



**US Army Corps
of Engineers®**

Final Decision Document

**Former Tongue Point Naval Air Station
Astoria, Clatsop County, Oregon**

DERP-FUDS Project No. F10OR048303

**U.S. ARMY CORPS OF ENGINEERS
KANSAS CITY DISTRICT
601 East 12th Street
Kansas City, Missouri 64106**

August 2017

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Table of Contents

Acronyms and Abbreviations

Section 1 Declaration.....	1-1
1.1 Site Name and Location.....	1-1
1.2 Statement of Basis and Purpose.....	1-1
1.3 Description of the Selected Remedy.....	1-2
1.4 Statutory Determinations	1-2
1.5 Authorizing Signatures	1-2
Section 2 Decision Summary	2-1
2.1 Site Name, Location, and Brief Description.....	2-1
2.2 Site History	2-1
2.3 Previous Investigations.....	2-2
2.3.1 Summary of Previous Investigations.....	2-3
2.3.1.1 Incinerator Building DU	2-3
2.3.1.2 Former Fire Training Area DU	2-3
2.3.1.3 Aquatic DUs.....	2-4
2.4 Physical and Chemical Characteristics.....	2-4
2.4.1 Geology and Hydrogeology	2-4
2.4.2 Surface Water Hydrology.....	2-6
2.4.3 Ecological Setting.....	2-6
2.4.4 Nature and Extent of Contamination.....	2-7
2.4.4.1 Incinerator Building DU	2-7
2.4.4.2 Former Fire Training Area DU	2-7
2.4.4.3 Aquatic DU – North of Pier 8	2-8
2.4.4.4 Aquatic DU – Finger Piers.....	2-9
2.4.4.5 Aquatic DU – Near Landfill.....	2-10
2.5 Community Participation.....	2-10
2.6 Current and Future Land and Water Use.....	2-10
2.6.1 Current Land and Water Use.....	2-11
2.6.2 Future Land and Water Use.....	2-11
2.7 Summary of Site Risk.....	2-12
2.7.1 Human Health Risk Assessment Summary	2-13
2.7.1.1 Incinerator Building DU	2-13
2.7.1.2 Aquatic DUs.....	2-13
2.7.1.3 Former Fire Training Area DU	2-14
2.7.2 Ecological Risk Assessment Summary	2-15
2.7.2.1 Incinerator Building DU	2-15
2.7.2.2 Aquatic DUs.....	2-15
2.7.2.3 Former Fire Training Area DU	2-15
2.7.3 Site Risk Conclusions.....	2-16
2.8 Determinations of Significant Changes	2-16
Section 3 Responsive Summary.....	3-1
3.1 Stakeholder Issues and Lead Agency Responses	3-1
3.2 Technical and Legal Issues.....	3-1
Section 4 References.....	4-1

List of Figures

Figure 1 Project Area

List of Tables

Table 1 Summary of Cancer Risk and Non-cancer Hazards

Table 2 Comparison of Aquatic Decision Unit Fish and Sediment Data to Reference and Background Levels

Table 3 Summary of Sediment and Surface Water Hazard Quotients for Ecological Receptors

Table 4 Biota Tissue Hazard Quotients for Ecological Receptors

Acronyms

bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DD	decision document
DDT	dichlorodiphenyltrichloroethane
DERP	Defense Environmental Restoration Program
DoD	United States Department of Defense
DU	decision unit
ERA	ecological risk assessment
FUDS	Formerly Used Defense Sites
gpm	gallons per minute
HQ	hazard quotient
HTRW	hazardous, toxic, and radioactive waste
LRI	limited remedial investigation
MLLW	mean lower low water
NAS	naval air station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
ODEQ	Oregon Department of Environmental Quality
ODSL	Oregon Division of State Lands
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
ppt	parts per thousand
RBC	risk-based concentration
RI	remedial investigation
SARA	Superfund Amendments and Reauthorization Act
SVOC	semi-volatile organic compound
TPH	total petroleum hydrocarbons
TRV	toxicity reference value
µg/kg	micrograms per kilogram
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound

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Section 1

Declaration

This Decision Document (DD) presents the No Action decision for five decision units (DUs) at the former Tongue Point Naval Air Station project (Project) in Astoria, Clatsop County, Oregon. The Tongue Point Project is being conducted as part of the Formerly Used Defense Sites (FUDS) program (United States Army Corps of Engineers [USACE] 2004). “Decision unit” is a term used for an area that had sufficient activity to warrant a focused study, including collection of appropriate samples and assessment of risks to humans and the environment. The use of DUs is made to manage investigations and cleanup decisions efficiently. Each DU has a geographic extent approximated by the limits of the media samples, which were representative of potential United States Department of Defense (DoD) effects within that DU.

1.1 Site Name and Location

- Site Name: Former Tongue Point Naval Air Station
- Site Location: Astoria, Clatsop County, Oregon
- FUDS Property/Project Number: F10OR048303

The Project area addressed in this Decision Document comprises the following three aquatic and two terrestrial DUs:

- Aquatic DU – North of Pier 8
- Aquatic DU – Finger Piers
- Aquatic DU – Near Landfill
- Incinerator Building DU (terrestrial)
- Former Fire Training Area DU (terrestrial)

The Project area is located at the former Tongue Point Naval Air Station (NAS) in a rural area on the tidelands near the mouth of the Columbia River (Cathlamet Bay) adjacent to Old Highway 30 approximately 3 miles east of Astoria, Oregon (**Figure 1**). The DoD used the area from 1921 through 1961 after which the Navy deactivated the facility and transferred the property to the Government Services Administration in 1962.

1.2 Statement of Basis and Purpose

This DD presents a No Action decision for the five DUs listed above. Investigation and cleanup decision activities at NAS were conducted with the authorities of the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) within the USACE program for response actions addressing hazardous, toxic, and radioactive waste (HTRW) releases. These programs follow requirements and regulations of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for the Project. The stakeholders that have participated in the investigations

and decision process are the USACE, Oregon Department of Environmental Quality (ODEQ), Oregon Division of State Lands (ODSL), Washington Development Company, Port of Astoria, and U.S. Fish and Wildlife Service (USFWS), and each concurs with the decision for No Action for the five DUs at the former Tongue Point NAS.

1.3 Description of the Selected Remedy

The USACE has determined that no unacceptable risks or ecological effects exist related to past DoD activities, and no remedial action is necessary to ensure protection of human health and the environment.

The results of the investigation and risk assessment activities and the current and future site uses for the areas discussed in this DD show that cleanup is not needed because the DoD-related contamination does not pose an unacceptable risk to human health or the environment. This was determined through completion of human health risk assessment and ecological assessments that considered current and potential future land and water use. The aquatic DUs, Incinerator Building DU, and the Former Fire Training Area DU will continue to be used as industrial and open space without the need for land use restrictions or other institutional controls to prevent future residential use.

1.4 Statutory Determinations

No remedial action is necessary to ensure protection of human health and the environment at the former Tongue Point NAS because the risk assessments concluded that no unacceptable risks exist due to past DoD activities at the five DUs covered under this DD. Therefore, the CERCLA Section 121 statutory determinations (e.g., requirements to conduct a five-year review) are not required because no remedy is being selected.

1.5 Authorizing Signatures

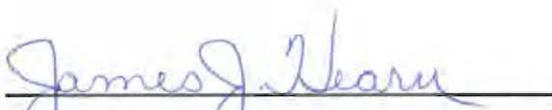
The U.S. Army Corps of Engineers Northwestern Division denotes acceptance of this DD as the final response action for the selected DUs addressed in this DD by signing the authorizing signature page at the end of this section. This DD will be part of the Administrative Record and available for public viewing at the public information repository at the Astoria Public Library located at 450 10th Street, Astoria, Oregon.

FINAL DECISION DOCUMENT
FORMER TONGUE POINT NAVAL AIR STATION
ASTORIA, CLATSOP COUNTY, OREGON

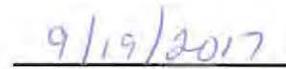
APPROVAL

This Decision Document (DD) presents the selected decision for the five Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Decision Units (DUs) at the Formerly Used Defense Site (FUDS) known as the Tongue Point Naval Air Station, Astoria, Oregon. The five DUs addressed by this DD are the Incinerator Building DU, Former Fire Training Area DU, Aquatic DU – North of Pier 8, Aquatic DU – Finger Piers, and Aquatic DU – Near Landfill. The U.S. Army Corps of Engineers is the lead federal agency with authority from the Defense Environmental Restoration Program (DERP) and has prepared this DD consistent with CERCLA, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This DD, presenting the No Action decision, is approved by the undersigned, pursuant to Memorandum, CENWD-PDM, August 11, 2016, Subject: Re-delegation of Assignment of Mission Execution Functions Associated with Department of Defense Led Agent Responsibilities for the Formerly Used Defense Sites Program.

APPROVED:



James J. Hearn, SES
Director, Regional Business
Northwestern Division



Date

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Section 2

Decision Summary

The Decision Summary identifies that no remedy is being selected, explains why no remedial action is necessary to ensure protection of human health and the environment, and provides a substantive summary of the Administrative Record file that supports the no action decision.

2.1 Site Name, Location, and Brief Description

Site Name:	Former Tongue Point NAS
Location:	Astoria, Clatsop County, Oregon
Lead Agency:	U.S. Army Corps of Engineers
State Support Agency:	Oregon Department of Environmental Quality
Site Type:	Formerly Used Defense Site
Funding Source:	Funding for remedial activities is provided by the Defense Environmental Restoration Account, a funding source approved by Congress to clean up contaminated sites on DoD installations.
Site Description:	The Tongue Point Project Area is located near the mouth of the Columbia River (Cathlamet Bay) adjacent to Highway 30 and is within the city limits of Astoria, Oregon. The Project area for the five DUs comprises 230 acres (85 acres terrestrial and 145 acres aquatic) at the former Tongue Point Naval Air Station. The Decision Document addresses five DUs as two terrestrial areas and three aquatic areas. Figure 1 shows the layout and the relative Project location as an inset map. The five DUs addressed by this DD are indicated on the map as Incinerator Building DU, Former Fire Training Area DU, Aquatic DU – North of Pier 8, Aquatic DU – Finger Piers, and Aquatic DU – Near Landfill.

2.2 Site History

The DoD originally acquired 395 acres in 1921 through deed for use as a submarine and destroyer base; however, the base never became fully operational. Use was limited to the uplands area and some tidelands and was essentially dormant until 1939. From 1940 through 1948, additional acreage was acquired by deed and by condemnation to a total of approximately 840 acres for the FUDS property. In 1939, the Navy began converting the base to an NAS for seaplanes. As part of this conversion, additional construction occurred along the waterfront areas of eastern Cathlamet Bay, and the current peninsula was created by hydrofilling Tongue Neck, a tidal isthmus connecting the river shore to a small offshore island. The DoD used the area as a naval seaplane base from 1941 through 1946 and constructed seaplane hangars, aviation gasoline refueling systems, and repair and maintenance facilities on a portion of the former Tongue Point NAS. Construction activities were completed in 1942, and seaplanes arrived in early 1943. Concrete ramps allowed seaplanes access to the river, and a large ordnance storage area was constructed on Tongue Point. Supporting structures included living quarters, an athletic field, a medical

dispensary, a powerhouse, a sewage treatment plant, a fire training area, sludge burn pits, pipelines, tanks, and a waste incinerator.

In 1946, naval air operations ceased, and the base became a fleet facility for the Columbia River Group of the Pacific Reserve Fleet. This group dredged a portion of Cathlamet Bay and constructed eight concrete finger piers. The piers are approximately 40 feet wide, 1,100 to 1,500 feet long, and spaced approximately 520 feet apart, with the exception of Piers 7 and 8, which are approximately 290 feet apart. Piers are numbered one through eight from south to north. The wharf between Piers 6 and 8, constructed of treated wood, is 700 feet long and 25 feet wide. In addition to the finger piers, concrete ramps extend into the river about midway between Piers 3 and 4 and on the south side of Pier 7. Activities at the NAS from 1946 to the end of 1961 included handling of electrical transformers, pesticide application, ship deactivation and reactivation, preservation of deactivated ships, and ship overhauls.

In January 1962, the Navy deactivated the facility, and the property was subsequently transferred to the General Services Administration that year. The DoD-era activity is therefore considered to coincide with the Navy's active occupation of shore facilities from 1941 through 1962 as described above.

In 1971, a portion of the property was formally transferred to the U.S. Department of Labor. Subsequent property transfers included transfer of the southern portion of the former NAS to the ODSL in 1980. This transfer included the former landfill area, the aquatic areas east of the former landfill and east of the finger piers, the southern and western portions of the Former Fire Training Area, the stockpiled dredge materials from Pier 4, and the Former Incinerator Building DU.

The post DoD land utilization for the five DUs addressed in this document has included various business enterprises, light industrial, marine, and wood products related activities common to the northwest region.

2.3 Previous Investigations

The following subsections summarize the previous investigations, former and current land uses, and the remedial investigation and risk assessment results.

The Tongue Point Project Area has progressed through the preliminary assessment/site inspection phase of the CERCLA process. Risk management decisions for the five DUs covered by this DD are based on site history and comparison of sample results to the background, chemical, and risk-based regulatory criteria identified in the Tongue Point Multi-Sites Remedial Investigation (RI) report (USACE 2012). These criteria included background criteria from ODEQ and other federal regulatory agencies and from other investigations in the Columbia River Basin. The risk-based comparison criteria for the Project were identified and applied in the RI through collaboration between ODEQ and USACE.

The five DUs, including the near shore sediments adjacent to the Tongue Point Landfill, were subject to a series of investigations leading to the comprehensive RI (USACE 2012). The investigations and studies were conducted by USACE and followed the CERCLA phases represented by the documents and investigations listed below.

- USACE Tongue Point Monitoring Program (1988 to 1992)
- Tongue Point Landfill Limited Remedial Investigation (LRI) (1992 to 1993) (USACE 1993)
- Finger Piers Groundwater Monitoring (1994)

- Finger Piers Sediments LRI (1995) (USACE 1998)
- LRI Phase II Tongue Point Landfill (1995 to 1998), including the fire training area (USACE 1999a)
- Final Remedial Investigation Report, Tongue Point Multi-Sites Project, Former Tongue Point Naval Air Station, Astoria (USACE 2012)

2.3.1 Summary of Previous Investigations

The USACE began oversight in 1990 under the purview of DERP-FUDS (DoD 2012) and completed an RI for the Project in 2008 (USACE 2012), which evaluated potential threats to human health and the environment. Several limited investigations were conducted before the RI but did not provide sufficient information and/or meet the USACE’s data quality requirements for a cleanup decision. However, previous studies were used to determine sampling locations, media, and chemicals of interest for the RI phase. Data collected during the 2008 RI focused on specific areas, called DUs, related to the potential release of contamination from past DoD use and thought to have been sources (terrestrial) or to have been affected by releases from the sources (aquatic) associated with DoD-era activities from 1941 to 1962. The relative sizes of the five DUs covered in this DD are shown on **Figure 1**.

2.3.1.1 Incinerator Building DU

The Incinerator Building consists of a small (10 feet by 25 feet), short-stacked brick structure in the southern portion of the investigation area, west of Pier 2 and west of the Portland and Western Railroad tracks. It is adjacent to a steep slope in a heavily forested and thick brushy area. Also known as a “Refuse and Garbage Incinerator,” it was used by the Navy as a low temperature furnace to burn paper wastes, but it was never used by the subsequent property owner, the Job Corps Center.

One residual ash sample was collected in 1993 from inside the incinerator and analyzed for various metals. The results indicated that the incinerator was not used to burn munitions. In 2007, the USACE conducted additional sampling (ash and soils) to assess the nature and extent of contamination in the surface soils, related to ash and stack deposition around the perimeter of the brick structure. The ash is limited to residual ash in the firebox and chimney of the building, both of which are too small for a person to enter.

2.3.1.2 Former Fire Training Area DU

This DU was formerly a public works storage yard with a portion of the northern area used for fire training exercises. In addition, for a brief period, the southern portion was part of an athletic field. This DU contained several features mostly constructed in 1947, including a warehouse building, a railroad spur, two steel oil-storage tanks, and one steel tank specifically used for fire training. Fill soil has been reported from ground surface to approximately 17 feet below ground surface (bgs). Alluvium underlies the fill and extends to 22 to 32 feet bgs (or to the maximum depth explored at this DU). Bedrock, the Astoria Formation, underlies the alluvium. The surface fill includes mounds of dredge spoils overlying older hydraulic fill that was placed as part of early site development.

Groundwater beneath the Former Fire Training Area DU is unconfined within the fill and alluvium. Historically, the depth to groundwater ranged from 5 to 15 feet bgs, with the deeper depths located within the dredged stockpile area. The saturated thickness ranges from 12 to 20 feet, with the greatest saturated thickness near the shoreline. Groundwater flows east toward Cathlamet Bay, and groundwater levels are expected to be tidally influenced.

Several monitoring wells were installed before the RI along the eastern shoreline near the finger piers and in the Fire Training Area DU. Vinyl chloride was detected in a soil sample collected during well installation in one of the finger piers well borings at a concentration of 16 micrograms per kilogram ($\mu\text{g}/\text{kg}$). Concentrations up to 34 $\mu\text{g}/\text{kg}$ of vinyl chloride occurred in soil samples from water table depths at well locations in the Former Fire Training Area DU. Aroclor-1254, a polychlorinated biphenyl (PCB), was detected in water table samples at concentrations ranging from 24 to 100 $\mu\text{g}/\text{kg}$. Several semi-volatile organic compounds (SVOCs) and total petroleum hydrocarbon (TPH) compounds were also detected. Vinyl chloride was also detected in groundwater samples from monitoring wells.

2.3.1.3 Aquatic DUs

Three aquatic DUs are covered in this DD, including North of Pier 8 Area, Finger Pier Area, and Near Landfill Area. Aquatic DUs include surface water, sediment, and biota present in the areas surrounding the eight reinforced concrete finger piers on the east side of the hydrofilled area of Cathlamet Bay. The piers are approximately 30 to 50 feet wide and 1,100 to 1,200 feet long and spaced about 520 feet apart, with the exception of Piers 7 and 8 that are 290 feet apart. Sediment in the aquatic DUs generally consists of a sequence of silt and sandy silt (ranging from 5 to 20 feet in thickness) underlain by sand (at least 10 feet thick). The upper silt unit is believed to be sediment deposited after the initial development of the submarine base and construction of the Finger Piers. The underlying sand represents sediment deposited in a higher energy environment before DoD development occurred. Infilling of the bay and construction of the Finger Piers slowed river flow velocities, resulting in a lower energy depositional environment and increased silt deposition. Sediment accumulation within the Finger Piers DU ranged from 1.5 to 3 feet between 1995 and 2008. During the 1995 Sediment LRI, sediments were characterized with data from discrete samples at 32 locations. Analytical results were evaluated and documented in the Sediment LRI report, which concluded that (1) surface sample data showed no exceedances of sediment criteria and (2) any threats to human health and the environment were minimal.

2.4 Physical and Chemical Site Characteristics

This section summarizes the physical characteristics of the Tongue Point NAS Project Area, including the nature and extent of chemicals for the five DUs.

2.4.1 Geology and Hydrogeology

The terrestrial DUs of the NAS were constructed on unconsolidated fill from material dredged from the Columbia River. Native surface soils are exposed in some of the upland areas and have been identified as the Templeton Ecola Silt Loam. Bedrock subjacent to the DUs consists of Miocene marine deposits of the Astoria Formation, which primarily comprises fossiliferous siltstone and claystone. The Astoria Formation is estimated to be 2,000 feet thick near the Project (USACE 1999b). Columbia River flood basalts, of similar age to the Astoria Formation, are present as an outcrop of Columbia River basalt that creates the prominent “point” of Tongue Point north of the five subject DUs.

The maximum depth explored during the RI (USACE 2012) was 30 feet bgs in the Former Fire Training Area. Fill underlies the ground surface in this area to depths of approximately 17 feet bgs. Alluvium underlies the fill and extends to depths up to 22 to 32 feet bgs (or to the maximum depth explored at this DU). The RI report assumes that bedrock of the Astoria Formation underlies the alluvium and dips eastward. The surficial fill includes mounds of dredge sediment from the Finger Piers, overlying older hydraulic fill. The hydraulic fill was placed in the 1940s, as part of early site development, and consists predominantly of poorly graded sand with minor silt and silty sand layers. The dredged sediment covering

the Former Fire Training Area DU was placed in 2001 by the property owner and lessee and is unrelated to past DoD activity.

Groundwater generally occurs in the Project area under unconfined conditions within the fill and alluvium overlying the low permeability bedrock that acts as an aquitard. Groundwater is not used as a drinking water source and is not likely to be used for drinking water in the future because the water-bearing zones have limited yield and there is an existing supplied-water infrastructure (City of Astoria). During the September 2008 investigation, the depth to groundwater at the Former Fire Training Area ranged from 5 to 15 feet bgs, with the deeper depths occurring within the dredged stockpile area (USACE 2012). The saturated thickness ranged from 12 to 20 feet, with the greatest saturated thickness near the shoreline. Aquifer testing was not specifically conducted at the Former Fire Training Area. However, based on similar lithology, the hydraulic conductivity of the unconfined water-bearing zone is assumed to be similar to that determined for fill and alluvium at a nearby DU where conductivity ranged from 1 to 20 feet/day (USACE 2012).

The September 2008 groundwater elevation contour map for the Former Fire Training Area indicated that groundwater flows east toward Cathlamet Bay, with an approximate hydraulic gradient of 0.0075 feet/foot. Based on previous investigations, groundwater levels are expected to be tidally influenced (USACE 2000a). The average linear groundwater velocity is estimated at 0.8 foot/day. The estimated yield for wells screened in the unconfined water-bearing zone, assuming 10 to 14 feet of saturated thickness, ranges from 0.3 to 9.4 gallons per minute (gpm).

Sediment in the three aquatic DUs consists of a thick sequence of silt and sandy silt underlain by sand. The silt unit ranges from 5 to 20 feet thick and has a high organic content with invertebrates present in the upper 3 feet of sediment. The upper silt unit is believed to be sediment deposited after the initial development of the destroyer and submarine base and construction of the Finger Piers (USACE 1998). The underlying sand unit is at least 10 feet thick (USACE 1998) and represents sediment deposited in a higher energy environment before development occurred in the area. Infilling of the bay and construction of the Finger Piers slowed river flow velocities, resulting in a lower energy depositional environment and increased silt deposition.

Results from a bathymetric survey conducted in September 2008 for the Finger Piers showed that the depth of water relative to mean lower low water (MLLW) ranges from 5 feet deep for the mudflats of the Near Landfill Aquatic DU to 28 feet deep in the Finger Piers Aquatic DU surrounding Pier 4 (USACE 2012). Two prominent bathymetric features are present: (1) a depression of the river bottom around Pier 4, resulting from the 2001 dredging activities, and (2) a northeast-trending steep-sided channel on the north side of Pier 7. The channel along the north side of Pier 7 may represent a former erosional feature along the south side of the former Tongue Point Island or may be evidence of a historical dredging event. The remaining area around the finger piers is relatively flat. A short distance beyond the east end of the piers and into Cathlamet Bay, the river bottom drops off steeply to depths exceeding 30 feet below MLLW.

Sediment accumulation ranged from approximately 1.1 to 4.6 feet per year over the 13.4-year period between the 1995 and 2008 bathymetric surveys. The least sediment accumulation occurred at the south end of the DU, south of Pier 1, and the greatest sediment accumulation occurred within the steep-sided channel north of Pier 7. Sediment accumulation over the remainder of the Finger Piers DU was more uniform, averaging 2.1 inches per year. Based on this sedimentation rate and as correlated from sediment cores, the USACE calculated approximately 8.1 feet of sediment accumulated from the cessation of DoD-

related activities in 1962 to the time of the 2008 bathymetric survey. In addition, sediment accumulation after the 2008 bathymetric survey has added an estimated additional 1.4 feet of sediment through 2016. The total accumulated sediment thickness overlying the DoD-era sediments is estimated as approximately 10 feet.

2.4.2 Surface Water Hydrology

The Columbia River is the primary surface water feature in the Project area, which is located approximately 12 miles upstream of the mouth of the Columbia River in Cathlamet Bay, a lower energy slack water environment. The Columbia River is influenced both by tidal fluctuations and by the release schedule of upstream Bonneville Dam. Tidal information from the National Oceanic and Atmospheric Administration gauge at the Tongue Point U.S. Coast Guard Station shows the magnitude of the tidal fluctuation at Cathlamet Bay to be 7 to 8 feet (USACE 2000b).

A secondary surface water feature is Mill Creek, which discharges to the Near Landfill Aquatic DU and into Cathlamet Bay. An unlined drainage ditch along the west side the Fire Training Area DU adjacent to the railroad tracks provides drainage for upland areas and the western portion of the Project area; the ditch discharges to the Columbia River at the mouth of Mill Creek. Stormwater is regulated by ODEQ through permits to the business on the terrestrial areas, and runoff is directed into stormwater inlets and, via conveyances, travels beneath the paved surfaces to discharge points along the shoreline of the Finger Piers aquatic areas.

2.4.3 Ecological Setting

The five DUs are located in the lower portion of the Tidal-Fluvial Zone (Simenstad et al. 1990) of the lower Columbia River estuary ecosystem. Potential habitats within 2 miles of the Project include the open water habitat of Cathlamet Bay, upland conifer forest at the tip of Tongue Point, and upland/riparian forest on Mott and Lois Islands within the Lewis and Clark National Wildlife Refuge and on the Tongue Point Peninsula. In addition, there are emergent wetlands, intertidal flats, and subtidal areas associated with Mill Creek. The small areas comprising the two terrestrial DUs were identified as non-significant habitat relative to the preferred habitats of the nearby vicinity (USACE 2012).

Aquatic DUs adjacent to Cathlamet Bay are predominantly shallow, subtidal habitat dominated by fine sediments. The tidal-fluvial zone is characterized by the dominance of freshwater inputs from the Columbia River; however, salinities near the Project area vary widely, both seasonally and over individual tidal cycles. In shallow subtidal areas of the three aquatic DUs, bottom salinities range from 0.0 parts per thousand (ppt) at low tide (Emmett et al. 1984 and 1986) to 15 ppt during high tide and low river flow conditions (Ingles 1989).

The small areas comprising the two terrestrial DUs were identified as non-significant habitat relative to the preferred habitats of the nearby vicinity (USACE 2012). Terrestrial habitats adjacent to and within the NAS include the upland conifer forest at the tip of Tongue Point; upland/riparian forest on the Tongue Point peninsula; and emergent wetlands, flats, and subtidal areas along Mill Creek (USACE 2012). The upland/riparian forests are characterized by a variety of overstory trees, including red alder, black cottonwood, Douglas fir, Sitka spruce, and western hemlock. Several black cottonwood trees and conifers are large enough to provide perching sites for raptors such as bald eagles. Understory vegetation includes many native species, such as red elderberry, salmonberry, and thimbleberry, with herbaceous species, including sword fern as well as lady fern and horsetail, in the wetter areas. Himalayan blackberry, an invasive non-native plant, occurs in dense stands where the ground has been disturbed. Wetland areas may be dominated by reed canary grass.

Wildlife species known to occur near the former NAS area (USACE 2012) are shorebirds that use the flats and marsh areas for foraging and nesting as well as migrating, breeding, and overwintering waterfowl. Songbirds and neotropical migrants use the diversity of habitats for breeding, nesting, foraging, and migration. These birds often are found within forested or scrub/shrub habitats. Mammals observed within the Project area include black-tailed deer, raccoons, and opossums. River otters and nutria may visit the former NAS area but were not observed during the RI (USACE 2012).

2.4.4 Nature and Extent of Contamination

This section summarizes the nature and extent of chemicals detected in media at each of the DUs based upon data collected in 2008 and reported in the RI (USACE 2012). The USACE's investigation, including results from the health and environmental risk assessments, showed that past chemical releases in the five DUs addressed by this DD did not leave significant levels or areas of contamination. To make risk-based decisions for the DUs, the USACE compared results for the soil, sediment, groundwater, surface water, and tissue (fish and clams) samples collected during the RI against conservative screening levels from U.S. Environmental Protection Agency (USEPA) and ODEQ and against other risk-based criteria as developed and presented in the RI (USACE 2012). The screening process helps focus the risk assessments on chemicals that could pose a risk to human health or ecological receptors and is conducted to limit the number of contaminants included in quantitative risk assessment while also assuring that all significant contaminants are addressed. The screening process uses conservative methods that include chemicals that may not pose any risk or hazard to human health or ecological receptors rather than exclude chemicals that might pose such risks or hazards. Thus, while finding a chemical at a concentration above a screening level indicates a need for further evaluation, it does not indicate that cleanup is required. The need for cleanup depends on factors such as site use and other considerations. Investigation activities associated with the five DUs covered by this DD are summarized in the subsections below. Evaluations and conclusions are presented in Section 2.7.1. This information is summarized from the RI report (USACE 2012).

2.4.4.1 Incinerator Building DU

The sampling at this DU was conducted by USACE and completed before the RI. The 2007 ash sample contained PCBs, metals, a non-explosive nitroaromatic/nitroamine compound, and common combustion byproducts, including polycyclic aromatic hydrocarbons (PAHs) and dioxin/furan compounds. None of the chemicals analyzed exceeded their screening criteria, which are described in the RI (USACE 2012). However, the detected concentrations of chemicals were used to focus the analyses of soil samples. The ash is contained within the small firebox and not accessible for human exposure; therefore, it was not evaluated in the risk assessments.

Soil samples collected in 2007 from the incinerator area were analyzed for SVOCs, PAHs, PCBs, dioxins/furans, nitroaromatics/nitroamines, and metals. Carcinogenic PAHs did not exceed comparison criteria in any of the five analyses. The detected concentrations of dioxins/furans were above the comparison criteria, with the maximum detected concentration on the same order as the criterion. Total PCBs concentrations were less than the comparison criteria. Dioxin/furan was evaluated for risks from surface soils surrounding the Incinerator Building, and the risk assessment conclusions are presented in Section 2.7.1.

2.4.4.2 Former Fire Training Area DU

During the RI sampling conducted in 2008, the USACE collected several groundwater, soil, soil gas, near-shore sediment, and surface water samples to assess the nature and extent of volatile organic

compound (VOC) and light non-aqueous phase liquid petroleum hydrocarbons related to Former Fire Training Area activities. Several compounds and inorganic constituents were detected in the soil, soil gas, groundwater, sediment, and surface water samples collected at the Former Fire Training Area DU. Analytical results (USACE 2012) are summarized below. Reported concentrations that exceeded screening levels were retained for further screening and evaluation of risks.

- Soil – Fifteen soil samples were collected for analysis of VOCs, select TPH compounds, PAHs, and metals; select samples were also analyzed for dioxin/furans, pesticides, and PCBs. PCBs were not detected. TPH-diesel range organics exceeded the DU-specific TPH risk-based concentration (RBC) in soil at one location.
- Soil Gas – Samples from seven soil gas probes advanced around and within the dredged sediments stockpile were analyzed for VOCs, oxygen, and carbon dioxide. Chloroform concentrations exceeded the comparison criterion in some samples. Four of the VOCs detected in soil gas do not have relevant comparison criteria. In addition to chloroform, these four VOCs were also evaluated in the risk assessment.
- Groundwater – During the RI, the USACE collected 17 samples from both existing and temporary wells for analysis of VOCs, PAHs, select TPH compounds, and metals. Select samples were also analyzed for dioxin/furans (three samples) and pesticides and PCBs (five samples). PCBs were not detected. TPH-gasoline range organics were detected in groundwater at concentrations greater than DU-specific TPH RBCs. Concentrations for dioxins/furans, three VOCs, two PAHs/PAH groups, and three inorganic constituents also exceeded comparison criteria.
- Sediment – The USACE collected two sediment samples from two near-shore sediment cores at locations between Finger Piers 1 and 2. The samples were analyzed for VOCs, select TPH compounds, SVOCs, pesticides, metals, PCB Aroclors, and hexachlorobenzene. VOCs were not detected. Concentrations of carcinogenic PAHs, total dichlorodiphenyltrichloroethane (DDT), total PCBs, lead, and mercury exceeded comparison criteria and were retained for evaluation in the risk assessment process. The documented former DoD activity at the Former Fire Training Area DU suggests some uncertainty regarding whether contaminants present in near-shore sediments are related to DoD activities or non-DoD-associated stormwater discharges and/or incoming sediment deposition.
- Near-Shore Surface Water – In addition to the sediment samples, the USACE collected two surface water samples from two near-shore locations between Finger Piers 1 and 2 for analysis of VOCs, select TPH compounds, SVOCs, pesticides, and metals. TPH and VOCs were not detected. Arsenic was the only constituent with concentrations exceeding the comparison criterion.

2.4.4.3 Aquatic DU – North of Pier 8

Some reported concentrations in samples of surface water, sediment, and tissue samples exceeded screening levels and were retained for evaluation in the risk assessment process.

- Surface Water – One surface water sample from North of Pier 8 was analyzed for TPH, VOCs, SVOCs (including PAHs), pesticides, PCBs, and metals. TPH, VOCs, and PCBs were not detected. Arsenic was the only constituent with concentrations exceeding the comparison criterion.

- Sediment – Seven sediment samples from North of Pier 8 were analyzed for SVOCs (including PAHs), pesticides, PCBs, and metals and three of the samples for VOCs and TPH. Carcinogenic PAHs, arsenic, and mercury concentrations in some samples exceeded comparison criteria.
- Tissue – The USACE collected tissue from organisms in the North of Pier 8 area and analyzed one composite sample for each type of tissue (clam, forage fish, game fillet) for select bioaccumulative constituents, PAHs, pesticides, PCBs, dioxins/furans, and tributyltin. PCBs and tributyltin were not detected. In clam tissue, only arsenic, lead, and selenium exceeded the comparison criteria and were retained for additional evaluation. In forage fish tissue, total DDT, lead, mercury, and selenium exceeded comparison criteria, and in game fish fillets, only lead, mercury, and selenium exceeded the comparison criteria. A comparison criterion value for chromium in tissue was not available; therefore, chromium was also further evaluated in the risk assessment.

2.4.4.4 Aquatic DU – Finger Piers

The USACE collected surface water and sediment samples near the Finger Piers during the RI (USACE 2012) to assess health risks and potential ecological effects. Benthic biota (clam and fish) tissue samples were also collected to assess potential ecological effects and evaluate potential effects related to human consumption. Some reported concentrations in samples from surface water, sediment, and tissue from the Finger Piers area exceeded screening levels, and the chemicals were retained for evaluation in the risk assessment process.

- Surface Water – Two surface water samples from the Finger Piers area were analyzed for VOCs, SVOCs (including PAHs), pesticides, PCBs, TPH, and metals. TPH, VOCs, and PCBs were not detected. Arsenic was detected in both samples at concentrations two orders of magnitude greater than the comparison criterion.
- Sediment – Seven sediment samples from the Finger Piers area were analyzed for SVOCs (including PAHs), pesticides, PCBs, tributyltin, and metals; three of the samples were analyzed for VOCs and TPH. Carcinogenic PAHs, total DDT, total PCBs, and mercury concentrations exceeded comparison criteria.
- Tissue – The USACE collected tissue from organisms in the Finger Piers area and analyzed one composite sample for each type of tissue (clam, forage fish, game fillet) for select bioaccumulative constituents, pesticides, PCBs, percent lipids, and metals. Fish tissue samples were also analyzed for dioxins/furans, tributyltin, and SVOCs. However, because of the scarcity and small size of the clams collected using the Power Van Veen sampler, the volume of the composite clam tissue sampled for this DU was insufficient to complete these chemical analyses. PCBs and tributyltin were not detected in any of the samples. In clam tissue, only lead and selenium exceeded the comparison criteria and were retained for additional evaluation. In forage fish tissue, lead, mercury, and selenium exceeded comparison criteria, and in game fish fillets, only mercury and selenium exceeded the comparison criteria. A comparison criterion value for chromium in tissue was not available; therefore, chromium was also further evaluated in the risk assessment.

2.4.4.5 Aquatic DU – Near Landfill

Some reported concentrations in the surface water, sediment, and tissue samples from the Near Landfill area did exceed the comparison criteria that were developed in the RI (USACE 2012) and were retained for evaluation in the risk assessment process.

- Surface Water – One surface water sample from the Near Landfill area was analyzed for VOCs, SVOCs (including PAHs), pesticides, PCBs, TPH, and metals. TPH, VOCs, pesticides, and PCBs were not detected. Arsenic was detected in the sample at a concentration two orders of magnitude greater than the comparison criterion. None of the other constituents exceeded criteria.
- Sediment – Seven samples from the Near Landfill area were analyzed for SVOCs (including PAHs), pesticides, PCBs, metals, and dioxins/furans; three of the samples were analyzed for VOCs and TPH. Carcinogenic PAHs, total DDT, total PCBs, dioxins/furans, and mercury concentrations exceeded comparison criteria.
- Tissue – Tissue samples from organisms in the Near Landfill area were collected as composite samples for each type of tissue (clam, forage fish, game fillet) and analyzed for SVOCs, PCBs, select bioaccumulative constituents, and pesticides. PCBs were not detected in any of the samples. In all three tissue types, only lead, mercury, and selenium exceeded the comparison criteria and were retained as chemicals of potential concern and were evaluated through the risk assessment process. A comparison criterion value for chromium in tissue was not available; therefore, chromium also was evaluated further in the risk assessment.

2.5 Community Participation

The Tongue Point Proposed Plan for the five DUs of the Tongue Point Project was made available to the public on May 26, 2016 as part of the Administrative Record file. Copies of the Administrative Record file reside at the USACE Kansas City District office and in the repository at the Astoria Public Library. Selected documents were made available online for review at: <http://preview.tinyurl.com/Tongue-Point-FUDS>. The notice of the availability of the Proposed Plan and the date of the public meeting were first published in the May 26, 2016 edition of *The Daily Astorian* newspaper. A public comment period was held from June 1 through July 8, 2016, and the public meeting was held on June 29, 2016 at the Astoria Public Library to present the proposed plan. The public was encouraged to participate in the decision-making process by providing comments on the Proposed Plan and attending the public meeting; representatives from the USACE and ODEQ were present at the meeting. Public comments and the USACE's responses are discussed in the Responsiveness Summary, Section 3, of this DD. In addition, the USACE provided a summary presentation of the background and decision to the Port of Astoria and distributed several copies of the fact sheet and Proposed Plan to several Native American tribes and associated organizations. Pertinent documents supporting the decision are available for public viewing at the public information repository at the Astoria Public Library located at 450 10th Street, Astoria, Oregon.

2.6 Current and Potential Future Land and Water Use

This section describes the current and future land and water uses for the Tongue Point Project, with specific focus on the five DUs addressed in this DD.

2.6.1 Current Land and Water Use

The Project area and the five DUs, shown on **Figure 1**, comprise both onshore and offshore acreage. The land portion is situated within the flat-lying area on the banks of Cathlamet Bay within the Columbia River and is bordered by upland areas to the southwest, the prominent Tongue Point to the north, and Mill Creek to the south. The aquatic portion lies within Cathlamet Bay immediately surrounding the finger piers.

The Finger Piers area and adjacent Cathlamet Bay appear to be unproductive for resident fish and macroinvertebrates, as evidenced by their paucity during the RI. Fishing in Cathlamet Bay appears to target deeper upstream waters, and fishing is not typically conducted within the Finger Piers, which comprise the study area of this RI.

For the two terrestrial DUs, groundwater is classified as a potential source of potable water. However, groundwater is not used as a drinking water source and is not likely to be used for drinking water in the future because the water-bearing zones have limited yield and there is an existing supplied-water infrastructure (City of Astoria).

Industrial zones comprise the area south of Tongue Point to Hangar 2. The facilities include warehouse, fish processing, and equipment storage. Land south of Hangar 2 is zoned industrial, owned by Washington Development Company, and leased with an option to purchase by the Port of Astoria. The area consists of a multi-use transportation logistics and intermodal facility. This marine industrial facility provides berthage, storage, hangar, warehouse, and office rental space for marine, industrial, and light manufacturing companies. There are no residents living in the area south of Hangar 2. The aquatic DUs adjacent to the Finger Piers are leased from ODSL and used to support marine industrial activity associated with the terrestrial areas.

The southernmost portion of the Project area is owned by the ODSL and includes the Former Fire Training Area DU. The northwestern portion of the Former Fire Training Area DU is covered by a dredged materials pile that was placed in 2001, post-DoD activities. Unconsolidated fill from material dredged from the Columbia River underlies the aquatic DUs of the Project area. Land south of Hangar 2 area is paved, with the exception of a small strip of land along the waterfront and the unpaved Former Fire Training Area DU.

The Incinerator Building DU is on property owned by the U.S. Department of Labor and is associated with the Tongue Point Job Corps facility located further north. There is no activity at or adjacent to the Incinerator Building DU. Based upon the location on a steep slope adjacent to the railroad right of way, future land use is considered industrial, similar to the nearest land use activity.

2.6.2 Future Land and Water Use

The USACE expects the aquatic DUs, Incinerator Building DU, and the Former Fire Training Area DU to continue to be used as industrial and open space; future residential use is unlikely. Future drinking water would be provided by the City of Astoria. Based on available data and the current and expected future land use, no cleanup is required under CERCLA for these DUs. The DUs are expected to remain as industrial and open space; therefore, the USACE does not need to implement land use restrictions or other institutional controls to prevent future residential use.

The Tongue Point Project Area is an inactive facility with regard to DoD; however, several subsequent owners and tenants used the former Tongue Point NAS for a variety of governmental, commercial, and

educational uses. Access to the Tongue Point Project Area is controlled at a gatehouse as well as with perimeter security fencing and locked gates. The property in the southern portion of the Tongue Point Project Area, where the Former Fire Training Area and aquatic DUs are located, is owned by the ODSL. The Incinerator Building DU area is located on land owned by the U.S. Department of Labor Tongue Point Job Corps. The Project area is zoned S1, Marine Industrial Shorelands, by the City of Astoria. There are no residents living on or adjacent to the DUs in this DD or in the area south of Hangar 2. The existing and foreseeable future land use is expected to remain industrial based upon land ownership by the ODSL and the adjacent property (owned by the Washington Development Company) leased to the Port of Astoria for marine industrial use. The existing and foreseeable future land use of nearshore and aquatic DUs areas is assumed to support marine industrial or to be recreational based on the nearby presence of the Lewis and Clark National Wildlife Refuge.

2.7 Summary of Site Risk

The human health risk and ecological assessments in the RI (USACE 2012) evaluated potential threats to human health and ecological receptors associated with exposure to specific chemicals, for current and future anticipated conditions, and in the absence of any remedial action. The Project area was defined to include both upland source areas and aquatic areas that may have received releases from these source areas and/or from historical DoD operations.

The purpose of the cleanup decision process is to implement cleanup activities that eliminate, reduce, or control risks to human health and the environment. The human health risk and ecological assessments for the five DUs covered in this DD determined whether chemicals within each of the DUs posed risks that warranted action or potentially triggered cleanup. The risk assessments were consistent with USEPA guidance and generally followed State of Oregon guidance.

CERCLA provides a range of acceptable risk values to assess whether federal cleanup is necessary based on potential threats to human health. The USEPA established an acceptable excess cancer risk range, from 1 in 10,000 (or 10^{-4}) to 1 in 1,000,000 (or 10^{-6}) over a person's lifetime. An excess lifetime cancer risk of 1 in 10,000 indicates that an individual experiencing the reasonable maximum exposure estimate for current and future land use has a 1 in 10,000 chance of developing cancer because of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun.

Non-cancer human health effects are evaluated by comparing an exposure level over a specified period (e.g., lifetime) with a reference dose that represents a maximum level an individual may be exposed to without adverse effects. The USEPA (and ODEQ) established a non-cancer hazard index threshold of 1 to indicate that adverse non-cancer effects are unlikely.

Effects to ecological receptors are assessed using the hazard quotient (HQ) approach. This method is based on the ratio of an exposure concentration to an effects concentration. HQs greater than 1.0 (i.e., where the exposure concentration exceeds the effects concentration) indicate significant potential for adverse effects. HQs less than 1.0 are considered insignificant and adverse effects are unexpected. Higher HQs are not necessarily indicative of more severe effects, but instead, where confidence in toxicity reference values (TRVs) is equal, suggest a greater likelihood of adverse effects.

The DoD-related risks were compared to the USEPA acceptable risk levels by DU; these assessments are summarized in the following sections.

2.7.1 Human Health Risk Assessment Summary

The human health risk assessment provides a quantitative estimate of cancer risk and health hazards associated with exposure to chemicals of concern for the Project. Risk assessment methods and procedures used during the RI (USACE 2012) were consistent with ODEQ and CERCLA guidance. Cancer risks and non-cancer hazards for receptors at each DU are summarized in **Table 1**.

2.7.1.1 Incinerator Building DU

The ash found in the Incinerator Building DU is limited to residual ash in the firebox and chimney of the building, both of which are too small for a person to enter. The medium of concern for the DU is therefore soil. Receptors of concern for the Incinerator Building DU are current and future trespassers, future outdoor workers, and future construction workers. Exposure routes evaluated for all receptor groups include incidental ingestion of and dermal contact with soil and inhalation of fugitive dust. Dioxins/furans were the only chemical of potential concern. Considering all scenarios evaluated for current and future land use, excess cancer risk estimates fell within or below the USEPA target cancer risk range of 10^{-4} to 10^{-6} , and the non-cancer hazards were below the threshold of 1. Contaminants in soils are therefore not likely to cause adverse health effects for humans using this area.

The USACE found no actionable risk for the Incinerator Building DU attributable to past DoD practices, and existing conditions do not pose a health threat to current and future humans using the area.

2.7.1.2 Aquatic DUs

The media of concern for the aquatic DUs are surface water, sediment, and tissue. Receptors of concern for aquatic DUs are recreational users and anglers. Exposure routes evaluated for recreational users include incidental ingestion of and dermal contact with surface water and sediment. Anglers were evaluated for incidental ingestion of and dermal contact with surface water and sediment and ingestion of fish/shellfish.

Excess cancer risks for recreational users are below or within the USEPA target risk range of 10^{-4} to 10^{-6} , and non-cancer hazards are below the threshold of 1. These results indicate that recreational users of the shoreline are unlikely to experience exposure to site-related contaminants at a level of concern.

Cancer risks for anglers are equivalent to or exceed the upper bound of the USEPA target risk range primarily from consumption of fish as opposed to direct contact with sediment and surface water or consumption of shellfish. Cancer risks for anglers are at the upper bound of the USEPA target risk range at the North of the Pier 8 DU area and the Near Landfill DU area and were 2 in 10,000 (2×10^{-4}) in the Finger Piers DU area. Cancer risk is primarily from ingestion of arsenic in fish tissue. Non-cancer hazards in the Finger Piers DU exceed 1 and are related to ingestion of arsenic and dioxins/furans in fish tissue. Comparison of arsenic concentrations in fish tissue collected from the aquatic DUs to the reference area show that concentrations are similar (**Table 2**). These results indicate that risks associated with ingestion of arsenic in fish tissue are not a result of DoD activities in the area.

Contaminants in sediment from chemicals possibly released during DoD activities are not accessible because of overlying sediment that accumulated post-DoD, from 1962 to the present. This overlying layer of sediment separates any chemicals associated with DoD activities from organisms using or in contact with the near-surface sediment. In addition, Cathlamet Bay is a depositional environment with little or no potential for scouring to expose the DoD-era sediments. Dredging activities required to maintain the pier areas for existing commercial uses would not encounter the DoD-era sediments.

The USACE found no actionable risk for the aquatic DUs attributable to past DoD practices. Based on multiple lines of evidence, as presented in the RI report (USACE 2012), concentrations of CERCLA contaminants from DoD-era activity pose no actionable risk to humans using the aquatic DUs.

2.7.1.3 Former Fire Training Area DU

Media of concern for the Former Fire Training Area DU include subsurface soil, indoor air, groundwater, sediment, and surface water adjacent to the DU. For the Former Fire Training Area DU, evaluations did not include the surface soil because the DU is covered by dredged spoils that are unrelated to past activity of the DoD. Receptors of concern for this DU are future construction workers, future indoor workers, and current and future recreational users.

Future construction workers were evaluated for exposure to contaminants in subsurface soil via incidental ingestion of and dermal contact with soil and inhalation of dust and vapors. Cancer risks and hazards for future construction workers exposed to subsurface soil were below a level of concern. Construction workers were also evaluated for dermal contact with groundwater and inhalation of vapors emanating from groundwater. Total excess cancer risks for all exposure pathways were below the USEPA target cancer risk range of 10^{-6} , and non-cancer hazards were below the threshold of 1.

Risk-based conclusions for the vapor intrusion pathway (soil gas) indicate no risk to current land users because the concentrations were relatively low and no buildings or structures are currently present in the DU. Risks and hazards for future receptors were also below a level of concern. The vapor intrusion exposure pathway was evaluated for future indoor workers. Cancer risks were below the USEPA target cancer risk range of 10^{-4} to 10^{-6} , and non-cancer hazards were below the threshold of 1.

Groundwater beneath the Former Fire Training Area is not now, nor in the near future, a drinking water source because potable water in the area is provided by the City of Astoria. Although unlikely, future indoor workers were assumed to use site groundwater as drinking water. The total excess cancer risk estimate for indoor workers is within the USEPA target cancer risk range of 10^{-4} to 10^{-6} . Cancer risk from consumption of groundwater in this DU is primarily from ingestion of vinyl chloride and arsenic. The presence of vinyl chloride is most commonly related to the use of industrial solvents such as tetra- and trichloroethene. Both solvents degrade to vinyl chloride when oxygen concentrations are sufficiently low.

The occurrence of vinyl chloride is consistent with DoD fire training exercises; however, the origins of the vinyl chloride are not clear because of additional post-DoD activities of previous land users. Arsenic concentrations in groundwater are at background levels. Importantly, contaminants in groundwater are not accessible to humans given the current and likely future land use. In addition, based on the quantitative evaluation of the drinking water exposure pathway, contaminants in groundwater do not pose unacceptable human health risks even if they were to become accessible through foreseeable industrial future use of the DU.

Risk-based conclusions for the aquatic DUs adjacent to the Former Fire Training Area indicate that potential DoD-related chemicals at the Former Fire Training Area do not pose a threat to human health for people exposed to surface water or sediment adjacent to the Fire Training DU area of Cathlamet Bay.

The USACE found no actionable risk for the Former Fire Training Area DU attributable to past DoD practices, and existing conditions are protective of current and future humans using the area.

2.7.2 Ecological Risk Assessment Summary

The ecological risk assessment (ERA) provides an estimate of hazards associated with chemicals of ecological concern. The assessment methods and procedures used during the RI (USACE 2012) were consistent with ODEQ and CERCLA guidance. HQs for ecological receptors exposed to chemicals of ecological concern in sediment and surface water are presented by DU in **Table 3**. Biota Tissue HQs for aquatic DUs are shown on **Table 4**. Although biota tissue HQs in specimens collected from aquatic DUs may be higher than those of reference area, the values are the same order of magnitude and are not necessarily indicative of organisms being effected.

2.7.2.1 Incinerator Building DU

The medium of concern for the Incinerator Building DU is soil. However, the Incinerator Building DU is small (20 by 15 feet) and provides little or no suitable habitat for ecological receptors; thus, this DU was not evaluated further in the ERA. Consequently, the USACE expects little or no adverse ecological effects attributable to past DoD practices at the Incinerator Building DU.

2.7.2.2 Aquatic DUs

The aquatic area adjacent to Tongue Point has been highly altered by human activities. Concentrations for several chemicals are of potential ecological concern in sediment for certain organisms such as benthic invertebrates, aquatic life such as fish, water column invertebrates, and/or birds. However, existing concentrations of CERCLA contaminants within surface water and sediment in the near-surface biotic zone were observed to not be distinguishable from concentrations of CERCLA contaminants observed in surrounding areas not impacted by DoD activities or upstream in the Lower Columbia River (**Table 3**). In addition, and as noted above, chemicals that may have been released during DoD activities are currently not accessible to biota in the aquatic DUs because of post DoD sediment that has accumulated from 1962 to the present. This layer of sediment separates chemicals associated with DoD activities from the sediment near-surface biotic zone. The total accumulated sediment thickness overlying the DoD-era sediments is estimated at approximately 10 feet. There is little or no potential for scouring to expose the DoD-era sediments, and commercial dredging activities would not encounter the DoD-era sediments. In addition, concentrations and HQs for bioaccumulative chemicals of ecological concern in fish and clam tissue collected in the aquatic DUs are generally similar to and often lower than concentrations and HQs for the reference area (**Table 4**). This similarity of HQs for DUs and reference location indicates that adverse effects to the survival, growth, or reproduction of piscivorous/water-dependent birds and mammals related to DoD activities are unlikely. Adverse ecological effects related to DoD activities are therefore unlikely.

The USACE studies found no actionable threat to the aquatic DUs attributable to past DoD practices. Based on multiple lines of evidence, as presented in the RI report (USACE 2012), concentrations of CERCLA contaminants from DoD-era activity pose no actionable effect to ecological receptors using the aquatic DUs.

2.7.2.3 Former Fire Training Area DU

The Former Fire Training Area DU is disturbed, primarily because of the placement of dredged materials and dominance of vegetation associated with poor quality habitat. Nevertheless, ecological receptors tolerant of disturbed conditions have potential to use this area at least intermittently. For the Former Fire Training Area DU, evaluations did not include assessment of exposure to surface soil because the DU is covered by dredged spoils that are unrelated to past activity of the DoD. Exposures to chemicals of ecological concern in surface water and nearshore sediment were evaluated for ecological receptors by

comparing mean concentrations in each media to ODEQ screening levels. Although HQs for some chemicals of ecological concern in sediment and surface water exceed the threshold of 1, results are not significantly different than for the reference area. Thus, the USACE expects little or no adverse ecological effects attributable to past DoD practices.

2.7.3 Site Risk Conclusions

Petroleum compounds, SVOCs/PAHs, VOCs, metals, dioxin/furans, pesticides, and PCBs were detected in several samples in various media. However, based on the human health risk and ecological assessments, the USACE found no actionable human health or ecological effects attributable to past DoD activities at the three aquatic DUs (i.e., Aquatic North of Pier 8 Area, Aquatic Finger Pier Area, and Aquatic Near Landfill Area), the Incinerator Building DU, or the Former Fire Training Area DU. Results from the RI and expected land use show that no cleanup is required for the three aquatic DUs, the Incinerator Building DU, and Former Fire Training Area DU. The current land use of each area is expected to continue into the foreseeable future, which is that these DUs will remain in industrial and open space use; therefore, land use restrictions or other institutional controls to prevent future residential use are not needed.

2.8 Documentation of Significant Changes

The Proposed Plan detailing the No Action recommendation for the three aquatic DUs, the Incinerator Building DU, and the Former Fire Training Area DU was released for public comment on May 26, 2016. No comments were received from the public during the comment period. Therefore, no significant changes to the proposed No Action recommendation were necessary.

Section 3

Responsive Summary

3.1 Stakeholder Issues and Lead Agency Responses

The USACE placed a public notice in *The Daily Astorian* soliciting comments on the no action Proposed Plan for the five DUs at the Project. The notice was published for 4 days (May 26, 27, 30, and 31, 2016), and a public comment period was open from June 1 through July 8, 2016. In addition, the USACE sponsored a public meeting on June 29, 2016 in Astoria, Oregon to present the Proposed Plan, including a summary of the investigation and risk assessment results and to accept public comments. A transcript of the meeting is available in the Administrative Record file at the USACE Kansas City District office and in the Public Information Repository at the Astoria Public Library. Only one member of the public attended the meeting. No comments were received during the public comment period or at the public meeting. Consequently, no changes were made to the no action Proposed Plan that will be implemented with approval of this no action DD.

Oregon Department of Environmental Quality concurs with the USACE's proposal of no action at the former Tongue Point NAS for the five DUs addressed by this DD: the Incinerator Building DU, Former Fire Training Area DU, Aquatic DU – North of Pier 8, Aquatic DU – Finger Piers, and Aquatic DU – Near Landfill. ODEQ takes exception to some procedures used in the risk assessments. However, ODEQ agrees that since no substantial contamination was identified in the areas of investigation, the threat of unacceptable risk from any undiscovered DoD-related contamination is likely low.

3.2 Technical and Legal Issues

No technical or legal issues were identified during the public review period of the Proposed Plan.

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Section 4

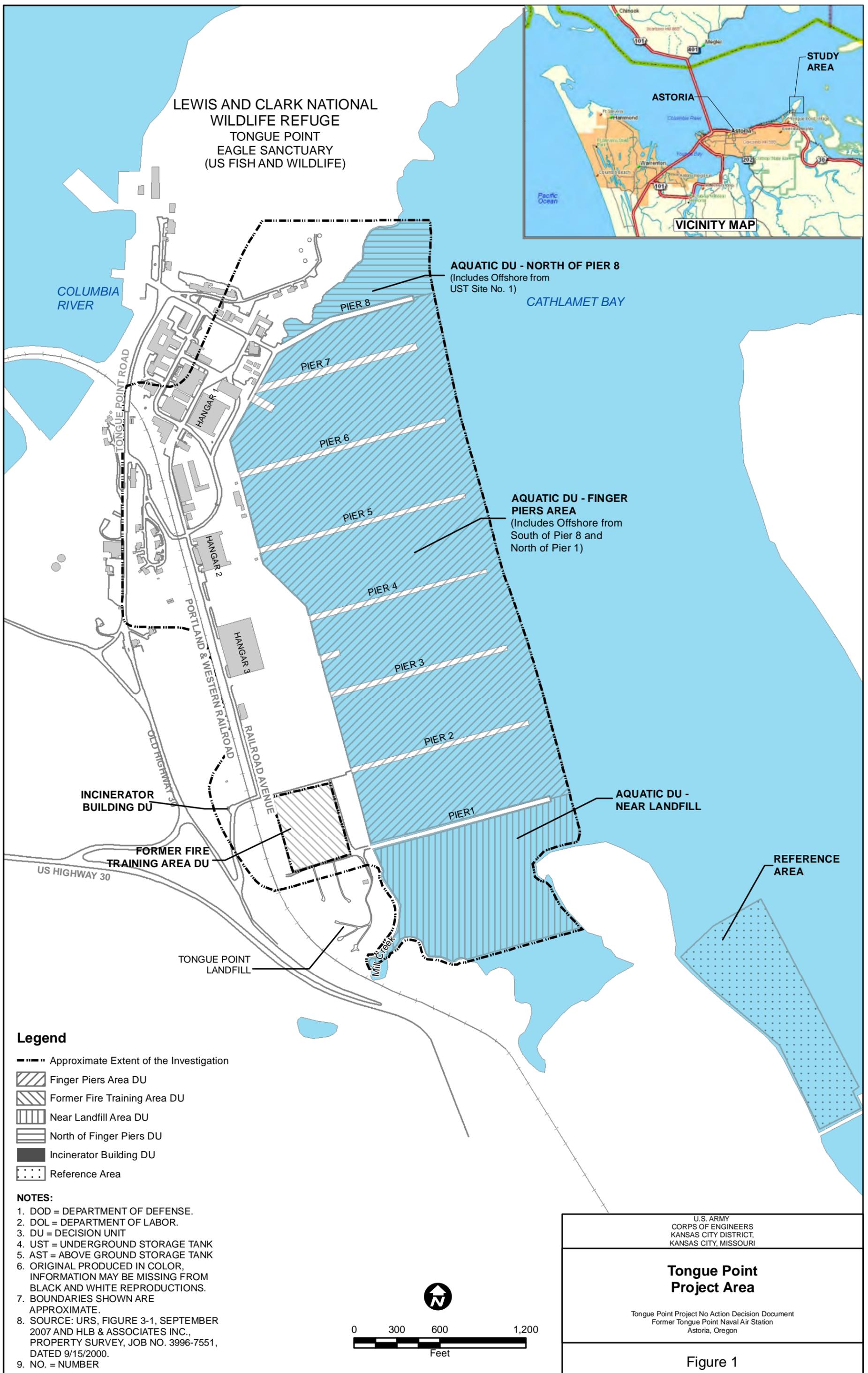
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Figures

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Tables

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Table 1
Summary of Cancer Risk and Noncancer Hazards
CERCLA Methods
Tongue Point Multi-Sites Project, Astoria, Oregon

Decision Unit	Scenario Timeframe	Exposure Scenario	Excess Cancer Risk	Hazard Index	Risk Contributor			Comment
					COPC	Cancer Risk	Noncancer Hazard	
Incinerator Building	Current/Future	Trespasser, Adolescent	2E-08	0.002				
	Future	Outdoor Worker	7E-07	0.02				
		Construction Worker	4E-08	0.02				
Fire Training Area	Current/Future	Recreational User, Adult	4E-07	0.003				
		Recreational User, Adolescent	2E-06	0.04				
	Future	Indoor Worker	7E-05	0.5	Vinyl chloride	3.E-05	0.04	Risk is associated with use of shallow groundwater as drinking water which is highly unlikely
		Construction Worker	8E-07	0.4	Arsenic	3.E-05	0.2	
Aquatic North of Pier 8 Area	Current/Future	Recreational User, Adult	5E-07	0.003				
		Recreational User, Adolescent	2E-06	0.04				
		Angler	1E-04	1	Arsenic (Fish fillet)	1.E-04	0.8	Arsenic concentrations in fish fillet similar to reference area
Aquatic Finger Pier Area	Current/Future	Recreational User, Adult	4E-07	0.002				
		Recreational User, Adolescent	1E-06	0.03				
		Angler	2E-04	Hazard Index (HI) by target organ/effect: Development HI = 2 Nervous system HI = 1 Lung HI = 1 Cardiovascular system HI = 1 Skin HI = 1	Arsenic (Fish fillet)	2.E-04	1	Arsenic concentrations in fish fillet similar to reference area
					Dioxin/Furan TEQ (fish Fillet)	2.E-05	0.6	Dioxin/furan concentrations in fish fillet similar to reference area
Aquatic Near Landfill Area	Current/Future	Recreational User, Adult	4E-07	0.002				
		Recreational User, Adolescent	1E-06	0.03				
		Angler	1E-04	1	Arsenic (Fish fillet)	1.E-04	0.6	Arsenic concentrations in fish fillet similar to reference area
					Dioxin/Furan TEQ (fish Fillet)	1.E-05	0.2	Dioxin/furan concentrations in fish fillet similar to reference area

Notes:

Bolded chemicals exceed CERCLA or ODEQ target risk thresholds.

Table 2**Comparison of Aquatic Decision Unit Fish and Sediment Data to Reference and Background Levels
Tongue Point Multi-Sites Project, Astoria, Oregon**

Chemical of Potential Concern	North of Pier 8	Finger Piers	Near Landfill	Reference Area	Background Concentration
					ODEQ ⁽¹⁾
Prickly Sculpin Fillet Concentration⁽²⁾					
2,3,7,8-TCDD TEQ (ng/kg)	NC	2.295	0.969	NC	NA
Arsenic (mg/kg)	0.95	1.31	0.8	0.88	NA
Mean Sediment Concentration⁽²⁾					
2,3,7,8-TCDD TEQ (ng/kg)	No Data	No Data	0.54	0.96	NA
Arsenic (mg/kg)	7	5	6	5	7

Notes:

(1) ODEQ Regional Default Background Concentrations for Soil/Sediment

(2) All units in mg/kg wet weight unless otherwise noted.

NC = Not Calculated; COPC not detected in media type at location noted; or in historical results not detected at reporting limits

NA - value not available

No Data = Analyte not analyzed in medium or at location noted

mg/kg = milligrams per kilogram

ng/kg = nanogram per kilogram

Table 3
Summary of Sediment and Surface Water Hazard Quotients for Ecological Receptors
Tongue Point Multi-Sites Project, Astoria, Oregon

Sediment Hazard Quotients for Ecological Receptors

LEVEL I/II CPEC	Mean SED Conc					SLV Freshwater SED	Freshwater SLV HQ				
	FTA	NP8	FP	LF	Reference		FTA	NP8	FP	LF	Reference
Semi-Volatile Organic Compounds (µg/kg)											
Benzo(a)anthracene					6.24	32					0.2
Benzo(a)pyrene		18.93			8.53	32		0.6			0.3
Benzo(k)fluoranthene					3.77	27					0.1
Chrysene					10.34	57					0.2
Dibenzo(a,h)anthracene		3.29			1.46	33		0.1			0.0
Fluoranthene					12.20	111					0.1
Indeno(1,2,3-cd)pyrene	22	15.99	15.71		8.39	17	1.3	0.9	0.9		0.5
Phenanthrene				13.0	5.36	42				0.3	0.1
Pyrene			30.71	28.0	14.14	53			0.6	0.5	0.3
Dioxin/Furan (TEQ, ng/kg)											
Dioxins/Furans TEQ for mammals				5.4E-07	9.6E-07	9.0E-03				0.000060	0.00011
Pesticides/Polychlorinated Biphenyls (µg/kg)											
4,4'-DDE			0.98		0.54	1.5			0.7		0.4
4,4'-DDT					0.43	4					0.1
Total DDT	2.14		2.04	1.52	1.06	7	0.3		0.3	0.2	0.2
gamma-BHC (Lindane)					ND	0.9					
Heptachlor				0.58	ND	10				0.1	
Heptachlor epoxide			0.37		ND	0.6			0.6		
Aroclor-1254	13.45		3.2	4.0	ND	7	1.9		0.5	0.6	
Inorganics (mg/kg)											
Arsenic	6.04	7.47	5.34	5.54	4.95	6	1.0	1.2	0.9	0.9	0.8
Barium	97.55	76.07	77.7	82.7	84.96	48	2.0	1.6	1.6	1.7	1.8
Cadmium	0.67	0.35	0.42	0.39	0.30	0.6	1.1	0.6	0.7	0.7	0.5
Copper	55.1	37.89	33.1		29.47	36	1.5	1.1	0.9		0.8
Lead	17.6	11.51	10.1	10.6	7.80	35	0.5	0.3	0.3	0.3	0.2
Mercury	0.11	0.07	0.10	0.07	0.06	0.2	0.6	0.4	0.5	0.4	0.3
Nickel	19.75	14.17	15.2	13.8	12.5	18	1.1	0.8	0.8	0.8	0.7
Selenium	0.8				0.45	1	0.8				0.5
Vanadium	70.25	63.83	66.0		53.41	no SLV					
Zinc	98.2					123	0.8				

Surface Water Hazard Quotients for Ecological Receptors

LEVEL I/II CPEC	Mean SW Conc mg/L					SLV Aq. Life (mg/L)	Aquatic Life HQ				
	FTA	NP8	FP	LF	Reference		FTA	NP8	FP	LF	Reference
Inorganics (mg/L)											
Barium	0.0272	0.0271	0.0291	0.0263	0.0255	0.004	6.8	6.8	7.3	6.6	6.4

Notes:

DUs:

FTA = Fire Training Area

NP8 = North of Pier 8

FP = Finger Piers

LF = Near Landfill

CPEC = chemical of potential ecological concern

HQ = Mean Conc / SLV

SLV = screening level values

Freshwater Sediment SLV (ODEQ 2001)

SLV Aq.= Aquatic Life Screening Level (ODEQ 2001)

mg/kg = milligrams per kilogram

µg/kg - micrograms per kilogram

mg/L - milligrams per liter

Reference:

Oregon Department of Environmental Quality (ODEQ).2001. *Guidance for Ecological Risk Assessment, Final*. Waste Management and Cleanup Division, Cleanup Policy and Program Development Section. Updated version, December 2001.

Table 4
Biota Tissue Hazard Quotients for Ecological Receptors
Tongue Point Multi-Sites Project, Astoria, Oregon

LEVEL I/II CPEC	Mean Whole Body Forage Fish mg/kg ww				CTL mg/kg ww	CTL HQ			
	Near LF	NP8	FP	Reference		Near LF	NP8	FP	Reference
Dioxin/Furan									
Dioxins/Furans TEQ - mammal	NC	5.9E-07	8.8E-06	3.3E-07	6.4E-06	-	0.1	1.4	0.1
Dioxins/Furans TEQ - bird	NC	1.6E-06	1.2E-06	1.1E-06	6.4E-06	-	0.2	0.2	0.2
Pesticides/Polychlorinated Biphenyls									
Total DDT	0.0214	0.1058	0.0196	0.0222	0.054	0.4	2.0	0.4	0.4
Inorganics									
Arsenic	1.62	2.09	1.69	1.25	6.6	0.2	0.3	0.3	0.2
Chromium	0.43	0.53	0.26	0.47	No CTL	-	-	-	-
Lead	0.374	0.604	0.325	0.27	0.120	3.1	5.0	2.7	2.3
Mercury	0.370	0.145	0.238	0.303	0.088	4.2	1.6	2.7	3.4
Selenium	2.0	1.9	2.2	2.6	0.024	83	79	92	108

LEVEL I/II CPEC	Mean Soft Tissue Clam mg/kg ww				CTL mg/kg ww	CTL HQ			
	Near LF	NP8	FP	Reference		Near LF	NP8	FP	Reference
Dioxin/Furan									
Dioxins/Furans TEQ - mammal	3.7E-07	3.0E-06	No Data	NC	6.4E-06	0.1	0.5	-	-
Dioxins/Furans TEQ - bird	7.2E-07	1E-05	No Data	NC	6.4E-06	0.1	1.6	-	-
Pesticides/Polychlorinated Biphenyls									
Total DDT	0.0114	0.0140	0.0119	0.00614	0.054	0.2	0.3	0.2	0.1
Inorganics									
Arsenic	6.13	11.1	6.09	4.9	6.6	0.9	1.7	0.9	0.7
Chromium	1.96	2.46	2.52	4.25	No CTL	-	-	-	-
Lead	0.911	0.229	0.873	1.87	0.12	7.6	1.9	7.3	16
Mercury	0.089	0.062	0.055	0.066	0.09	1.0	0.7	0.6	0.8
Selenium	2.4	2.7	3.4	3.2	0.024	100	113	142	133

Notes:

DUs:

LF = Near Landfill

NP8 = North Pier 8

FP = Finger Piers

mg/kg = milligrams per kilogram

ww = wet weight

CPEC = chemical of potential ecological concern

CTL = Critical Tissue Level, freshwater, ODEQ 2007

DDT = dichlorodiphenyltrichloroethane CTL for total DDT assumed equal to CTL for DDD, DDE, and DDT (all 0.054 mg/kg ww)

HQ = Mean Conc / CTL

NC = Not Calculated; CPEC not detected in media type at location noted; or in historic results not detected at reporting limits.

No Data = Analyte not analyzed in medium or at location noted

TEQ = toxicity equivalent

Chromium in biota not assessed quantitatively because no CTL provided by ODEQ

Reference:

Oregon Department of Environmental Quality (ODEQ). 2007. *Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment*. Final, 07-LQ-023A. January 31, 2007, updated April 3, 2007.