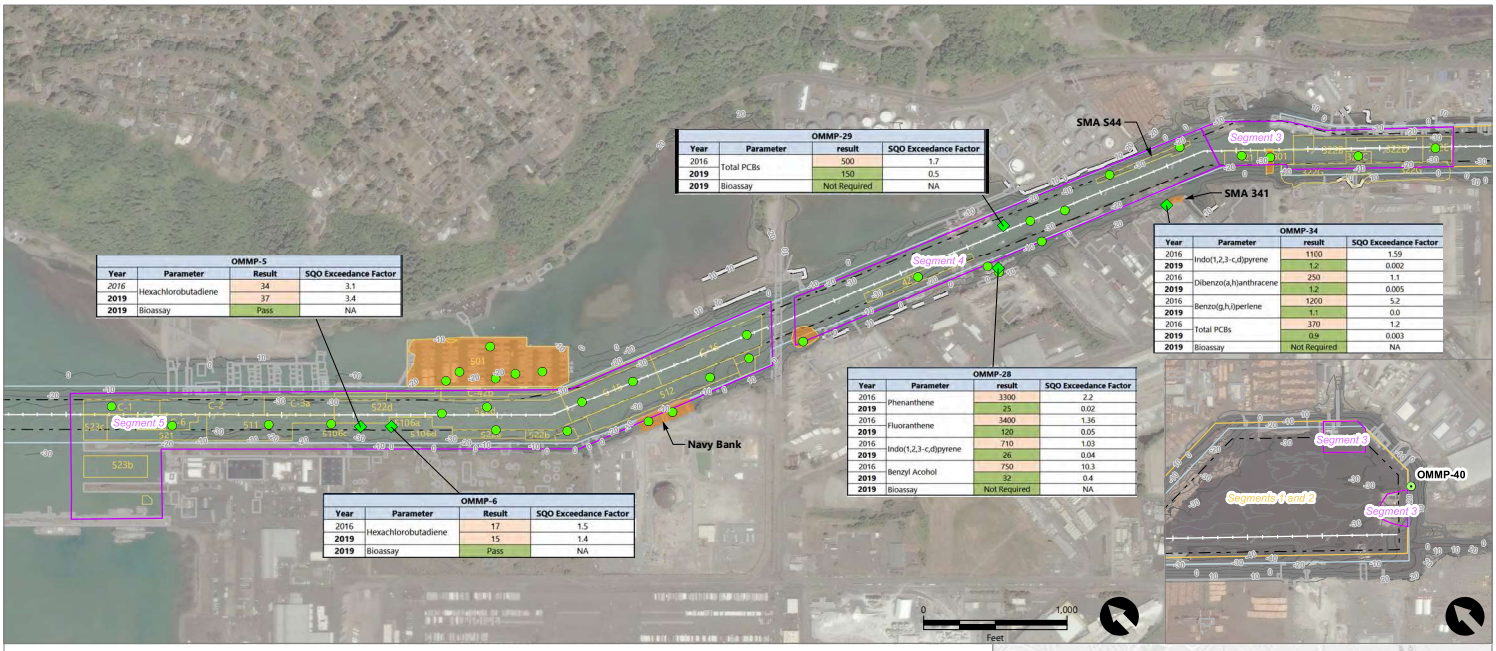
PREPARED BY

SITTS & HILL ENGINEERS, INC.
CIVIL ▪ STRUCTURAL ▪ SURVEYING
4815 CENTER STREET ● TACOMA, WA. 98409 ● (253) 474-9449

DRAWN BY	CHECKED BY	PROJECT NUMBER
DMS	MAM	16730
DATE	SCALE	SHEET NUMBER
01/04/2016	1"=200'	1 OF 1

ORIGINAL

201601265003



OMMP-29

Year	Parameter	result	SQO Exceedance Factor
2016	Total PCBs	500	1.7
2019		150	0.5
2019	Bioassay	Not Required	NA

OMMP-5

Year	Parameter	Result	SQO Exceedance Factor
2016	Hexachlorobutadiene	34	3.1
2019		37	3.4
2019	Bioassay	Pass	NA

OMMP-34

Year	Parameter	result	SQO Exceedance Factor
2016	Indo(1,2,3-c,d)pyrene	1100	1.59
2019		1.2	0.002
2016	Dibenzo(a,h)anthracene	250	1.1
2019		1.2	0.005
2016	Benzo(g,h,i)perlene	1200	5.2
2019		1.1	0.0
2016	Total PCBs	370	1.2
2019		0.9	0.003
2019	Bioassay	Not Required	NA

OMMP-28

Year	Parameter	result	SQO Exceedance Factor
2016	Phenanthene	3300	2.2
2019		25	0.02
2016	Fluoranthene	3400	1.36
2019		120	0.05
2016	Indo(1,2,3-c,d)pyrene	710	1.03
2019		26	0.04
2016	Benzyl Acohol	750	10.3
2019		32	0.4
2019	Bioassay	Not Required	NA

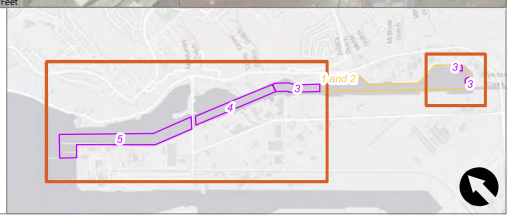
OMMP-6

Year	Parameter	Result	SQO Exceedance Factor
2016	Hexachlorobutadiene	17	1.5
2019		15	1.4
2019	Bioassay	Pass	NA

LEGEND:

- No SQO Exceedance
- Sediment Sampling Station
- Historical DMMU and MNR Boundaries
- Monitored Natural Recovery
- Project Limits of the Hylebos Segment 3 to 5 Cleanup Project
- Buildings and Other Structures
- Bulkhead
- Navigation Channel
- Pierhead Line
- 2-foot MLLW Contour (Port of Tacoma 2015)

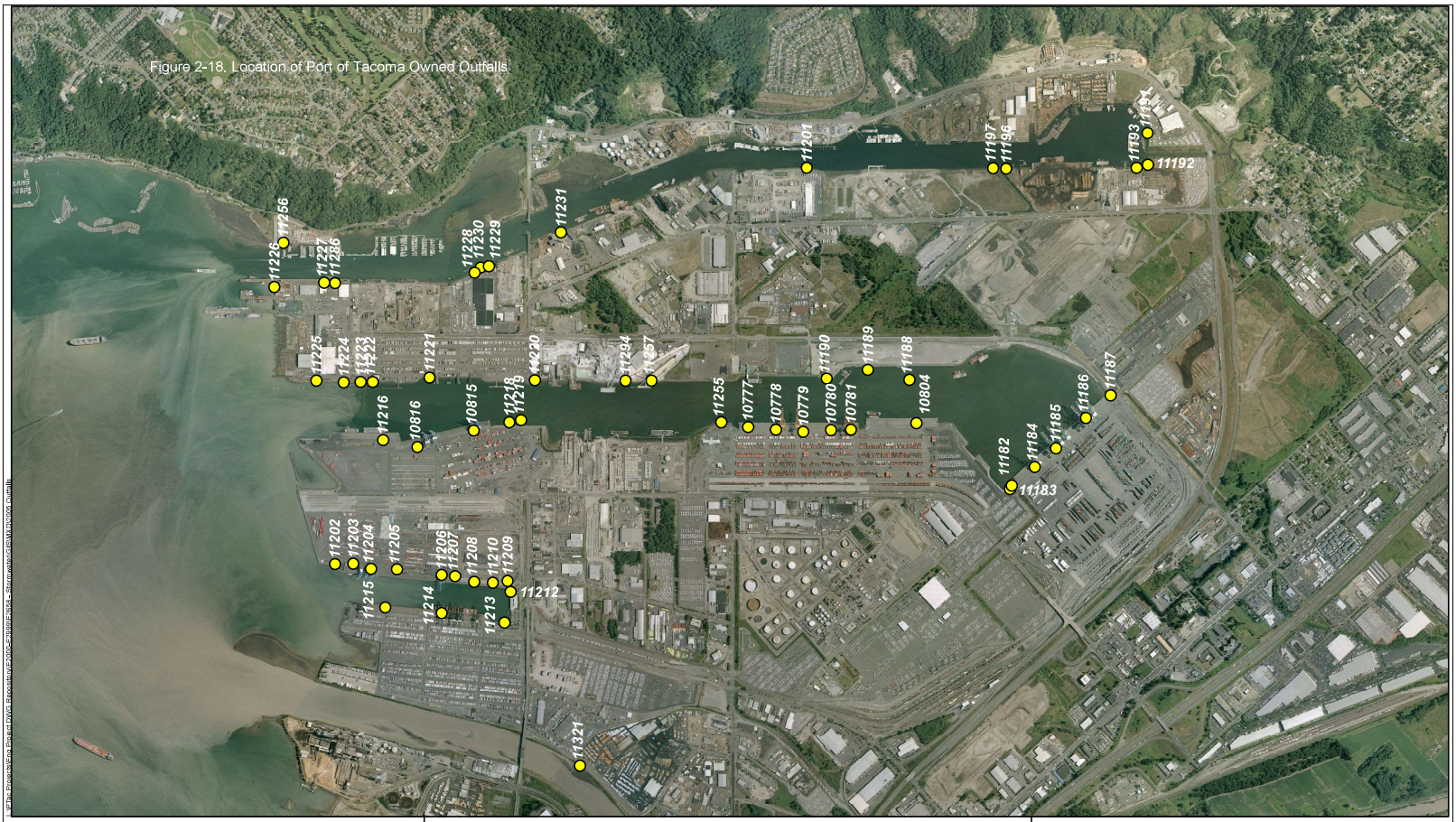
NOTES:
1. Segments 1 and 2 compose the Head of Hylebos unit which is addressed seperately.
µg/kg: Micrograms per Kilogram
MLLW: Mean Lower Low Water
OMMP: Operations, Maintenance, and Monitoring Plan
PCB: Polychlorinated Biphenyl
SQO: Sediment Quality Objective



Publish Date: 2020/02/20, 9:48 AM | User: adowell
Filepath: \\orcas\gis\Jobs\Glenn_Springs_Holdings_0049\Tacoma_HylebosWaterway\Maps\OMMP\SAP_Addendum\AQ_OMMP_Station_Locs_2019_Actuals.mxd

ANCHOR QEA

Figure 2-17
2019 vs 2016 OMMP Segment 3 to 5 Sediment Sampling Results
Addendum 1 Sampling and Quality Assurance Project Plan
Mouth of Hylebos Waterway (Segments 3, 4, and 5)



Port of Tacoma Owned Outfalls

Map created by: BArcher
Map created on: 8-19-2011

0 650 1,300 Feet

PORT of TACOMA U.S.A.

PO Box 1837 Tacoma, WA 98401
(253) 383-5841

FIGURE 02

STATE: WA
COUNTY: Pierce
CITY/PORT: Port of Tacoma
LOCATION: Port of Tacoma
PURPOSE: Maintenance and Repair

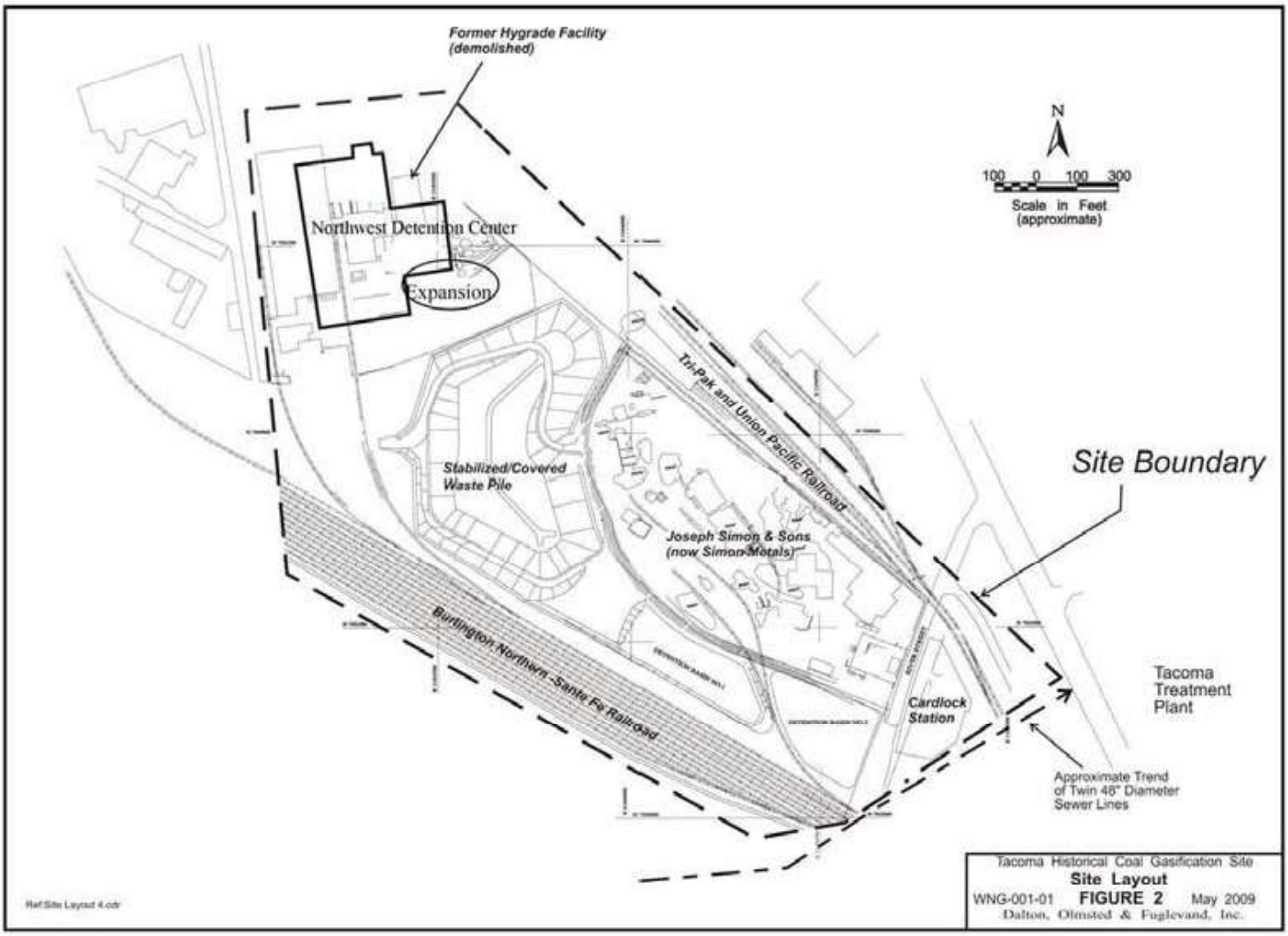
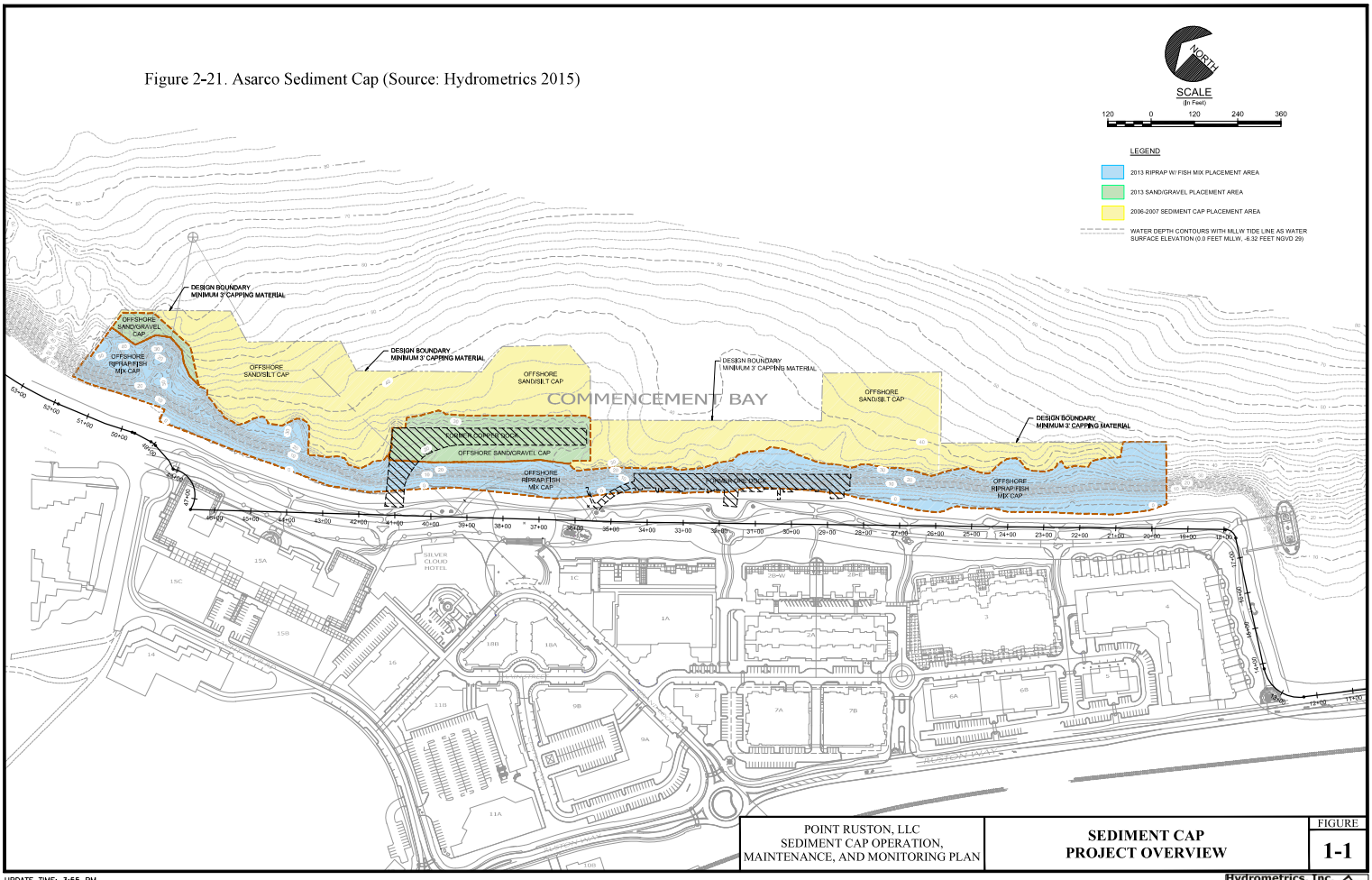


Figure 2-19. Tacoma Tar Pits Site Feature (Source: EPA 2009)


Figure 2-20. Asarco Off-Property Remedial Action
Legend
EPA Action Complete
EPA Action Needed
EPA Recommend Notice
EPA No Action Needed*
No Sampling Data
Unknown Status
Former Asarco Smelter Stack
N Park Ave
N Lexington St
Zone 1
Zone 2
Zone 3
Zone 4
Ruston Way
N Pearl St
N 35th St
NORTH
*Arsenic levels in soil are below 230 parts per million (ppm) or below 500 ppm for lead.
Layer Credit: Leica Geosystems, Inc

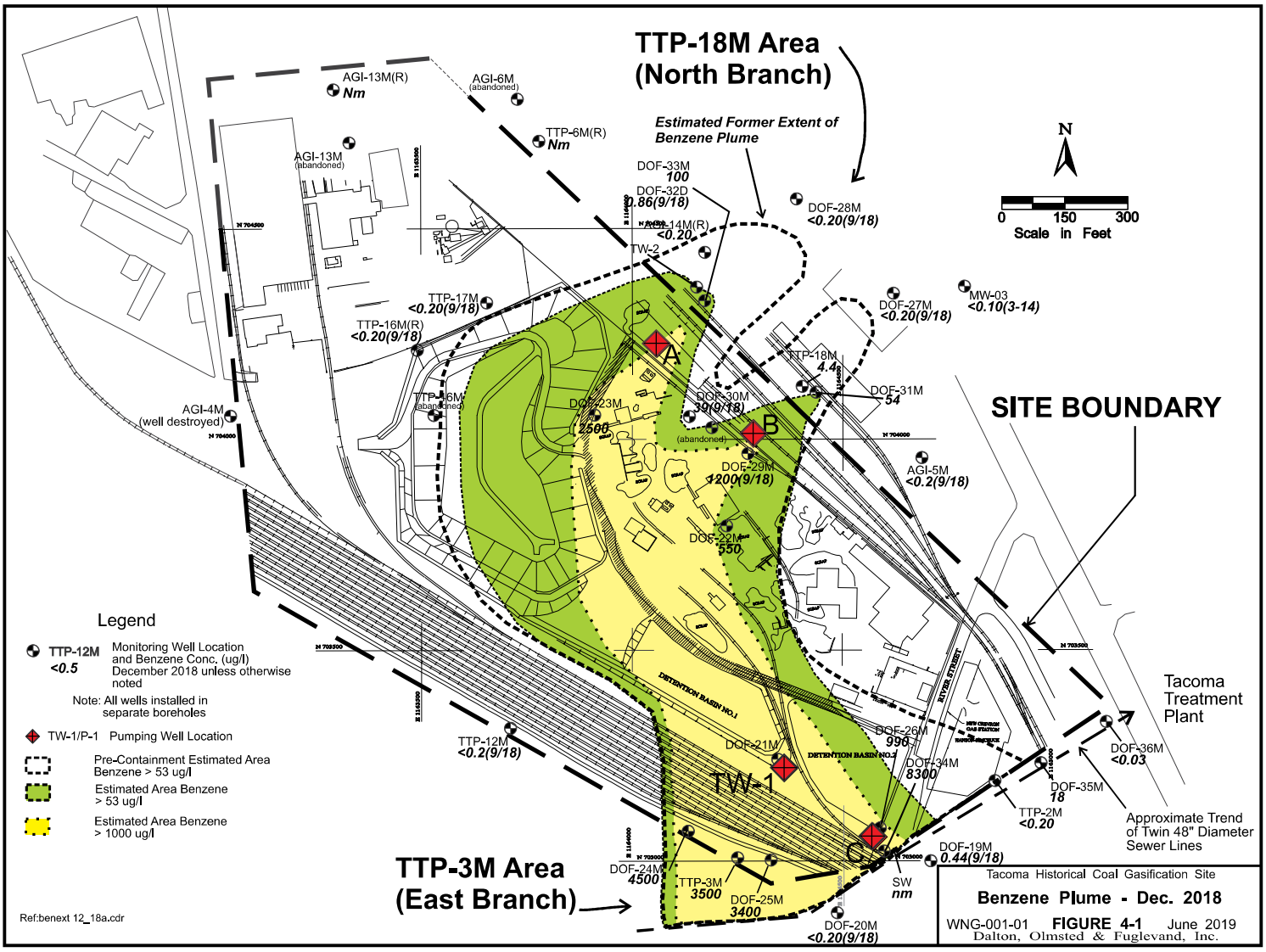
Figure 2-21. Asarco Sediment Cap (Source: Hydrometrics 2015)



POINT RUSTON, LLC SEDIMENT CAP OPERATION, MAINTENANCE, AND MONITORING PLAN	**SEDIMENT CAP PROJECT OVERVIEW**	FIGURE **1-1**

UPDATE TIME: 3:55 PM
AJOURDONNAIS\HEL\20150721\I:\LAND PROJECTS\1400101\DWG\1400101H015A.DWG

Hydrometrics, Inc.
Consulting Scientists and Engineers


TTP-18M Area
(North Branch)
Estimated Former Extent of
Benzene Plume
N
0 150 300
Scale in Feet
AGI-13M(R)
Nm
AGI-6M
(abandoned)
TTP-6M(R)
Nm
AGI-13M
(abandoned)
DOF-33M
100
DOF-32D
0.86(9/18)
DOF-28M
<0.20(9/18)
AGI-14M(R)
<0.20
TW-2
TTP-17M
<0.20(9/18)
TTP-16M(R)
<0.20(9/18)
DOF-27M
<0.20(9/18)
MW-03
<0.10(3-14)
TTP-18M
4.4
DOF-31M
54
AGI-4M
(well destroyed)
TTP-16M
(abandoned)
DOF-23M
2500
DOF-30M
39(9/18)
(abandoned)
DOF-29M
1200(9/18)
AGI-5M
<0.2(9/18)
SITE BOUNDARY
DOF-22M
550
A
B
C
TW-1
DETENTION BASIN NO.1
DETENTION BASIN NO.2
RIVER STREET
Tacoma
Treatment
Plant
DOF-26M
990
DOF-34M
8300
DOF-36M
<0.03
DOF-35M
18
TTP-2M
<0.20
Approximate Trend
of Twin 48" Diameter
Sewer Lines
TTP-12M
<0.2(9/18)
DOF-21M
DOF-19M
0.44(9/18)
SW
nm
DOF-24M
4500
TTP-3M
3500
DOF-25M
3400
DOF-20M
<0.20(9/18)
TTP-3M Area
(East Branch)
Legend
TTP-12M
<0.5
Monitoring Well Location
and Benzene Conc. (ug/l)
December 2018 unless otherwise
noted
Note: All wells installed in
separate boreholes
TW-1/P-1 Pumping Well Location
Pre-Containment Estimated Area
Benzene > 53 ug/l
Estimated Area Benzene
> 53 ug/l
Estimated Area Benzene
> 1000 ug/l
Ref:benext 12_18a.cdr
Tacoma Historical Coal Gasification Site
Benzene Plume - Dec. 2018
WNG-001-01 FIGURE 4-1 June 2019
Dalton, Olmsted & Fuglevand, Inc.

APPENDIX A – REFERENCE LIST

Document ID	Date	Title
1344751	9/9/1986	Administrative Order on Consent: Asarco, Incorporated; EPA Docket No. 1086-04-24-106.
2819	12/30/1987	Record of Decision, Decision Summary and Responsiveness Summary for Final Remedial Action, Commencement Bay Nearshore/Tideflats, Tacoma Tar Pits Site (Appendix 1 Consent Decree, U.S. v. Washington Natural Gas, et al).
1346753	9/10/1988	Final Endangerment Assessment: Ruston/Vashon Island Area.
1382774	9/29/1988	Administrative Order on Consent (AOC) for Ruston Expedited Response Action (ERA) at Publicly Accessible Locations; EPA Docket No. 1088-03-18-106.
1314070	1/31/1989	Third amendment to the 1986 Remedial Investigation/Feasibility Study Administrative Order on Consent.
1382847	3/3/1989	Final Report: Review of Final Field Investigation and Engineering Evaluation/Cost Analysis Reports for Ruston/Vashon Island, Washington; K/J/C 886027.03.
1413448	3/8/1989	UNREDACTED Administrative Order on Consent for Ruston Expedited Response Action at Publicly Accessible Locations; EPA Docket No. 108-03-18-106.
1326256	3/18/1989	Final Report: Asarco Tacoma Smelter Remedial Investigation - Volumes 1 Through 5.
1108026	4/1/1989	Final Report, Remedial Investigation, Volume 2, Appendices H through P.
1413785	4/25/1989	Expedited Response Action Plan: Ruston/North Tacoma, Washington.
42551	9/30/1989	Record of Decision for Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Pierce County, Washington.
1382776	7/5/1990	First Amendment to Administrative Order on Consent (AOC) for Ruston Expedited Response Action (ERA) at Publicly Accessible Locations; EPA Docket No. 1089-03-27-106.
1039795	9/28/1990	Source Control Completion Report, St. Paul Waterway Problem Area.
1344483	12/31/1990	Record of Decision, Decision Summary, and Responsiveness Summary for Interim Response Action, Asarco Demolition, Tacoma, Washington.
1039796	1/11/1991	Superfund Completion Report for St. Paul Waterway Sediment Remedial Action.

Document ID	Date	Title
1325901	1/31/1991	Sediment Remedial Action Certification of Completion: St. Paul Waterway Problem Area, Commencement Bay - Nearshore/Tideflats Superfund Site - Superfund Completion Report (Attached).
1374453	5/10/1991	Final Investigation Report: Upper Hylebos Property, Tacoma, Washington.
1039803	8/27/1991	Final Investigation Report, East-West Road Property, Port of Tacoma, Washington, Volume 1.
1039804	8/27/1991	Final Investigation Report, East-West Road Property, Port of Tacoma, Volume II, Appendices A through I.
1427711	8/28/1991	Civil Complaint No. C91-5528B: United States of America v. Asarco, Incorporated.
1039805	10/15/1991	Final Investigation Report, Taylor Way Property, Port of Tacoma; Work Order No. E-1192; J-2350-07.
5582	11/1/1991	Explanation of Significant Differences for the Tacoma Tar Pits, Commencement Bay Nearshore/Tideflats, Tacoma, Washington.
1231549	12/14/1991	Cover Letter with Attached Issuance of Unilateral Administrative Order - Removal of Auto Refuse Material at the Inner Hylebos Property.
1444675	1/6/1992	Remedial Investigation Report for Ruston/North Tacoma (Volume 2 of 2): Tables, Figures, and Appendices; EPA Contract No. 68-W9-0060; EPA Work Assignment No. 60-03-0LF3.
1444676	1/6/1992	Remedial Investigation Report for Ruston/North Tacoma (Volume 1 of 2): EPA Contract No. 68-W9-0060; EPA Work Assignment No. 60-03-0LF3.
1444716	1/10/1992	Feasibility Study Report for Ruston/North Tacoma: EPA Contract No. 68-W9-0060; EPA Work Assignment No. 60-03-0LF3.
1444717	1/11/1992	Baseline Risk Assessment: Technical Enforcement Support at Hazardous Waste Sites TES 11, Zone 4; Ruston/North Tacoma Operable Unit; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
1374398	2/28/1992	Final Investigation Report: Inner Hylebos Property, Tacoma, Washington.
1266430	4/14/1992	Final Investigation Report for Blair Waterway Property, Tacoma, Washington.
1374465	7/7/1992	Administrative Order on Consent (AOC) For Certain of the Properties to be Transferred Under the Puyallup Tribe of Indians Settlement Act of 1989.

Document ID	Date	Title
1427756	11/2/1992	Notice of the Joint Filing of Modification One to Consent Decree; Case No. C91-5528B.
9839	11/19/1992	Analysis of Alternatives, Blair Backup Property, Port of Tacoma, Tacoma, Washington (Volume I).
11544	1/29/1993	Revised Asarco Tacoma Plant Yacht Club Breakwater Remedial Investigation Report, Tacoma, Washington.
9841	2/17/1993	Final Cleanup Plan for the OFA/Pennwalt Area, Blair Backup Property, Port of Tacoma, WA (Includes February 26, 1993 "Errata to the February 17, 1993 Final Cleanup Plan, Blair Backup Property, Puyallup Settlement Agreement").
1401365	2/19/1993	Cleanup Plan for Blair Waterway Property, Tacoma, Washington.
1298067	3/9/1993	EPA Docket 1093-03-05-106: Administrative Order on Consent (AOC) for Removal Action At Blair Water Property and the Blair Backup Property.
1401392	3/9/1993	Errata to the February 17, 1993 Final Cleanup Plan, Blair Backup Property, Puyallup Settlement Agreement (Originally Published on February 26, 1993).
1346296	4/1/1993	Technical Memorandum: Ecological Risk Assessment - Asarco Tacoma Smelter Superfund Site Operable Unit 02.
1002152	5/24/1993	Asarco Tacoma Plant Feasibility Study, Tacoma, Washington; Operable Unit 02.
1115368	6/16/1993	Record of Decision: Operable Unit 04, Ruston/North Tacoma Study Area, Includes Responsiveness Summary.
1266444	6/18/1993	Lincoln Avenue Ditch Mitigation Plan; Blair Waterway; Proposed .80 Acre Intertidal Wetlands Fill.
1002115	6/24/1993	Explanation of Significant Differences: Sitcum Waterway Problem Area; Nearshore/Tideflats; Operable Units 01 and 05 - Contaminated Marine Sediments and Sources, Respectively.
1346752	8/3/1993	Final On-Property Baseline Human Health Risk Assessment, Asarco Tacoma Plant, Tacoma, Washington; Kleinfelder Project No. 60-1217-01.
1002145	8/20/1993	Feasibility Study Volume 3 - Appendices: Asarco Tacoma Plant, Tacoma, Washington.
1002146	8/20/1993	Revised Feasibility Study Volume 1 - Text and Exhibits: Asarco Tacoma Plant, Tacoma, Washington.
1002147	8/20/1993	Feasibility Study Volume 2 - Appendices.
1002148	8/20/1993	Feasibility Study Volume 4 - Appendices; Asarco Tacoma Plant, Tacoma, Washington.
1002149	8/20/1993	Feasibility Study Volume 5 - Appendices.

Document ID	Date	Title
1002190	9/1/1993	Cover Letter and Revised Pages for the Final On-Property Baseline Human Health Risk Assessment.
1396650	9/26/1993	Expedited Response Action (ERA) for Ruston/North Tacoma, Washington: Final ERA Report; K/J 886027.08
1002192	10/1/1993	Supplemental Feasibility Study for the Asarco Sediments Site: Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington; Contract No. 68-W9-0046; Work Assignment No. 46-16-QLF9.
887060	11/3/1993	Amendment 1 to Administrative Order on Consent for a Removal Action at the Blair Waterway Property and the Blair Backup Property; Docket 1093-03-05-106.
1000288	11/3/1993	Amendment to Action Memorandum Concerning CERCLA Administrative Order on Consent for Removal Action by Port of Tacoma at Blair Waterway Property, Puyallup Land Settlement; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
1019536	11/22/1993	Administrative Order on Consent for Pre-Remedial Design Study for Hylebos Waterway, U.S. EPA Docket No. 1093-07-03-104/122.
1003124	11/29/1993	Explanation of Significant Difference to the Ruston/North Tacoma Study Area Record of Decision, Ruston and Tacoma, WA.
1048585	12/20/1993	Final Decision Document: Asarco Petition for Exemption of Residential Soil in the Ruston and North Tacoma Area from Washington State's Dangerous Waste Regulation Chapter 173-303 WAC.
1266472	1/21/1994	Completion Report for OFA/Pennwalt Area of Blair Backup Property (Oversize Maps at the Records Center).
1266467	3/30/1994	Blair Waterway Property Completion Report: Port of Tacoma, Tacoma, Washington.
500013630	6/3/1994	Operations, Maintenance, and Monitoring Plan for Sitcum Waterway Remediation Project; Work Order E-1288.
1450374	9/27/1994	Letter of Referral of CERCLA Judicial Action and Consent Decree; Civil Action No. C94-5714 RJB - United States of America v. Asarco.
1029949	10/3/1994	Administrative Order on Consent for Groundwater, Surface Water, Soil and Marine Sediments Monitoring and Sampling; Operable Units 02 and 06; Asarco Smelter and Offshore Sediments of the Commencement Bay Nearshore Tideflats Superfund Site.

Document ID	Date	Title
1029088	10/4/1994	Administrative Order on Consent for Groundwater, Surface Water, Soil and Marine Sediments Monitoring and Sampling; Operable Units 02 and 06; Asarco Smelter and Offshore Sediments of the Commencement Bay Nearshore Tideflats Superfund Site.
886792	1/26/1995	Puyallup Land Transfer Consent Decree; Civil Action C94-5648; United States EPA v. The Port of Tacoma.
1360413	3/22/1995	Follow-Up to Previous Information Concerning Approved Preventative Maintenance Project of Sediment Cap at the St. Paul Waterway Project.
1029344	3/24/1995	Record of Decision: Commencement Bay Nearshore/Tideflats Superfund Site: Operable Unit 02; Asarco Tacoma Smelter Facility, Ruston and Tacoma, Washington.
1029764	4/28/1995	Amendment One to the Administrative Order on Consent, Which Sets Forth the Requirement for Asarco's Monitoring of the Three Surface Water Outfalls at the Former Smelter Facility (Cover Letter Attached).
1447298	5/9/1995	Tacoma Tar Pits Revised Explanation of Significant Differences.
1486724	7/25/1995	Response to Your May 19 and July 10, 1995 Construction Completion Reports on the Sitcum Waterway Remediation Projects.
706591	8/20/1995	Inspection and Maintenance Manual for the Tacoma Historical Coal Gasification Site: Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
1401542	10/1/1995	Additional Response Action Plan, Terminal 7 Phase 2 Subarea: Sitcum Waterway Remediation Project, Tacoma, Washington.
1105737	12/1/1995	Final Demolition of Remaining Structures Remedial Design Report; Primary Activity 7.0.
1270468	1/8/1996	Outer Hylebos "As-Built" and Monitoring Report.
1348620	2/15/1996	Civil Action regarding Asarco Tacoma Smelter Consent Decree: United States of America, Plaintiff, v. Asarco, Incorporated, Defendant.
1346682	6/5/1996	Amendment No. 1 to the November 29, 1993 Administrative Order on Consent and Statement of Work as Agreed by the EPA and the Hylebos Cleanup Committee (HCC).
1029967	7/2/1996	Explanation of Significant Differences to the Asarco Tacoma Smelter Facility Record of Decision of March 1995.
1044168	7/3/1996	Post-Remedial Investigation, Long-Term Monitoring, Sampling and Analysis Plan Revising the October 1994 Plan.

Document ID	Date	Title
1019123	8/28/1996	Federal Register Notice of Intent for Partial Deletion of the Commencement Bay Nearshore/Tideflats Superfund Site From the National Priorities List.
1095766	4/14/1997	Administrative Order on Consent for the Pre-Remedial and Remedial Design Study for the Middle Waterway problem area of the Commencement Bay Nearshore/Tideflats Superfund Site. (No pages 57-58 for this decree. They are not missing.)
1245400	6/10/1997	Memo regarding Source Control Completion Report for Mouth of Thea Foss Problem Area.
1058116	7/28/1997	Final PCB Cleanup Level Modification Explanation of Significant Differences and Responsiveness Summary to Modify the Cleanup Level for Remediation of Marine Sediments Contaminated with Polychlorinated Biphenyls (PCBs).
1068786	10/13/1998	Final and Effective Administrative Order on Consent and Statement of Work for the Removal Action on General Metals' Intertidal Sediments (Transmittal Letter Attached).
1098364	12/22/1998	Terminal 3/4 Northern Expansion Project Mitigation Plan.
1095016	8/11/1999	Final Report: Schnitzer Steel Wharf Sediment Cap Construction Observations and Acceptance.
873424	12/16/1999	St. Paul Notice of Consent Decree Recorded No. 9912169615; Parcel of Land Situate in Section 33, Township 21 North, Range 3 East of the Willamette Meridian, City of Tacoma (Attached to Document 873421).
1094647	3/28/2000	Sediment Post Removal Site Control Plan for Schnitzer Steel of Tacoma, Tacoma, Washington.
1413917	5/17/2000	Exhibit A for Modified Slip 5 Mitigation Action; Originally Presented as Section 5.3.2 of the Terminal 3/4 Northern Expansion Project Mitigation Plan.
100206205	5/17/2000	Exhibit E: Clear Creek Habitat Improvement Project; Phase II.
100206206	5/17/2000	Exhibit D: Additional Slip 5 Monitoring Activities Agreed to by the Port of Tacoma and Washington Dept. of Fish and Wildlife.
1094833	6/14/2000	Source Control Status Report for the Head of Hylebos Waterway Problem Area, Milestone 5: Commencement Bay Nearshore/Tideflats Superfund Site.
1094834	6/14/2000	Source Control Status Report for the Mouth of Hylebos Waterway Problem Area, Milestone 5: Commencement Bay Nearshore/Tideflats Superfund Site.

Document ID	Date	Title
1094832	6/16/2000	Source Control Status Report for Wheeler-Osgood Waterway Problem Area, Milestone 5: Commencement Bay Nearshore/Tideflats Superfund Site.
1310343	6/28/2000	Source Control Completion Report; Wheeler-Osgood Waterway Problem Area; Commercial Bay Nearshore/Tideflats Superfund Site.
1094860	7/1/2000	Engineering Evaluation/Cost Analysis Report for Area 5106 Removal Action: Former Occidental Chemical Corporation Tacoma Facility, Tacoma, Washington.
100002775	7/13/2000	REDACTED Record of Decision for the Asarco Sediments/Groundwater Operable Unit 06, Ruston and Tacoma, Washington.
1389829	10/13/2000	Case No. C91-5528 RJB; Minute Order; United States of America v. Asarco, Incorporated; Notice of Lodging of Amendment Number One to Consent Decree Involving the Cleanup of Ruston/North Tacoma Study Area and AOC Dated October 1994.
1444007	11/2/2000	Order That the United States' Motion to Enter Amendment Number One to the Consent Decree is Granted, and Amendment Number One to the Consent Decree is Approved and Entered; C91-5528B.
1450167	11/7/2000	Amendment Number One to Asarco Smelter Consent Decree: Civil No. C91-5528B; United States of America v. Asarco, Incorporated.
1095785	12/11/2000	Memo Documenting the Completion of the Source Control Remedial Action Plan; Enclosed Are the Milestone 5 Source Control Status Report and the Source Control Completion Report for the Middle Waterway Problem Area (Both Dated 12/8/2000).
1095786	12/22/2000	Memorandum Confirming Completion of the Remedial Action for Source Control in the Middle Waterway Problem Area of the Commencement Bay Nearshore/Tideflats Superfund Site; Attached is Source Control Completion Report Dated 12/8/2000.
1081661	4/30/2001	Engineering Evaluation/Cost Analysis for the Olympic View Resource Area Removal Action.
1095754	6/20/2001	Action Memorandum: Request for Removal Action at the Occidental Chemical Site in the Hylebos Waterway Problem Area, Commencement Bay Nearshore/Tideflats Superfund Site (Approval Dated July 6, 2001).

Document ID	Date	Title
1125749	7/16/2001	Action Memorandum for a Non-Time-Critical Removal Action at the Olympic View Resource Area. Also Enclosed Are the Executive Summary of Pentec's EE/CA prepared for City of Tacoma; Responsiveness Summary dated 6/25/01; and Pentec's ARARS and TBCs Report.
1234644	7/24/2001	Administrative Order On Consent For Removal Action in the Matter of Olympic View Resource Area; Docket No. 10-2001-0069.
1138452	12/21/2001	Memorandum Regarding the Request for a Removal Action at the Embankment Area of Occidental Chemical Site in Hylebos Waterway Problem Area of the Commencement Bay Nearshore/Tideflats Superfund Site.
1138453	12/21/2001	Responsiveness Summary for the Embankment Area Removal Action Engineering Evaluation/Cost Analysis (EE/CA) of the Occidental Chemical Site in Hylebos Waterway Problem Area of the Commencement Bay Nearshore/Tideflats Superfund Site.
1266099	1/31/2002	Final Design Documents for Olympic View Resource Area Non-Time-Critical Removal Action. and Design Analysis Report Construction Quality Assurance Plan, Water Quality Monitoring Plan, Monitoring and Adaptive Management Plan Technical, etc.
1138099	2/4/2002	Final Explanation of Significant Differences (ESD), Middle Waterway, Commencement Bay Nearshore/Tideflats Superfund Site.
1331006	3/5/2002	Unilateral Administrative Order for Remedial Design and Remedial Action; EPA Docket No. 10-2002-0046.
1314368	3/25/2002	Attachment 2 to Unilateral Administrative Order for Remedial Design and Remedial Action; Head of Hylebos Waterway Problem Area.
1314369	3/25/2002	Attachment 3 to Unilateral Administrative Order for Remedial Design and Remedial Action; Head of Hylebos Waterway Problem Area.
1314370	3/25/2002	Attachment 4 to Unilateral Administrative Order for Remedial Design and Remedial Action; Head of Hylebos Waterway Problem Area.
1314404	3/25/2002	Unilateral Administrative Order for Remedial Design and Remedial Action: Port of Tacoma, Occidental Chemical Corporation, and OCC Tacoma, Inc.

Document ID	Date	Title
1314405	3/25/2002	UNREDACTED Attachment 1 to Unilateral Administrative Order for Remedial Design and Remedial Action, Mouth of Hylebos Waterway Problem Area.
1314406	3/25/2002	Attachment 2 to Unilateral Administrative Order for Remedial Design and Remedial Action, Mouth of Hylebos Waterway Problem Area.
1314407	3/25/2002	Attachment 3 to Unilateral Administrative Order for Remedial Design and Remedial Action, Mouth of Hylebos Waterway Problem Area.
1314408	3/25/2002	Attachment 4 to Unilateral Administrative Order for Remedial Design and Remedial Action, Mouth of Hylebos Waterway Problem Area.
1331009	3/25/2002	Unilateral Administrative Order for Remedial Design and Remedial Action; Docket No. 10-2002-0065: Atofina Chemicals and General Metals of Tacoma (DBA Schnitzer Steel of Tacoma).
1331013	3/25/2002	Statement of Work for the Unilateral Administrative Order Remedial Design, Remedial Action, and Long-Term Monitoring; Docket No. 10-2002-0064; Mouth of Hylebos Waterway Problem Area: Segments 3, 4, and 5, and Portions of Segment 1.
1314182	8/30/2002	Mouth of Hylebos Waterway Unilateral Administrative Order: Blair Waterway Slip 1 Nearshore Confined Disposal Facility Project Stage I Containment Berm; 100% Design Submittal.
1451860	10/16/2002	Consent Decree for Case No. CV 02-2079-PHX-RCB; United States of America v. Asarco and Southern Peru Holdings.
1167602	11/27/2002	Memo regarding the Primary Activity 2.0 Stack Hill 2002 remediation summary.
1159890	12/24/2002	Final Design Report for Sediment Cap: Marine Sediments and Groundwater; Asarco Sediments Superfund Site.
1379188	1/10/2003	Remedial Action Final Report: Blair Waterway Slip 1 Pier Demolition; Unilateral Administrative Order (UAO); CERCLA 10-2002-0064; Mouth of Hylebos Problem Area; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
1295938	1/14/2003	St. Paul Waterway Area Remedial Action & Habitat Restoration Project: Proposal for Transect 4 Area Beach Nourishment; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.

Document ID	Date	Title
100215660	2/28/2003	Remedial Design/Remedial Action Consent Decree C03-5117 RJB for Thea Foss and Wheeler-Osgood Waterways Problem Areas; Commencement Bay Nearshore/Tideflats Superfund Site.
1379221	3/6/2003	Remedial Action Final Report: Blair Waterway Slip 1, Stage I Containment Berm; Mouth of Hylebos Problem Area; Unilateral Administrative Order; EPA Docket No. 10-2002-0064.
1530466	3/6/2003	Preliminary Completion Report for Area 5106 Dredging; Area 5106 Removal Action; Former Occidental Chemical Corporation Tacoma Facility, Tacoma, Washington.
1153665	3/14/2003	Hylebos Waterway Cleanup/Slip 1 Nearshore Confined Disposal Facility Project, 100% Design Submittal, Design Analysis Report and Ancillary Documents; Mouth of Hylebos Waterway Unilateral Administrative Order, EPA Docket No. CERCLA 10-2002-0064.
1153762	3/19/2003	Hylebos Waterway Cleanup/Slip 1 Nearshore Confined Disposal Facility Project - Addendum No. 1.
1176283	3/20/2003	Supplemental Explanation of Significant Differences, Commencement Bay Nearshore/Tideflats Superfund Site: Middle Waterway.
1153763	3/24/2003	Hylebos Waterway Cleanup/Slip 1 Nearshore Confined Disposal Facility Project; Job No. 727843; Addendum No. 2.
1153764	3/24/2003	Hylebos Waterway Cleanup/Slip 1 Nearshore Confined Disposal Facility Project - Addendum No. 3.
1234863	3/28/2003	Final Removal Action Completion Report for the Olympic View Resource Area Non-Time-Critical Removal Action, Tacoma, Washington; Work Order DC 1098.
500014732	3/28/2003	Final Removal Action Completion Report for the Olympic View Resource Area (OVRA) Removal Action and Monitoring; Non-Time-Critical Removal Action, Tacoma, Washington; Work Order DC 1098; EPA Docket No. CERCLA 10-2001-0069.
1401836	5/28/2003	Conditional Approval of Clear Creek Habitat Improvement, Phase II Design Mitigation for Slip 1 Nearshore Confined Disposal (NCD) Facility Project Mouth Response to EPA Letter Dated May 13, 2002.

Document ID	Date	Title
1153777	6/20/2003	Letter transmitting Hylebos Cleanup/Slip 1 NCD Facility Project, Unilateral Administrative Order for Remedial Design and Remedial Action, Mouth of Hylebos Problem Area documents for the 100% Design Submittal, (only Appendices G and H are included).
1279529	7/22/2003	Operations, Maintenance, and Monitoring Plan (OMMP) for the Head of the Thea Foss Waterway Remediation Project. Contract Numbers M1108 and 4600002319. Project No. 2562.
1094840	8/3/2003	Final Explanation of Significant Differences for Commencement Bay Nearshore/Tideflats Superfund Site: Thea Foss, Wheeler-Osgood, and Hylebos Waterways.
1314470	8/9/2003	Unilateral Administrative Order for Remedial Design and Remedial Action; EPA Docket No. 1093-08-02-016; Asarco, Incorporated.
1266394	8/14/2003	Consent Decree for Remedial Design and Remedial Action at the Middle Waterway Problem Area; Civil Action No. C03-5331(RJB)FDB.
1234943	8/15/2003	Final Long-Term Monitoring and Reporting Plan for the Olympic View Resource Area Non-Time-Critical Removal Action, Tacoma, Washington; Work Order No. DC 1098.
1366842	10/20/2003	Final (100%) Design and Basis for Design Submittals; Unilateral Administrative Order (UAO) for Remedial Design/Remedial Action; Head of Hylebos Waterway.
1298052	2/24/2004	Habitat Improvement Final Report; Clear Creek Habitat Improvement Project Phase II; Unilateral AR.
1380076	3/6/2004	Dredging Completion Report: St. Paul Waterway Area Sediment Remedial Action and Habitat Restoration Project.
1320353	3/22/2004	Bank Remediation Focused Feasibility Study for Atofina Chemicals, Inc.
1388190	4/6/2004	Final Design Documents: Middle Waterway Problem Area C; Sediment Management Units 51A and 51B; Design Analysis Report; CQAP; OMMP Outline; Technical Specifications; Plan Sheet Drawings; ESA Consultation Road Map; 7946-00; Contract No. AE 099.
1176822	6/9/2004	Head of the Thea Foss Waterway, Remediation Project, Remedial Action Construction Report, (Color pages can be viewed at the EPA Region 10 Superfund Records Center).
100206075	9/13/2004	Civil Action No. 05319-RBL: United States of America, Plaintiff, v. Atofina Chemicals, Inc. and General Metals of Tacoma, Inc.; Remedial Design/Remedial Action Consent Decree for Head of Hylebos Waterway Problem Area.

Document ID	Date	Title
500010040	9/30/2004	Explanation of Significant Differences for the Commencement Bay Nearshore/Tideflats Superfund Site: Thea Foss and Wheeler-Osgood Waterways.
1304324	11/15/2004	Thea Foss/Wheeler-Osgood Waterways: Operations, Maintenance, and Monitoring Plan - Remediation Project / 7853-02.
1301404	2/14/2005	Final Revised Operations, Monitoring, and Maintenance Plan for Areas A and B; Middle Waterway Problem Area, Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
649794	3/10/2005	Appendix E: Data Validation Reports - Final Remedial Action Pre-Certification Inspection Letter Report and Remedial Action Completion Report.
649802	3/10/2005	Appendix C: Confirmation Surface Sediment Data - Final Remedial Action Pre-Certification Inspection Letter Report and Remedial Action Completion Report.
649812	3/10/2005	Appendix B: Water Quality Data - Final Remedial Action Pre-Certification Inspection Letter Report and Remedial Action Completion Report.
1266718	3/10/2005	Final Remedial Action Pre-Certification Inspection Letter Report and Remedial Action Completion Report for Middle Waterway Problem Area, Areas A and B; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
100206103	3/15/2005	Civil Action No. C05-5103-FDB: United States of America, Plaintiff, v. Port of Tacoma, Occidental Petroleum Corp., Mariana Properties, Inc., and Pioneer Americas, LLC, Defendants; RD/RA Consent Decree; Mouth of Hylebos Waterway.
1301400	4/7/2005	Remedial Action Completion Report for Middle Waterway Problem Area C; Sediment Management Units 51a and 51b; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington; 7946-01.
1382052	4/8/2005	Approval Letter of Two Documents: Combined Final Remedial Action Pre-Certification Inspection Letter Report and Remedial Action Completion Report for Middle Waterway Problem Area - Areas A and B (Dated March 10, 2005).
1393941	4/27/2005	Operations, Maintenance, and Monitoring Plan for Middle Waterway Problem Area C Sediment Management Units 51a and 51b: Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington; 7946-00.

Document ID	Date	Title
1323403	6/6/2005	Letter regarding Institutional Controls for St. Paul Waterway Consent Decree No. C91-5260TC; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington; Lease Area #22-00-2658.
1360730	6/22/2005	Primary Activity 2.0: Stack Hill and Arsenic Kitchen 2003/2004 Remediation Summary.
1564404	8/30/2005	Action Memorandum for a Time Critical Removal Action, CB/NT Ruston RD/RA Response Action, Ruston Asarco Yards 2005, Tacoma, Ruston, Washington.
1346675	9/1/2005	Construction Completion Report for Hylebos Peninsula Mitigation Action; Port of Tacoma Project No. E2190.
1382029	9/12/2005	Approval of 2 Documents Submitted by DNR as Required by Consent Decree and SOW for Middle Waterway Problem Area C - Remedial Action Completion Report for Area C Dated 4/7/2005 and Completion Report, Addendum to Completion Report Dated 8/19/2005.
1229508	1/10/2006	Action Memorandum for Removal Action Documenting Findings of Imminent and Substantial Endangerment at Thea Foss Abandoned Drum Site, Tacoma, Washington.
100206222	1/20/2006	E-Mail regarding Revised Draft Operations, Maintenance, and Monitoring Plan (Part 1) for the Head of Hylebos Waterway, January 2006.
705948	6/29/2006	UNREDACTED Second Amendment to Consent Decree: U.S. v. Asarco, Inc. and Point Ruston, LLC; Civil Action No. C91-5528B.
100206242	7/21/2006	Agency Review Draft of Operations, Maintenance, and Monitoring Plan (Part 2) for the Head of Hylebos Waterway; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
1266297	9/11/2006	Remedial Action Construction Report for Thea Foss and Wheeler-Osgood Waterways Remedial Project.
1231909	1/23/2007	Letter and attached report regarding OMMP for On-SIte Containment Facility.
1530664	5/10/2007	Letter regarding Hylebos Waterway Problem Areas Consent Decree: Piers 24 and 25 Embankment Capping Project: E2663/E1934 Revised Draft Final, 100 Percent, Design Submittal Bid Set: Plans and Specifications; Tacoma, Washington.
1301629	12/16/2007	Commencement Bay NT - Asarco/Ruston, LLC: Construction Monitoring Report - Offshore Sediment Capping.
100205371	3/20/2008	Remedial Action Completion Report

Document ID	Date	Title
895396	6/5/2009	Order and Judgement Approving Amended Settlement Agreement Regarding Miscellaneous Federal and State Environmental Sites.
100189705	7/6/2009	Memorandum regarding Institutional Controls for Tacoma Historical Coal Gasification Site: Summarizes the Results of Assessment of Institutional Controls Associated With Properties Located Within Coal Gasification Site Boundary; Reference No. WNG-001-00.
654308	10/20/2009	Institutional Control Study for Sitcum Waterway Remediation Project; Commencement Bay Nearshore/Tideflats Superfund Site.
1344820	7/9/2010	Coast Guard Authorization for Two Navigation Buoys Located Off the St. Paul/Middle Waterway Peninsula Which are There to Mark a Shoaled Habitat Protection Area.
70000507	11/24/2010	Email Record: 70000498 attachment :DNR Docks Demolition Quarry Spalls.pdf; Capping Plan for Ore Dock Area; Demolition of Ore Dock at Former Asarco Site.
100210487	4/28/2011	Construction Completion Report Appendices April 2011, Demolition of Ore Dock at Former Asarco Smelter Site, Washington Department of Natural Resources, Starting with Figure G1, Title, Location, and Sheet Index.
100210489	4/28/2011	Draft Asarco Tacoma Smelter Site, Tacoma, Washington, Pier and Piling Removal Construction Completion Report, April 2011, Parametrix, Sans Appendices.
637537	6/17/2011	Memorandum of Approval with Attached Outer Hylebos Mitigation Site Contingency Plan; Puyallup Land Transfer Consent Decree; Civil Action No. C94-5648.
649966	8/31/2011	Remedial Action Construction Report: Head of Hylebos Problem Area; Commencement Bay - Nearshore/Tideflats Superfund Site, Tacoma, Washington.
648459	11/2/2011	Easement No. 51-087166: Aquatic Lands Easement for Conservation Uses - Sitcum Waterway Remediation Project, Milwaukee Habitat Area.
100206256	12/8/2011	Letter regarding Updated Head of Hylebos Pre-Operations, Maintenance, and Monitoring Plan Sediment Sampling Program; Remedial Decision/Remedial Action Consent Decree 04-CV-05319 RLB. Commencement Bay Nearshore/Tideflats Superfund Site.

Document ID	Date	Title
650540	12/14/2011	Environmental Covenant (Milwaukee Habitat Area - State-Owned Within Port Aquatic Lands Management Area); Portion of Harbor Area in Front of Tracts 7 and 8; Agreement No. 20-80007.
1393387	12/14/2011	Aquatic Lands Easement for Conservation Uses: Sitcum Waterway Remediation Project, Milwaukee Habitat Area; Easement No. 51-087166.
100206217	12/21/2011	Letter regarding Updated Head of Hylebos Pre-Operations, Maintenance, and Monitoring Plan Sediment Sampling Program for December 8, 2011.
100136294	7/30/2012	Pre-Operation, Maintenance, and Monitoring Plan Sediment Sampling Program Tacoma, Washington RD/RA Consent Decree, 04-CV-05319RLB; Head of Hylebos Waterway of the Commencement Bay Nearshore/Tideflats Superfund Site (Cover Letter Attached).
681946	12/26/2012	Sediment Cap Construction Manual.
686460	12/26/2012	Appendix B: Sediment Cap Construction Manual.
1442921	3/6/2013	Final Construction Report; Sediment Cap Phase; Point Ruston, LLC.
1440407	3/7/2013	Point Ruston LLC 100 Percent Design Plans; Nearshore/Offshore Capping Area; Completed Sediment Cap Within 2013 Project Limit.
697831	5/23/2013	Final Additional Response Action Completion Report for Middle Waterway Problem Area - Areas A and B.
717089	6/24/2013	Year 10 (2013) Monitoring Report for Middle Waterway Problem Area C Sediment Management, Units 51a and 51b: Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington; 17947-00.
100207578	7/3/2013	Volume I: Operation, Maintenance and Monitoring Plan for Smelter Site Cap, Slag Peninsula Cap, Shoreline Armoring and Utilities.
1431775	7/12/2013	Remedial Action Completion Report for Ruston/North Tacoma Residential Remediation: Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
100206182	9/27/2013	Conditional Approval of Remedial Action Construction Report: Segment 3/4 Dredging and Disposal and Slip 1 Nearshore Confined Disposal Facility; Mouth of Hylebos Waterway Consent Decree, Civil Action No. C05-5103 FDB.

Document ID	Date	Title
100206203	9/30/2013	Conditional Approval of Remedial Action Construction Report: Segment 5 Dredging and Disposal and Slip 1 Nearshore Confined Disposal Facility; Mouth of Hylebos Waterway Consent Decree, Civil Action No. C05-5103 FDB.
100214655	11/22/2013	2013 Contact List of Natural Resource Trustees and Tribal Contacts.
100094559	12/11/2013	Final Remedial Action Construction Report; Piers 24 and 25 Embankment Remediation; Project E1934; Mouth of the Hylebos Waterway Problem Area; Civil Action No. C05-5103FDB; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
100210483	6/4/2014	Memorandum for Record, June 4, 2014, CENWS-OD-TS-NR-DMMO, Determination, Suitability of Federal Operation and Maintenance Dredged Material.
500016159	6/16/2014	Letter Referring to Response to Additional Comments of May 30, 2014; Hylebos Waterway Segment 3 / 4 Dredging and Disposal and Slip 1 NCD Construction; Hylebos Waterway "Mouth" Consent Decree (Civil Action No. C05-5103FDB).
500016161	6/16/2014	Response to Additional Comments From 5/30/2014; Hylebos Waterway Segment 5 Dredging and Disposal and Slip 1 NCD Construction Hylebos Waterway "Mouth" Consent Decree, Civil Action No. C05-5103FDB (Cover Letter Attached).
707650	6/24/2014	Consent Decree: Civil Action No. 2:14-cv-00588-TSZ; United States of America, Plaintiff v. Washington Dept. of Natural Resources, Defendant; Asarco Smelter and Asarco Sediments/Groundwater Sites in Ruston and Tacoma, Washington.
1423696	8/28/2014	Results of Year 10 Operations, Maintenance, and Monitoring Plan Sampling: Head of Thea Foss Waterway Remediation, Tacoma, Washington.
717220	12/1/2014	Fourth Five-Year Review Report (Final) for Commencement Bay Nearshore/Tideflats Superfund Site, Pierce County, Washington.
717221	12/1/2014	Summary of Attachments for the Fourth Five-Year Review Report for Commencement Bay Nearshore/Tideflats Superfund Site, Pierce County, Washington.
100207734	1/13/2015	Fourth Quarter 2014 Discharge Report for Tacoma Tar Pits: October 1, 2014 to December 31, 2014; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.

Document ID	Date	Title
719213	1/27/2015	Action Memorandum for the Time-Critical Removal Action at the Blair Waterway Tributyltin Site, Tacoma, Pierce County, Washington.
720570	1/30/2015	Status Report No. 18 (Final) for Groundwater Compliance Monitoring, Blair Backup Property, Puyallup Land Settlement, Including Changes as Requested In Your Letter to the Port of Tacoma Dated January 15, 2015.
1173957	2/6/2015	Signed Administrative Settlement Agreement and Order On Consent for Time-Critical Removal Action In the Matter of Blair Waterway TBT Site In Tacoma; Port of Tacoma, Respondent.
100207752	4/3/2015	First Quarter 2015 Discharge Report for Tacoma Tar Pits: January 1, 2015 to March 31, 2015; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.
100044387	8/1/2015	Sediment Cap Operation, Maintenance, and Monitoring Plan for Point Ruston, LLC: Commencement Bay Nearshore/Tideflats Superfund Site; Asarco Sediment/Groundwater Operable Unit 06.
100207755	10/15/2015	Third Quarter 2015 Discharge Report for Tacoma Tar Pits: July 1, 2015 to September 30, 2015; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.
100165920	10/30/2015	Operations, Monitoring, and Maintenance Plan: Mouth of Hylebos Waterway, Tacoma, Washington (Segments 3, 4, and 5).
100207748	1/7/2016	Fourth Quarter 2015 Discharge Report for Tacoma Tar Pits: October 1, 2015 to December 31, 2015; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.
100190414	2/2/2016	Memorandum regarding Requested Well Analytical Data for Tacoma Historical Coal Gasification Site; Reference No. WNG-001-01.
100015295	3/31/2016	2015 Point Ruston Annual Operation, Maintenance, and Monitoring Report: Commencement Bay Nearshore/Tideflats Superfund Site, Operable Unit 02 - Tacoma Shelter Facility and Slag Peninsula, Ruston and Tacoma, Washington.
100207081	4/12/2016	First Quarter 2016 Discharge Report for Tacoma Tar Pits: January 1, 2016 to March 31, 2016; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.
100163041	4/25/2016	Water Quality Monitoring Report, March and June 2015 Sampling Events, Tacoma Historical Coal Gasification Site (With Attachments and Transmittal Letter).

Document ID	Date	Title
100024884	4/28/2016	Addendum 1 to the "Final Long-Term Monitoring and Reporting Plan, Olympic View Resource Area, Non-Time Critical Removal Action" (August 15, 2003) Elevation Survey for Areas A, B, C-5, and D; Transects T0 through T4.
100163044	5/2/2016	Water Quality Monitoring Report, September and December 2015 Sampling Events, Tacoma Historical Coal Gasification Site (With Attachments and Transmittal Letter).
100210462	6/6/2016	Revised Evaluation Guidelines for Benzyl Alcohol in Marine Sediments, Final DMMP Clarification Paper, June 6, 2016.
100125677	7/1/2016	Operation, Maintenance, and Monitoring Plan of the Port of Tacoma Pier 24/25 in July 2016.
100207728	7/10/2016	Second Quarter 2015 Discharge Report for Tacoma Tar Pits: April 1, 2015 to June 30, 2015; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.
100034049	7/11/2016	Time-Critical Removal Action Completion Report for Pier 4 Phase 1 Removal Action Project to Address Tributyltin-Contaminated Sediments Present at Pier 4.
100207085	7/12/2016	Second Quarter 2016 Discharge Report for Tacoma Tar Pits: April 1, 2016 to June 30, 2016; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.
100215637	7/20/2016	Appendix C - Chemical Analytical Data Reports for Baseline Chemical Monitoring Report for Commencement Bay Nearshore/Tideflats Operable Unit 06 Sediment Cap, Tacoma, Washington.
100190078	8/10/2016	Memorandum regarding Proposed Pavement Repair at Simons Metals, LLC in Tacoma, Washington: Asphalt Pavement Southwest of the Cable Shredding Building Has Been Damaged; Reference No. WNG-001-01.
100190074	8/25/2016	EPA's Preliminary Questions/Concerns on Simon's Recycling Pavement Repair.
100215644	9/1/2016	2016 Monitoring Report for Olympic View Resource Area: Commencement Bay Nearshore/Tideflats Superfund Site.
100215636	9/2/2016	Baseline Chemical Monitoring Report for Commencement Bay Nearshore/Tideflats Operable Unit 06 Sediment Cap, Tacoma, Washington.
100131111	9/19/2016	Third Amended Consent Decree Between the United States and Point Ruston, LLC; Civil Action No. C91-5528 B; Commencement Bay Nearshore/Tideflats Superfund Site, Asarco Tacoma Smelter.

Document ID	Date	Title
100190299	10/10/2016	Periodic Review Report Final: Associated Petroleum Products, River Street Cardlock Facility; Facility Site ID#: 96834847; 2115 East River Street, Tacoma, Washington.
100207087	10/12/2016	Third Quarter 2016 Discharge Report for Tacoma Tar Pits: July 1, 2016 to September 30, 2016; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.
100066658	10/23/2016	Final Construction Completion Report for Dock Street Pier Removal, Tacoma, Washington.
100214837	11/1/2016	2016 Post-Construction Sediment Data Summary Report: Mouth of Hylebos Waterway (Segments 3, 4, and 5).
100215157	11/1/2016	Draft Data Summary Report for Surface Sediment and Near-Surface Porewater in Mouth of Hylebos Waterway Adjacent to Occidental Chemical Site in Tacoma, Washington; Commencement Bay Nearshore/Tideflats Superfund Site.
100215516	11/15/2016	Year 10 Monitoring: Annual Operations, Maintenance, and Monitoring Report; Thea Foss and Wheeler-Osgood Remediation Project; Commencement Bay Nearshore/Tideflats Superfund Site (Volume 1 of 2).
100215533	11/15/2016	Appendices for Year 10 Monitoring: Annual Operations, Maintenance, and Monitoring Report; Thea Foss and Wheeler-Osgood Remediation Project; Commencement Bay Nearshore/Tideflats Superfund Site (Volume 2 of 2).
100207091	1/6/2017	Fourth Quarter 2016 Discharge Report for Tacoma Tar Pits: October 1, 2016 to December 31, 2016; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.
100163032	1/24/2017	Water Quality Monitoring Report, March and June 2016 Sampling Events, Tacoma Historical Coal Gasification Site (With Attachments and Transmittal Letter).
100041291	2/3/2017	Status Report No. 19: Groundwater Compliance Monitoring OFA/Pennwalt Area; Blair Backup Property, Port of Tacoma, Tacoma, Washington; 19000-12.
100106958	3/1/2017	2016 Source Control and Water Year 2016 Stormwater Monitoring Report: Thea Foss and Wheeler-Osgood Waterways, Tacoma, Washington.
100106989	3/1/2017	Appendix A: Drain-by-Drain Analysis of Source Control Activities.
100107091	3/1/2017	Appendix B: Data Validation Report for Water Year 2016.
100107384	3/1/2017	Appendix C: Supporting Field and Hydrologic Data.
100107392	3/1/2017	Appendix D: Analytical Data for Stormwater and Storm Sediment.

Document ID	Date	Title
100107393	3/1/2017	Appendix E: Statistical Summary of Stormwater and Baseflow Data.
100107394	3/1/2017	Appendix F: Drain-by-Drain Box Plots of Stormwater and Storm Sediment Data.
100107395	3/1/2017	Appendix G: Year-by-Year Box Plots of Stormwater Data.
100107397	3/1/2017	Appendix H: Seasonal Box Plots of Stormwater Data.
100167110	3/1/2017	Inspection and Maintenance Report, January 2014 to December 2015, Tacoma Historical Coal Gasification Site.
100215562	3/1/2017	2016 Point Ruston Annual Operation, Maintenance, and Monitoring Report for Tacoma Smelter Facility and Slag Peninsula; Commencement Bay Nearshore/Tideflats Superfund Site.
100043133	3/9/2017	Remedial Action Report for the Sitcum Waterway Problem Area; Civil Action No. C93-5462; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington; 17559-00.
100206833	3/20/2017	Renewed Industrial Wastewater Discharge Permit, Fact Sheet, and Submittal Schedule for the Tacoma Historical Coal Gasification Site; Permit No. TAC-031-2022 (Cover Letter Attached).
100189638	5/19/2017	E-Mail Notification That the 2014 Tacoma Tar Pits Site Five-Year Review is Within the Larger Commencement Bay Nearshore/Tideflats Five-Year Review Report; It is Summarized Within This Document's Executive Summary and Background Section.
100202206	6/19/2017	Industrial Pretreatment Program: Wastewater Permit Application regarding Remediation of Groundwater at Tacoma Historical Coal Gasification Site; Current Discharge Permit No. TAC-031-2022.
100206618	6/19/2017	Industrial Pretreatment Program: Wastewater Permit Application for Tacoma Historical Coal Gasification Site.
100202193	6/21/2017	Letter Submittal of Wastewater Discharge Permit Application to Replace the Existing Groundwater Treatment System; Tacoma Historical Coal Gasification Site, Tacoma, Washington.
100206623	6/28/2017	Memorandum regarding Permit Application/Engineering Report Submitted to City of Tacoma: Tacoma Historical Coal Gasification Site Replacement Treatment System; Reference No. WNG-001-01.

Document ID	Date	Title
100206221	6/29/2017	Letter regarding Draft 2017 Sediment Sampling and Analysis Plan for Head of Hylebos Waterway; Remedial Design/Remedial Action Consent Decree 04-CV-05319 RLB; Head of Hylebos Cleanup Group's Surface Sediment Sampling Program.
100163031	9/24/2017	Water Quality Monitoring Report, September and December 2016 Sampling Events, Tacoma Historical Coal Gasification Site (With Attachments and Transmittal Letter).
1571215	11/16/2017	Easement regarding Northwest 1/4 of Section 04, Township 20 North, Range 03 East, Willamette Meridian: Foss Waterway Development Authority for City of Tacoma; Accessor's Tax Parcel Number 895000-197-1.
100215105	12/1/2017	2017 Post-Construction Inspection Summary Report: Port of Tacoma Pier 24/25; Operations Maintenance, and Monitoring Plan Year 9; Commencement Bay Nearshore/Tideflats Superfund Site.
100102323	3/1/2018	2017 Source Control and Water Year 2017 Stormwater Monitoring Report for the Thea Foss and Wheeler-Osgood Waterways, Tacoma, Washington.
100215580	3/1/2018	2017 Point Ruston Annual Operation, Maintenance, and Monitoring Report for Tacoma Smelter Facility and Slag Peninsula; Commencement Bay Nearshore/Tideflats Superfund Site.
100215140	3/28/2018	Head of Hylebos Cleanup Group's 2017 Sediment Sampling Data Report for Head of Hylebos Waterway Problem Area; Commencement Bay Nearshore/Tideflats Superfund Site (Cover Letter Attached).
100165763	5/1/2018	Final Long-Term Monitoring Plan for Thea Foss and Wheeler-Osgood Waterways Remediation Project for May 2018.
100165681	6/29/2018	Long-Term Operations, Maintenance, and Monitoring Plan for Years 14 Through 33: Head of the Thea Foss Waterway Remediation Project, Tacoma, Washington.
100161034	7/1/2018	Inspection and Maintenance Report for January 2016 to December 2017 for the Tacoma Historical Coal Gasification Site in Tacoma, Washington.
100190550	7/10/2018	E-Mail regarding 2009 Five-Year Review Memorandum That Speaks to the Northwest Detention Center/Property History; Please Review As Soon As Possible.
100166092	7/17/2018	Sample Receipt Documentation and Analytical Results for Samples from the Thea Foss Year 14 Monitoring Project (Cover Letter Attached).

Document ID	Date	Title
100215428	7/17/2018	Appendix H: Data Report 18E0285 CLPLIKE (Revision 0): Sample Receipt Documentation and Analytical Results for Samples from Thea Foss Year 14 Monitoring.
100197862	7/18/2018	Memorandum regarding Agency Review Draft of Asphalt Permeability Testing Work Plan, Detention Basins: Tacoma Historical Coal Gasification Site; Reference No. WNG-001-00.
100197809	7/31/2018	Memorandum regarding Asphalt Permeability Testing Work Plan, Detention Basins: Tacoma Historical Coal Gasification Site; Reference No. WNG-001-00.
100166068	9/1/2018	Fourth Round of Stage 1 Groundwater Quality Monitoring Report: Sitcum Waterway Problem Area, Civil Action No. C93-5462, Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
1555278	9/14/2018	Thea Foss and Wheeler-Osgood Waterways Remediation Project: Year 12 Monitoring, St. Paul Waterway Confined Disposal Facility Performance Monitoring Memorandum.
100114419	9/27/2018	Explanation of Significant Difference for the Commencement Bay Nearshore/Tideflats Superfund Site, Operable Unit 02, Asarco Tacoma Smelter Facility and Slag Peninsula.
100205863	9/28/2018	Remedial Action Report for the Middle Waterway Problem Area, Operable Unit 01, Areas A and B; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
100147542	10/1/2018	Results of Long-Term Operations, Maintenance, and Monitoring, Year 14; Head of the Thea Foss Waterway Remediation Project, Tacoma, Washington.
100165984	10/1/2018	UNREDACTED Year 2 Chemical Monitoring Report for Commencement Bay Nearshore/Tideflats Operable Unit 06 Sediment Cap, Tacoma, Washington.
100166078	10/1/2018	Year 14 Results of Long-Term Operations, Maintenance, and Monitoring: Head of the Thea Foss Waterway Remediation Project, Tacoma, Washington.
100166099	10/1/2018	Photographs from Year 14 Results of Long-Term Operations, Maintenance, and Monitoring: Head of the Thea Foss Waterway Remediation Project, Tacoma, Washington.
100215406	10/12/2018	Transmittal Letter for the Year 14 Operations, Maintenance, and Monitoring Plan Results; Head of the Thea Foss Waterway Remediation, Tacoma, Washington.
100215415	10/12/2018	Appendix D-2: Sample Photos for Year 14 Operations, Maintenance, and Monitoring Plan Results; Head of the Thea Foss Waterway Remediation, Tacoma, Washington.

Document ID	Date	Title
100214830	11/9/2018	Fish and Shellfish Consumption Advisory for Commencement Bay: Unsafe Concentrations of Pollutants.
100165956	11/16/2018	Year 12 Monitoring: Long-Term Monitoring Plan Event Report; Thea Foss and Wheeler-Osgood Waterways Remediation Project (Volume 1 of 2).
100165958	11/16/2018	Year 12 Monitoring: Long-Term Monitoring Plan Event Report; Thea Foss and Wheeler-Osgood Waterways Remediation Project (Volume 2 of 2).
100201597	12/5/2018	Memorandum Presenting the Results of Asphalt Permeability Testing Completed in the Bottom of Two Asphalt-Lined Storm Water Detention Basins at the Tacoma Historical Coal Gasification Site.
100200745	12/28/2018	Chart regarding Benzene Concentrations for Tacoma Tar Pits (TTP-2M, DOF-35M, DOF-36M) (Site Boundary Well) for East Branch Area.
100215597	1/8/2019	Status Report 20: Groundwater Compliance Monitoring of OFA/Pennwalt Area; Blair Backup Property, Port of Tacoma; Commencement Bay Nearshore/Tideflats Superfund Site.
1555895	1/18/2019	Request for Partial Channel Deauthorization: Thea Foss Waterway, Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
100215625	2/20/2019	Year 2 Chemical Monitoring Report for Commencement Bay Nearshore/Tideflats Operable Unit 06 Sediment Cap, Tacoma, Washington.
100191250	3/1/2019	Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100191254	3/1/2019	Tables for Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100191255	3/1/2019	Figures for Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100191258	3/1/2019	Appendix A: Drain-by-Drain Analysis of Source Control Activities: Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100191263	3/1/2019	Appendix B: Data Validation Report for Water Year 2018: Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.

Document ID	Date	Title
100191306	3/1/2019	Appendix C: Storm Field Summary Reports: Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100191308	3/1/2019	Appendix D: Stormwater Analytical Data for Outfall 230: Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100191338	3/1/2019	Appendix E: Summary Statistics for Baseflow at Outfalls: Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100191352	3/1/2019	Appendix F: Total Suspended Solids Drain-by-Drain Comparison in Stormwater; Total Lead Drain-by-Drain; Etc.: Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100191512	3/1/2019	Appendix G: Total Suspended Solids Year-by-Year Comparison in Stormwater; Total Lead Drain-by-Drain; Etc.: Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100191514	3/1/2019	Appendix H: Total Suspended Solids Seasonal Variation in Stormwater; Total Lead Drain-by-Drain; Etc.: Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100215587	3/1/2019	2018 Point Ruston Annual Operation, Maintenance, and Monitoring Report for Tacoma Smelter Facility and Slag Peninsula; Commencement Bay Nearshore/Tideflats Superfund Site.
100202225	3/3/2019	Water Quality Monitoring Report (March 2017 to June 2018 Sampling Events) for the Tacoma Historical Coal Gasification Site, Tacoma, Washington.
100207756	3/3/2019	Third Quarter 2015 Discharge Report for Tacoma Tar Pits: July 1, 2015 to September 30, 2015; Permit No. TAC-031-2011; Tacoma Historical Coal Gasification Site.
100191928	3/6/2019	Final Operation, Maintenance, and Monitoring Plan for Smelter Site Cap, Shoreline Armoring, and Utilities (Volume I).
1571213	3/29/2019	Thea Foss and Wheeler-Osgood Waterways 2018 Source Control and Water Year 2018 Stormwater Monitoring Report.
100192102	4/10/2019	E-Mail regarding Washington Department of Health: Source Water Protection Map for the City of Tacoma, Which Shows That the Tacoma Tar Pits Site is Within the 10-Year Time of Travel Zone for the City of Fircrest Water Supply Well Field.

Document ID	Date	Title
100192117	4/11/2019	E-Mail regarding Washington Dept. of Ecology Groundwater Classification for Tacoma Tar Pits 2009 Five-Year Review Recommendation; Groundwater Restoration.
100197823	4/18/2019	Memorandum regarding Results of Asphalt Permeability Testing, Detention Basins: Tacoma Historical Coal Gasification Site; Reference No. WNG-001-01.
100167112	5/1/2019	Inspection and Maintenance Report, January 2018 to December 2018, Tacoma Historical Coal Gasification Site.
100210479	5/1/2019	EPA to Review Past Cleanups at Commencement Bay, Nearshore Tideflats, Five Year Review Draft C Print, May 2019.
100206314	5/7/2019	Asarco Tacoma Smelter Fourth Amendment to Consent Decree Between the United States and Point Ruston, LLC; Civil Action No. C91-5528 B; Commencement Bay Nearshore/Tideflats Superfund Site, Tacoma, Washington.
100214813	5/18/2019	News Tribune Notice: EPA to Review Past Cleanups at Commencement Bay Nearshore/Tideflats Superfund Site.
100214801	5/20/2019	E-Mail regarding E-Tear from the Commencement Bay Notice, Which Was Published on Saturday, May 18, 2019.
100197451	5/24/2019	Results of Asphalt Permeability Testing Detention Basin DB#2: Tacoma Historical Coal Gasification Site; Reference No. WNG-001-01.
100214519	5/30/2019	E-Mail regarding Notice of Five-Year Review for the Commencement Bay Nearshore/Tideflats Superfund Site
100214644	5/31/2019	E-Mail: Send Notification to Commencement Bay Nearshore/Tideflats Stakeholders of Five-Year Review Initiation.
100214676	5/31/2019	Commencement Bay Nearshore/Tideflats and South Tacoma Channel Mailing List (Stakeholders and Asarco Team in Attached Spreadsheet).
100214752	5/31/2019	E-Mail regarding the Previous E-Mail for Commencement Bay Nearshore/Tideflats.
100214791	5/31/2019	Notice of Five-Year Review for the Commencement Bay Nearshore/Tideflats Superfund Site
100191941	6/3/2019	E-Mail regarding Five-Year Review of the Point Ruston Operation, Maintenance, and Monitoring Plan.
100207594	6/3/2019	Volume I: Final Operation, Maintenance and Monitoring Plan for Smelter Site Cap Shoreline Armoring and Utilities.

Document ID	Date	Title
100200678	6/10/2019	Diagram/Map Showing Tacoma Tar Pits 18M Area (North Branch) and 3M Area (East Branch); Benzene Plume for December 2018.
100214909	6/21/2019	Appendix C for Final Report: Job Number 580-86960-1; Job Description: Mouth of Hylebos Operations, Maintenance, and Monitoring Plan Sampling.
100214979	6/21/2019	Appendix C for Final Report: Job Number 580-86960-2; Job Description: Mouth of Hylebos Operations, Maintenance, and Monitoring Plan Sampling.
100210481	6/25/2019	Department of Ecology Letter regarding Beginning Fifth Five Year Review, Information on Source Control Activities, June 25, 2019.
100163026	6/26/2019	Transmittal Water Quality Monitoring Report, September and December 2018, Tacoma Historical Coal Gasification Site (With Attachments).
100201997	6/26/2019	Third and Fourth Quarter 2018 Combined Report for Tacoma Tar Pits: Water Quality Monitoring Report for September and December 2018; Tacoma Historical Coal Gasification Site in Tacoma, Washington.
100198880	8/1/2019	E-Mail regarding Tacoma Tar Pits Document Questions: There is No Stand-Alone Five-Year Review for Tacoma Tar Pits and is a Chapter in the Larger Commencement Bay Nearshore/Tideflats Site Five-Year Review Since TTP is an Operable Unit of That Site.
100215640	8/15/2019	Comments regarding the Fifth Five-Year Review of Commencement Bay Nearshore/Tideflats Superfund Site.
1571492	9/19/2019	Response to EPA Inquiry Received on July 1, 2019 regarding EPA Five-Year Review of the Commencement Bay Nearshore/Tideflats Superfund Site on Listed Source Control Activities.
100214890	9/23/2019	Sediment Data Memorandum: Sampling and Quality Assurance Project Plan Addendum 1, Mouth of Hylebos Waterway (Segments 3, 4, and 5), Tacoma, Washington.
100198701	9/24/2019	E-Mail regarding Tacoma Tar Pits Five-Year Review: From My End, the Only Outstanding Issue is an Update to the Operations, Maintenance, and Monitoring Plan.
100197408	10/3/2019	Memorandum regarding Updated Concrete Pavement Repair Recommendations: Tacoma Historical Coal Gasification Site Inspection and Maintenance Manual, Tacoma, Washington; Reference No. WNG-001-01.

Document ID	Date	Title
100215130	10/10/2019	2019 Post-Construction Inspection Summary Report: Port of Tacoma Pier 24/25; Operations Maintenance, and Monitoring Plan Year 11; Commencement Bay Nearshore/Tideflats Superfund Site.
100198704	10/11/2019	E-Mail regarding Tacoma Tar Pits Five-Year Review for 2019: the Detention Facility and its Proximity to a Superfund Site Gets Lots of Attention From Those Opposed to the Facility.
100198895	10/21/2019	E-Mail regarding Tacoma Historical Coal Gasification Site: I Have Reviewed the Fourth Five-Year Review for Operable Unit 03 and Have Contacted Puget Sound Energy to Get Cost Information So I Can Get You Average Yearly Expenditure Between 2015 and 2018.
100188717	10/28/2019	Case No. C89-155B, Consolidated With C89-489TB and C90-5373B: Order Granting Motion to Add Additional Party Signatory to Consent Decree; Burlington Northern Railroad v. Washington Natural Gas and Joseph Simon & Sons.
100215609	11/1/2019	Hylebos Mitigation Site Evaluation: Final Year 7 Report and Compendium; Commencement Bay Nearshore/Tideflats Superfund Site.
100198850	11/13/2019	E-Mail regarding Other Activities Since the Last Five-Year Review: Exceedance of Publicly-Owned Treatment Works Permit and New Treatment System; Tacoma Tar Pits Superfund Site, Tacoma, Washington.
100197042	11/21/2019	E-Mail regarding Meeting Request With for Metro Metals Northwest Management to Discuss Tacoma Historical Coal Gasification Site Project History and Performance/Inspection and Maintenance Requirements.
100210485	12/1/2019	Tacoma Smelter Plume: EPA Five-Year Survey, Commencement Bay Nearshore, Tideflats Superfund Site Ruston/North Tacoma Study Area, December 2019.
100198714	12/14/2019	E-Mail regarding the City Government, Gov.ME Site.
100215190	12/20/2019	Year 12 Monitoring: Long-Term Monitoring Plan Event Report for Thea Foss and Wheeler-Osgood Waterways Remediation Project; Commencement Bay Nearshore/Tideflats Superfund Site (Volume 1 of 2).
100215213	12/20/2019	Appendices for Year 12 Monitoring: Long-Term Monitoring Plan Event Report for Thea Foss and Wheeler-Osgood Waterways Remediation Project; Commencement Bay Nearshore/Tideflats Superfund Site (Volume 2 of 2).

Document ID	Date	Title
1571494	1/14/2020	Response to EPA Inquiry Received on July 1, 2019 regarding EPA Five-Year Review of the Commencement Bay Nearshore/Tideflats Superfund Site on Listed Source Control Activities.
100216612	3/2/2020	Updated Inspection and Maintenance Manual for March 2020: Tacoma Historical Coal Gasification Site, Tacoma, Washington (Revision 1 With Attachments).
100190422	10/03/20016	Periodic Review Report Final: Associated Petroleum Products, River Street Cardlock Facility; Facility ID 96834847; 2115 East River Street, Tacoma, Washington.
100214665		Commencement Bay Nearshore/Tideflats Mailing List.

APPENDIX B – SITE CHRONOLOGY

CHRONOLOGY OF SITE EVENTS	
EVENT	**DATE**
Industrial operations	
Site Discovery	11/01/1979
Interim listing on the EPA National Priorities List as Deepwater, Nearshore, Tideflats/Industrial, South Tacoma Channel (upland site)	12/30/1982
CB/NT Final listing on EPA National Priorities List[1]	09/08/1983
First FYR for OU 03 Tacoma Tar Pits	09/27/1998
First FYR Review for OU 01 Sediment and OU 05 Source Control	12/29/1999
First FYR for OU 04 Ruston/North Tacoma Yards	03/31/2000
Second FYR for OU 03 Tacoma Tar Pits	09/25/2003
Second FYR for CB/NT Site (OUs 01, 02, 04, 05, 06)	12/29/2004
Third FYR for CB/NT Site	12/23/2009
Fourth FYR for CB/NT Site	12/01/2014
OU 01 Sediment and OU 05 Source Control	
Sediment RI	08/18/1985
Sediment FS	12/10/1988
ROD	09/30/1989
Sediment ESD for Sitcum Waterway	06/24/1993
Sediment ESD for PCB Cleanup Level	07/28/1997
Sediment ESD for Thea Foss, Wheeler-Osgood, and Hylebos Waterways	08/03/2000
Sediment ESD for Middle Waterway	02/04/2002
Sediment ESD for Middle Waterway	03/20/2003
Sediment ESD for Thea Foss and Wheeler-Osgood Waterways	09/30/2004
St. Paul Waterway	
RA Construction Complete	08/09/1988
Source Control Complete	09/28/1990
CD (LTMP)	12/13/1991
Sediment RA Complete	01/30/1991
Cap Maintenance (add beach armoring @ Transect 5)	03/22/1995
Waterway CD Amendment 1	11/30/1995
Partial Delisting: St. Paul and Blair Waterways[2]	10/29/1996
CD Amendment 2 (LTMP)	12/10/1999
Cap Maintenance (add beach armoring @ Transect 4)	05/27/2003
Sitcum Waterway	
Sediment RD/RA AOC	03/29/1991
Sediment RD	09/30/1992
Milwaukee CDF RD	08/06/1993
Sediment RD/RA CD	10/08/1993
Sediment, Milwaukee CDF, and Milwaukee Habitat Mitigation OMMP	06/03/1994

CHRONOLOGY OF SITE EVENTS	
EVENT	**DATE**
Source Control Complete	09/28/1994
Sediment RA Construction Complete	07/25/1995
Milwaukee Habitat Mitigation Construction Complete	07/25/1995
Clear Creek Habitat Mitigation OMMP	09/26/1995
Clear Creek Habitat Mitigation Construction Complete	12/17/1998
RA Complete	03/09/2017
Thea Foss Waterway and Wheeler-Osgood Waterway	
Sediment pre-RD AOC	03/23/1994
Mouth Source Control Complete	06/10/1997
Wheel-Osgood Source Control Complete	06/28/2000
Mouth and Wheeler-Osgood RA UAO	09/30/2002
St. Paul CDF RD	12/18/2003
Head Source Control Complete	03/28/2003
RA Construction Complete (UAO only)	07/23/2003
RD/RA CD	05/03/2003
Head RD	07/14/2003
Head RA Construction Complete	06/09/2004
Mouth & Wheeler-Osgood Sediment OMMP	11/15/2004
Mouth & Wheeler-Osgood Sediment RA Construction Complete	09/28/2006
Head OMMP	07/22/2006
Head RA Complete	03/20/2008
Dock St. Pier Removal	10/23/2016
Mouth & Wheeler-Osgood Sediment LTMP (replaces OMMP)	05/01/2018
Head Sediment LTMP (replaces OMMP)	06/29/2018
Hylebos Waterway	
Sediment pre-RD AOC	11/22/1993
Amendment 1: Sediment pre-RD AOC	06/05/1996
Slip 5 and Clear Creek Phase II Mitigation Plan	12/22/1998
Slip 5 Mitigation Plan (Terminal 3/4 Northern Expansion Project Post-Project Habitat Mitigation Monitoring Manual, Exhibit A)	05/17/2000
Slip 5 Mitigation OMMP (Terminal 3/4 Northern Expansion Project Post-Project Habitat Mitigation Monitoring Manual, Exhibit B)	05/17/2000
Additional Slip 5 Mitigation Monitoring (Terminal 3/4 Northern Expansion Project Post-Project Habitat Mitigation Monitoring Manual, Exhibit D)	05/17/2000
Clear Creek Phase II OMMP (Terminal 3/4 Northern Expansion Project Post-Project Habitat Mitigation Monitoring Manual, Exhibit E)	05/17/2000
Source Control Complete	6/14/2000
Head UAO	03/25/2002
Mouth UAO	03/25/2002
Slip 1 RACR – Demolition Piers and Structures	01/10/2003
Slip 1 NCDF RD	06/20/2003

CHRONOLOGY OF SITE EVENTS	
EVENT	**DATE**
Head RD	10/20/2003
Head RD/RA CD (Replaced 03/25/2002 UAO)	06/03/2004
Clear Creek Habitat and Slip 5 Mitigation Construction Complete	02/24/2004
Mouth RD/RA CD (Replaced 03/25/2002 UAO)	03/15/2005
Head OMMP-1[4] (MNR & Habitat)	01/20/2006
Head OMMP-2[4] (Arkema cap)	07/21/2006
Pier 24/25 RD	05/10/2007
Head RA Construction Complete	08/31/2011
Slip 5 Mitigation Performance Standards Achieved	05/17/2013
Pier 24/25 Construction Complete	12/11/2013
Mouth RA Construction Complete	06/16/2014
Mouth OMMP (includes Slip 1)	10/30/2015
Pier 24/25 OMMP	07/01/2016
Head pre-OMMP SAP (surface sediment recontamination)	12/08/2011 06/29/2017
Middle Waterway	
Sediment pre-RD AOC	04/14/1997
Source Control Complete	12/22/2000
RD/RA CD	08/14/2003
Mouth (Areas A&B) RD	04/06/2004
Head (Area C) OMMP	09/12/2005
Head (Area C) RA Construction Complete/RA Complete	09/12/2005
Mouth (Areas A&B) RA Construction Complete	04/08/2005
Mouth (Areas A&B) OMMP	04/08/2005
Mouth (Areas A&B) RA Complete	09/28/2018
Puyallup Land Claim	
UAO (Inner Hylebos Property)	02/14/1991
RI (Upper Hylebos Property)	05/10/1991
RI (East-West Road Property)	08/27/1991
RI (Taylor Way Property)	10/15/1991
RI (Inner Hylebos Property)	02/28/1992
RI (Blair Waterway Property)	04/14/1992
AOC (Inner Hylebos, Upper Hylebos, Taylor Way, & East-West Road Properties)	07/07/1992
FS (Blair Backup Property)	11/19/1992
Cleanup Plan (Blair Backup Property)	02/17/1993
Cleanup Plan (Blair Waterway Property)	02/19/1993
AOC Blair Properties	03/09/1993
AOC Amendment 1 Blair Properties	11/03/1993
RA Complete (Blair Waterway Property)	03/30/1994
Puyallup Land Transfer CD	01/26/1995

CHRONOLOGY OF SITE EVENTS	
EVENT	**DATE**
Partial Delisting (Blair Backup, Blair Waterway, East-West Road, & Taylor Way Properties)[3]	10/29/1996
Outer Hylebos Mitigation RACR	09/01/2005
Outer Hylebos Mitigation Contingency Plan	06/17/2011
General Metals Removal Action	
General Metals (dba Schnitzer Steel) Removal Action (SMA 232) AOC	10/13/1998
Removal Action Complete	09/28/1999
Sediment Post-Removal Site Control Plan	03/28/2000
Olympic View Resource Area Removal Action	
EE/CA	04/30/2001
Action Memo	07/16/2001
AOC	07/24/2001
Design	01/31/2002
Construction Complete	03/28/2003
Long-term Monitoring & Reporting Plan	08/15/2003
Long-term Monitoring & Reporting Plan – Addendum 1	04/28/2016
Blair Waterway TBT Removal Action	
Action Memo	01/27/2015
AOC	02/06/2015
Completion Report	07/11/2016
Occidental Removal Actions	
AOC	11/06/1997
EE/CA (5106)	07/01/2000
Action Memo (5106)	06/20/2001
Action Memo (Embankment)	12/21/2001
Preliminary Completion Report (5106)	03/06/2003
OU 02 Asarco Tacoma Smelter Facility	
RI/FS AOC	09/09/1986 Amend 3 01/31/1989
RI	04/01/1989
RI – Breakwater Peninsula	01/29/1993
FS	08/20/1993
ROD	03/24/1995
RD/RA CD with Asarco	01/03/1997
ESD for OCF location	07/02/1996
LTMP for Surface Water and Groundwater	07/03/1996
RD/RA CD Amendment 1 with Asarco	11/17/1999
CD establishing Trust Fund	01/28/2003
RD/RA CD Amendment 2 with Point Ruston, LLC (BFPP)	10/23/2006

CHRONOLOGY OF SITE EVENTS	
EVENT	**DATE**
OCF OMMP	01/23/2007
Bankruptcy	06/05/2009
Smelter Cap, ~~Slag Peninsula Cap,~~[5] Shoreline Armoring, and Utilities OMMP (Volume 1)	07/03/2013 Revised 06/03/2019
RD/RA CD Amendment 3	09/19/2016
ESD for ICs	09/27/2018
RD/RA CD Amendment 4	07/08/2019
OU 03 Tacoma Tar Pits	
ROD	12/30/1987
ESD	1991
ESD	1995
Remedial Action Report	September 1995
Routine Inspection and Monitoring (I&M)	2015-2019
Groundwater Monitoring Reports	2015-2018
City of Tacoma discharge permit renewed (TAC-031-2022)	2017-2022
Replaced GWET (Treatment Plant)	November 2017
Detention Basin (DB#1 and DB#2) asphalt permeability testing	2018-2019
Asphalt Testing and I&M Reports revised	November 2019
OU 04 Asarco Ruston/North Tacoma Study Area	
AOC for RI/FS	09/09/1986
AOC for Expedited Response Action	03/08/1989 Amended 07/05/1990
EE/CA for Expedited Response Action	03/03/1989
Action Plan for Expedited Response Action	04/24/1989
ROD	06/16/1993
UAO for RD	08/09/1993
Completion Report for Expedited Response Action	09/26/1993
ESD	11/29/1993
CD for RD/RA	05/02/1995
CD Amendment 1 with Asarco	11/02/2000
CD establishing Trust Fund	01/28/2003
Removal Action	08/30/2005
Bankruptcy	06/05/2009
IA with USACE to perform remaining cleanup	09/08/2009
CA with Ecology to perform remaining cleanup and implement CPMs	08/27/2013
RA Complete	08/17/2013
OU 06 Asarco Sediment & Groundwater	
FS	05/24/1993

CHRONOLOGY OF SITE EVENTS	
EVENT	**DATE**
	Supplemental 10/01/1993
AOC for sampling	10/04/1994
ROD	07/14/2000
UAO	03/05/2002
RD for Sediment Cap (Asarco)	12/31/2002
Sediment Cap RACR (Asarco)	04/03/2007
RD for Dock Removal & Sediment Cap (WDNR)	11/24/2010
Dock Removal & Sediment Cap RACR (WDNR)	04/28/2011
RD for Sediment Cap (Point Ruston)	12/26/2012
Sediment Cap RACR (Point Ruston)	03/06/2013
CD (DNR Sediment Cap)	06/24/2014
OMMP (Sediment Cap)	08/01/2015
OU 07 Asarco Demolition	
Interim ROD	12/31/1990
CD	05/18/1992
RA Complete	07/21/1995

Notes:

1. CB South Tacoma Channel designated as a separate site; CB deepwater eliminated from list.
2. The 1989 ROD for OU 01 & OU 05 did not specify remedial action for the Blair Waterway because concentrations of contaminants were below remedial action levels (RALs).
3. This partial deletion does not include the portion of the Blair Backup Property that drains to the Hylebos Waterway.
4. EPA did not approve this OMMP.
5. The Slag Peninsula cap monitoring and maintenance requirements were removed from the OMMP in 2019 as the O&M requirements are being transferred to Metro Parks Tacoma (property owner).

APPENDIX C – LIST OF CWA 404 PERMITS

LIST OF CERLA COORDINATIONS WITH USACE ON CWA 404 PERMITS		
PERMIT NUMBER	**APPLICANT**	**PROJECT DESCRIPTION**
NWS-2010-1386	Port of Tacoma	Maintenance of 86 existing stormwater outfalls and tide gates -- 10-year permit renewal
NWS-2011-0089	Port of Tacoma	Bay-wide maintenance activities at 15 pier/wharf structures, up to 200 piles/year -- 5-year extension
NWS-2014-0925	City of Tacoma - Metro Parks	Herring pen reconstruction
NWS-2014-0989	City of Tacoma	Stormwater outfall replacement - Point Defiance
NWS-2014-1003	Rob Tillotson	Lobster Shop -- piling repairs
NWS-2014-1149	Port of Tacoma	Terminal and dock minor maintenance and repair
NWS-2015-0095	Nisqually Tribe/WDNR	Les Davis Park -- dive park tire barrier removal
NWS-2015-0157	Port of Tacoma	Saltchuk subtidal habitat pilot project (material from Pier 4 Blair WW project (NWS-2014-0456)
NWS-2015-0159	Port of Tacoma	Bay-wide sampling - up to 100 samples/event, 4 events/year
NWS-2015-0159-b	Port of Tacoma	Bay-wide sampling - up to 100 samples/event, 4 events/year
NWS-2017-0032	Port of Tacoma	Stormwater Infrastructure/ditch maintenance
NWS-2017-0807	Herzel Hazan - Sojourn Maritime	Float and pile replacement/reconfiguration
NWS-2017-1080	Gary Coy	Sperry Ocean dock pile replacement - 20 piles/year for 5 years
NWS-2018-0948	City of Tacoma - Metro Parks	Dickman Mill headsaw restoration
NWS-2018-0953	City of Tacoma - Public Works	Bank stabilization at Silver Cloud Inn, Dickman Mill Park, and Puget Creek
NWS-2019-0195	WestRock CP, LLC	Outfall anode replacement
NWS-2019-0426	Washington State Ferries	Ferry terminal maintenance -- Point Defiance
NWS-2016-0625	City of Tacoma	Mason Creek dredging
NWS-2016-1179	City of Tacoma - Metro Parks	Seawater intake replacement for zoo/aquarium
NWS-2017-0169	City of Tacoma - Public Works	Ruston Way revetment replacement
NWS-2018-1099	Marchetti and McGuidwin	Asarco yacht basin piling replacement
NWS-2015-0114	Port of Tacoma	TOTE facility dolphin installation (LNG)
NWS-2015-0489	Port of Tacoma	Erdahl ditch arch culvert installation
NWS-2015-0634	GP Gypsum	Berth dredging
NWS-2015-0671	Paul Liner - Graymont Terminal	Effluent treatment system and outfall upgrade
NWS-2016-1041	Concrete Technology Corp	Bulkhead, dolphin replacement
NWS-2017-0401	Port of Tacoma	EBC boat ramp repair
NWS-2017-0901	Port of Tacoma	Pierce Co Terminal Wapato Creek arch culvert repair
NWS-2018-0138	Port of Tacoma	Parcel 77 redevelopment -- auto import terminal
NWS-2019-0737	Port of Tacoma	Earley Business Center shoreline cleanup (MTCA)
	City of Tacoma -- Mark D'Andrea	Taylor Way corridor widening and improvements

LIST OF CERLA COORDINATIONS WITH USACE ON CWA 404 PERMITS		
PERMIT NUMBER	**APPLICANT**	**PROJECT DESCRIPTION**
NWS-2011-0316	B&L Woodwaste Landfill	Ecology MTCA cleanup
NWS-2011-1000	Port of Tacoma	mitigation per EPA CD #C94-5648 -- salt marsh creation outer Hylebos
NWS-2012-0186	Tacoma Industrial Properties - Cunningham	install 3 new piers/ramps, reconstruct railway trestle pier (Kalakala moorage)
NWS-2012-0831	U.S. Army Reserve	Pier 23 - float and gangway replacement
NWS-2012-1249	Port of Tacoma	Arkema property -- soil removal, shoreline stabilization, install stormwater treatment and outfall, maintain boat ramp
NWS-2012-1264	EHW Constructors	Install new crane trestle and barge moorage facility
NWS-2014-0228	Port of Tacoma	Sampling at Occidental (sediment and porewater) per Ecology order
NWS-2014-0483	Targa Sound Terminal	Facility/dock maintenance (no in-water work)
NWS-2014-0543	Tacoma Industrial Properties - Cunningham	Dolphin replacements, construction 2 concrete piers, three pontoons, walkways & gangways, Mitigation: trestle and pier removals
NWS-2014-0652	Targa Sound Terminal - McQuade	Replacement of dolphins, installation of fender & walkway system & crane
NWS-2014-0821	Jesse Engineering	Industrial wharf decking replacement (no in-water work)
NWS-2014-0857	Targa Sound Terminal	Sediment sampling
NWS-2014-1128	Port of Tacoma & Puget Sound Energy	Construct LNG facility including 2 fueling piers
NWS-2015-0337	Targa Sound Terminal - Goodman	Maintenance dredging
NWS-2015-0488	U.S. Army Reserve	Pier 23 - floating dock & gangway installation
NWS-2015-0550	Port of Tacoma & Puget Sound Energy	Repair/replace 3 stormwater outfalls and associated timber bulkheads (LNG facility)
NWS-2015-0662	Port of Tacoma	Relocation of float, pier platform, and ramp from Hylebos to Pier 24
NWS-2015-0733	General Metals of Tacoma (former Schnitzer)	Wharf maintenance - up to 20 piles/year for 5 years, at 3 wharves
NWS-2015-0813	Port of Tacoma	Mitigation for work at Piers 3/4 (includes building & pile & float removal, sand placement @ Parcel 74/11th Street Bridge)
NWS-2016-0364	Interfor U.S.	Removal of mooring buoys, chains & anchors from Saltchuk former log rafting area
NWS-2016-1077	Port of Tacoma	Beach nourishment at Dick Gilmur shoreline restoration/access site
NWS-2017-0451	Trident Seafoods	Pier 24/25 repairs (no in-water work)
NWS-2018-0503	Old Ole & Charlie's Marina - Ladley	Dock decking and gangway replacement
NWS-2019-0339	Alaska Ice Seafoods	Installation 2 intake and 2 outlet pipes for seafood wet storage facility
NWS-2019-0439	General Metals of Tacoma (former Schnitzer)	Sediment sampling

LIST OF CERLA COORDINATIONS WITH USACE ON CWA 404 PERMITS		
PERMIT NUMBER	**APPLICANT**	**PROJECT DESCRIPTION**
NWS-2019-0613	Pacific Environmental and Redevelopment - King	Superlon drainage ditch interim action - MTCA Agreed Order No. DE 5940
NWS-2016-0449	Interfor U.S. (IPT Tacoma Logistics Center - Vanderburg)	New stormwater outfall to Middle WW
	Regal Logistics	St Paul CDF conversion from log storage to container storage
NWS-2018-0517	Port of Tacoma	Inline check valve installation - 2 stormwater outfalls
NWS-2014-0612	Foss Harbor Marina	Dock maintenance - replace docks & piling, remove dock roof
NWS-2014-1125	Dock Street Tacoma Associates - Simon	Piling replacement
NWS-2015-0177	Sound Transit - Ertl	Tacoma Trestle project mitigation - dock removal
NWS-2015-0366	Shore Terminals	Pier walkways and piling replacement
NWS-2015-0412	Foss Harbor Marina - Natucci	Marina gangway repair (no in-water work)
NWS-2016-1028	Shore Terminals	Stormwater outfall replacement
NWS-2017-0595	City of Tacoma	Jefferson-Hood stormwater outfall construction & shoreline enhancement mitigation
NWS-2017-1083	Foss Harbor Marina	Dock maintenance - replace docks & piling, remove dock roof
NWS-2018-0514	Foss Landing Marina - Jones	Removal and replacement of floating dock decking and gangways
NWS-2018-0530	Shore Terminals - Herzog	Pier walkways and piling replacement
NWS-2018-0901	City of Tacoma Public Works	Pier decking removal - advanced mitigation (3 locations)

This page is intentionally blank

Appendix D
Five-Year Review Site Inspection Checklist

[This page intentionally left blank.]

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: St. Paul CAP	**Date of inspection:** 8/1/2019
Location and Region: Tacoma, WA R10	**EPA ID:** WAD980726368
Agency, office, or company leading the five-year review: EPA	**Weather/temperature:** Sunny 75°F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other Sediment Cap - intertidal and upland
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☒ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Tom Richardson (Name) Program Mgr. (Title) 8/1/19 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☒ Report attached _____

2. **O&M staff** _____ (Name) _____ (Title) _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ As-built drawings — ☐ Readily available — ☐ Up to date — ☒ N/A
   - ☐ Maintenance logs — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks: Current O&M only requires monitoring after a major storm - no monitoring since 2004

2. **Site-Specific Health and Safety Plan** — ☑ Readily available — ☑ Up to date — ☐ N/A
   - ☐ Contingency plan/emergency response plan — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks:

3. **O&M and OSHA Training Records** — ☑ Readily available — ☑ Up to date — ☐ N/A

   Remarks:

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☑ Effluent discharge — ☐ Readily available — ☒ Up to date — ☐ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☐ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☐ N/A

   Remarks:

5. **Gas Generation Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks:

6. **Settlement Monument Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks:

7. **Groundwater Monitoring Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks:

8. **Leachate Extraction Records** — ☐ Readily available — ☐ Up to date — ☒ N/A

   Remarks:

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☑ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks:

10. **Daily Access/Security Logs** — ☒ Readily available — ☑ Up to date — ☐ N/A

    Remarks:

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☒ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____

2. **O&M Cost Records** N/A

☐ Readily available ☐ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: N/A

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks Active facility w/ secure fencing, gates, and guards/security that prevents access to cap

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks Signs at entrance to facility restrict public access to cap

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self-reporting

Frequency _____

Responsible party/agency Ecology / DNR

Contact Lindie Schmidt (Name) DNR (Title) 8/13/19 (Date) via email (Phone no.)

Reporting is up-to-date ☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☐ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

Ecology oversees NPDES discharge - no violations
DNR has lease for cap - lease is current
- land use controls in DNR lease adequate

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks _____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks _____

2. **Land use changes on site** ☒ N/A

Remarks _____

3. **Land use changes off site** ☒ N/A

Remarks _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks access to cap through facility

B. Other Site Conditions

Remarks Inspection conducted at -4 MLLW tide.

VII. LANDFILL COVERS ☐ Applicable ☑ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks _____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent _____ Height _____
   Remarks _____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
- ☐ Wet areas ☐ Location shown on site map Areal extent_____
- ☐ Ponding ☐ Location shown on site map Areal extent_____
- ☐ Seeps ☐ Location shown on site map Areal extent_____
- ☐ Soft subgrade ☐ Location shown on site map Areal extent_____

Remarks_____

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches ☐ Applicable ☐ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay
Remarks_____

C. Letdown Channels ☐ Applicable ☒ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☐ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent _____ Depth _____
Remarks _____

5. **Obstructions** Type _____ ☐ No obstructions
☐ Location shown on site map Areal extent _____
Size _____
Remarks _____

6. **Excessive Vegetative Growth** Type _____
☐ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent _____
Remarks _____

D. Cover Penetrations ☐ Applicable ☒ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks _____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks _____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☐ N/A
   Remarks _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A
   Remarks _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A
   Remarks _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Areal extent _____ Depth _____ ☐ N/A
   ☐ Siltation not evident
   Remarks _____

2. **Erosion** Areal extent _____ Depth _____
   ☐ Erosion not evident
   Remarks _____

3. **Outlet Works** ☐ Functioning ☐ N/A
   Remarks _____

4. **Dam** ☐ Functioning ☐ N/A
   Remarks _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement _____ Vertical displacement _____
   Rotational displacement _____
   Remarks _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☐ Vegetation does not impede flow
   Areal extent _____ Type _____
   Remarks _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Discharge Structure** ☐ Functioning ☐ N/A
   Remarks _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☐ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Performance Monitoring** Type of monitoring _____
   ☐ Performance not monitored
   Frequency _____ ☐ Evidence of breaching
   Head differential _____
   Remarks _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☑ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
☐ Good condition☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A
Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition☐ Needs Maintenance
Remarks_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**
☐ Good condition☐ Needs Maintenance
Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☐ Good condition☐ Needs Maintenance
Remarks_____

3. **Spare Parts and Equipment**
☐ Readily available ☐ Good condition☐ Requires upgrade ☐ Needs to be provided
Remarks_____

C. Treatment System ☐ Applicable ☑ N/A

1. **Treatment Train** (Check components that apply)
   - ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   - ☐ Air stripping ☐ Carbon adsorbers
   - ☐ Filters _____
   - ☐ Additive (*e.g.*, chelation agent, flocculent) _____
   - ☐ Others _____
   - ☐ Good condition ☐ Needs Maintenance
   - ☐ Sampling ports properly marked and functional
   - ☐ Sampling/maintenance log displayed and up to date
   - ☐ Equipment properly identified
   - ☐ Quantity of groundwater treated annually _____
   - ☐ Quantity of surface water treated annually _____
   - Remarks _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - ☑ N/A ☐ Good condition ☐ Needs Maintenance
   - Remarks _____

3. **Tanks, Vaults, Storage Vessels**
   - ☑ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   - Remarks _____

4. **Discharge Structure and Appurtenances**
   - ☑ N/A ☐ Good condition ☐ Needs Maintenance
   - Remarks _____

5. **Treatment Building(s)**
   - ☑ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   - ☐ Chemicals and equipment properly stored
   - Remarks _____

6. **Monitoring Wells** (pump and treatment remedy)
   - ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   - ☐ All required wells located ☐ Needs Maintenance ☑ N/A
   - Remarks _____

D. Monitoring Data

1. Monitoring Data
   - ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   - ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy design was to sequester contaminated sediment beneath a cap. The installed cap was subtidal, but subsequently NRDA trustees restored the area to intertidal and the facility increased the elevation to create upland & expand the facility. Therefore, the cap thickness ranges from 5-20 ft.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Currently, there is no requirement to inspect the cap to ensure it is continuing to function. Due to the thickness of the cap, the ability to observe material above the water line at a low tide (eg. ≥ -1 MLLW) will indicate the cap is present and functioning. Prior to 2004, extensive monitoring indicated that contamination was not migrating through the cap. There is sufficient evidence to show benthic recolonization and good habitat

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. N/A

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. N/A

St. Paul Cap Inspection
08/01/2019
List of Attendees

Name	Company	Title
Kristine Koch	EPA	Project Manager
Justine Barton	EPA	Ecologist
Tom Richardson	International Paper	Program Manager
Karl Shumacher	WestRock	Environmental Manager
Dave McEntee	Simpson Lumber Co., LLC	President

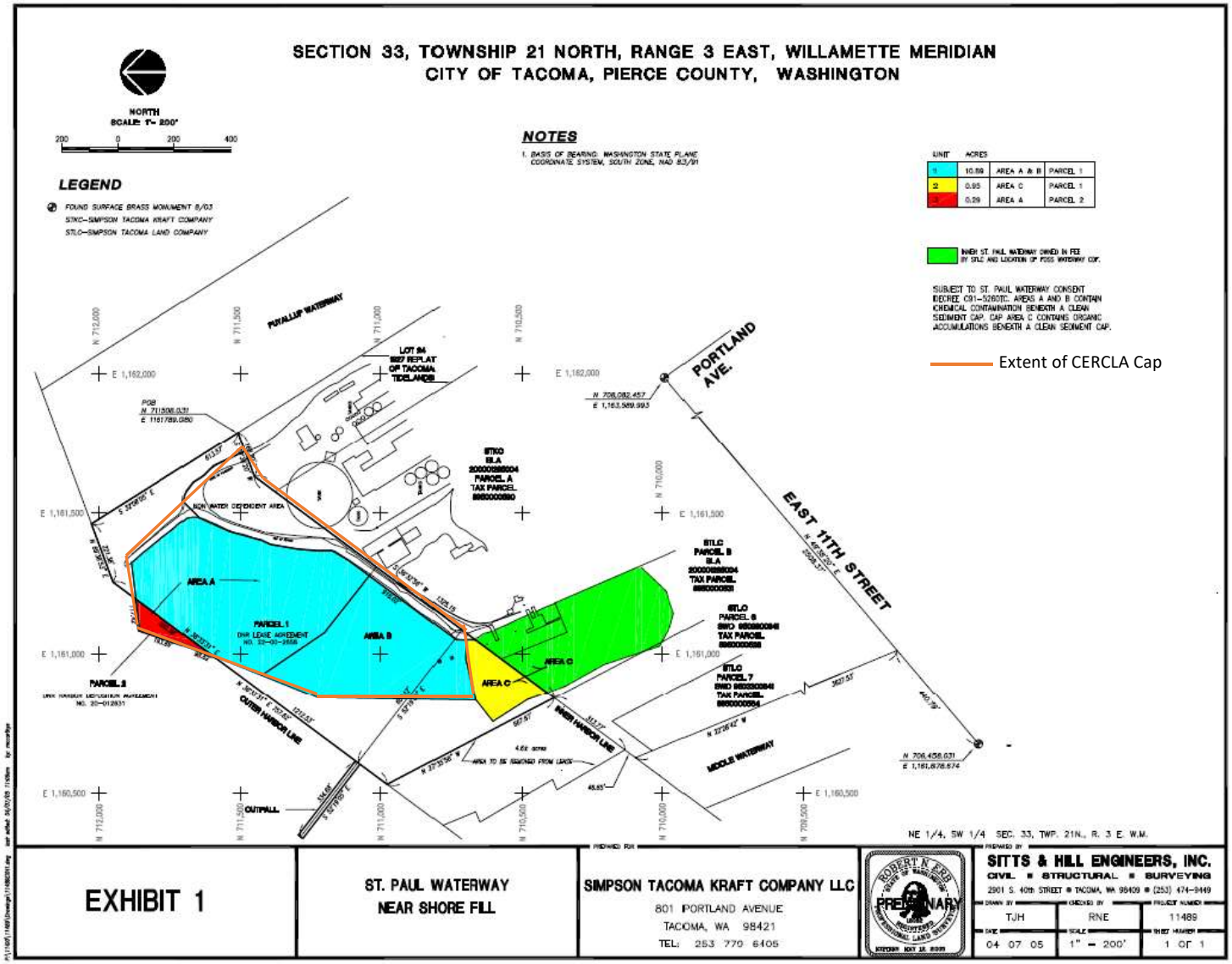

SECTION 33, TOWNSHIP 21 NORTH, RANGE 3 EAST, WILLAMETTE MERIDIAN
CITY OF TACOMA, PIERCE COUNTY, WASHINGTON
NORTH
SCALE: 1" = 200'
200 0 200 400
NOTES
1. BASIS OF BEARING: WASHINGTON STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD 83/91
LEGEND
FOUND SURFACE BRASS MONUMENT 8/03
STKC=SIMPSON TACOMA KRAFT COMPANY
STLC=SIMPSON TACOMA LAND COMPANY
UNIT ACRES
1 10.89 AREA A & B PARCEL 1
2 0.95 AREA C PARCEL 1
3 0.29 AREA A PARCEL 2
INNER ST. PAUL WATERWAY OWNED IN FEE BY STLC AND LOCATION OF FOSS WATERWAY COR.
SUBJECT TO ST. PAUL WATERWAY CONSENT DECREE C91-526DTC. AREAS A AND B CONTAIN CHEMICAL CONTAMINATION BENEATH A CLEAN SEDIMENT CAP. CAP AREA C CONTAINS ORGANIC ACCUMULATIONS BENEATH A CLEAN SEDIMENT CAP.
Extent of CERCLA Cap
PUYALLUP WATERWAY
PORTLAND AVE.
EAST 11TH STREET
LOT 84 1927 REPLAT OF TACOMA TIDELANDS
POB
AREA A
AREA B
AREA C
PARCEL 1
PARCEL 2
OUTER HARBOR LINE
INNER HARBOR LINE
MIDDLE WATERWAY
OUTFALL
NE 1/4, SW 1/4 SEC. 33, TWP. 21N., R. 3 E. W.M.
EXHIBIT 1
ST. PAUL WATERWAY
NEAR SHORE FILL
SIMPSON TACOMA KRAFT COMPANY LLC
801 PORTLAND AVENUE
TACOMA, WA 98421
TEL: 253 770 6405
PRELIMINARY
SITTS & HILL ENGINEERS, INC.
CIVIL ■ STRUCTURAL ■ SURVEYING
2901 S. 40th STREET ■ TACOMA, WA 98409 ■ (253) 474-9449
TJH
RNE
11489
04 07 05
1" = 200'
1 OF 1

Photo 1: Entrance at South end of WestRock facility. Cap is located on the North end of the facility.

Photo 2: South-East corner of intertidal cap looking North, including accreted peninsula that abuts the Puyallup River. Jetty to right (East) is barrier between intertidal cap and Puyallup River. Cap is covered with river delta deposits. Cap is very firm in this area, but very soft at the waters' edge to the West of the peninsula.

Photo 3: Eastern edge of cap at end of Jetty looking South-East and upstream at the Puyallup River.

Photo 4: Eastern edge of cap at end of Jetty looking South at WestRock facility.

Photo 5: Eastern end of cap at waters' edge looking South down peninsula at WestRock facility.

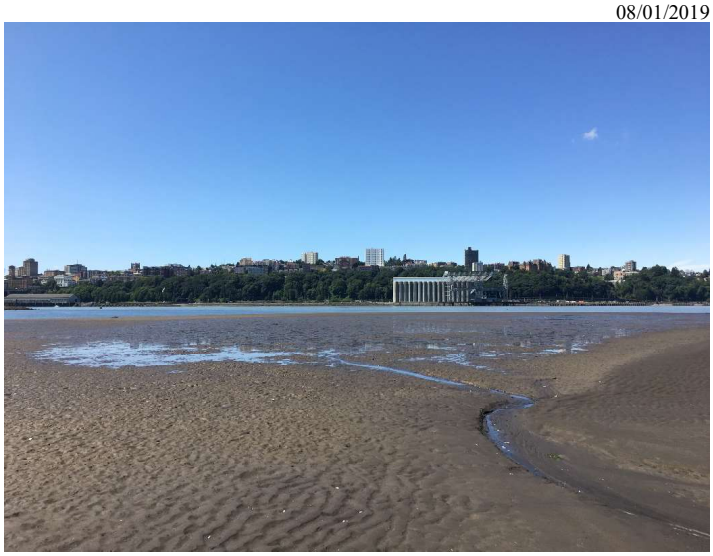


Photo 6: Eastern edge of cap at Jetty looking West toward downtown Tacoma. Natural runnel, pooling and rills apparent.

Photo 7: Moon Snail observed on the intertidal cap, along the West side of the accreted peninsula.

Photo 8: Eastern edge of cap looking West at subtidal cap. Scattered rock and kelp on cap surface is apparent.

Photo 9: Close-up of area of relatively finer-grained material (i.e., coarse sand) mixed with cobble armor as observed on beach.

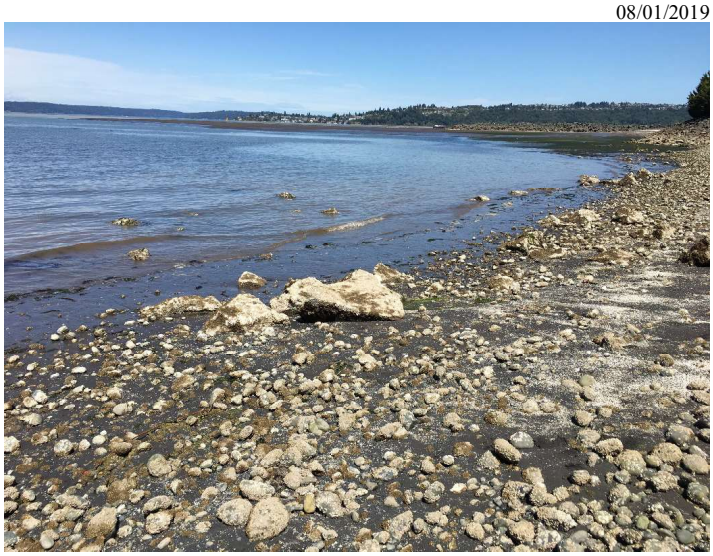


Photo 10: Western end of cap looking East toward far Jetty, peninsula, and Puyallup River. Scattered larger rocks noted, and more frequent patchy areas of finer-grained material observed in foreground.

Photo 11: Looking West, western extent of cap located at dolphins. Shoreline beach is predominantly cobbles overlying finer-grained material. A sandy fine-grained material zone is apparent in the grooved area of the beach.

Photo 12: Looking West, shoreline rip-rap cap transitions to beach in the upper intertidal zone. A sandy deposition zone of variable width is apparent along the rip-rap toe. Upper edge of rip-rap cap is vegetated with mature trees.

Photo 13: Western extent of cap at dolphins.

Photo 14: Oyster observed in beach cobbles.

Photo 15: Looking South, bank location of buried NPDES outfall pipe is marked with vertical white sign.

Photo 16: Looking North, location of submerged end of NPDES outfall is observable as a dark area on the water surface, which is due to the density difference between fresh and saltwater.

Photo 17: Looking North, extent of subtidal cap apparent from rock outcroppings and associated kelp.