



**UNITED STATES ARMY CORPS OF ENGINEERS  
KANSAS CITY DISTRICT**

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**FINAL**

**THIRD FIVE-YEAR REVIEW REPORT  
OLD NAVY DUMP/MANCHESTER ANNEX**

FUDS No. F10WA011902

EPA ID: WA8680030931

*Manchester, Washington*

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September 2014

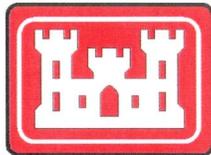
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**FINAL**

**THIRD FIVE-YEAR REVIEW REPORT**  
**OLD NAVY DUMP/ MANCHESTER ANNEX**



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*September 2014*

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## *Executive Summary*

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### **Purpose for the Five-year Review**

This report is the Third Five-Year Review (FYR) for the Old Navy Dump/Manchester Annex Site in Manchester, Washington. Under the Defense Environmental Restoration Act, the United States Army Corps of Engineers (USACE) is responsible for cleanup actions at Formerly Used Defense Sites (FUDS) on behalf of the U.S. Department of Defense.

The purpose of this FYR is to determine whether the remedial action implemented at the Old Navy Dump/Manchester Annex Site (Site) is functioning as designed, and continues to be protective of human health and the environment. Hazardous substances remain on-site above the risk-based levels determined in the 1997 Record of Decision (ROD) for the Site, thereby preventing long-term unlimited use and unrestricted exposure. Consequently, the Comprehensive Environmental Response, Compensation, and Liability Act, Section 121 and the National Contingency Plan (40 Code of Federal Regulations 300) requires five-year reviews be conducted to evaluate the performance of the Site to determine if the remedy continues to be protective of human health and the environment.

The methods, findings, and conclusions of the review are documented in this report. In addition, this report discusses issues or concerns identified during the review and includes recommendations and follow-up actions.

### **Triggering Action for the Review**

The triggering action for this review is the signature date of the second five-year review, September 25, 2009.

### **Site Location and Contaminants**

The site is located on the western shore of Clam Bay, about one mile north of Manchester, Washington. The Site was historically owned by the U.S. Navy and consisted of a Former Fire Training Area (FFTA), a landfill, and a former submarine net and boat depot (the Net Depot). The activities in these areas resulted in various types of contamination. Former Fire Training Area activities resulted in contamination of the soil with dioxins and petroleum hydrocarbons. Landfill activities contaminated soils and sediments with dioxins and furans, polychlorinated biphenyls (PCBs), metals, vinyl chloride, and asbestos. Upland sources from the Landfill area resulted in sediment contamination in Clam Bay. Although activities at the Net Depot resulted in low-level metal contamination in the soil and seeps nearby, the potential health risks were determined to be minimal, and consequently, no cleanup measures were proposed for that facility.

## **Remedial Actions**

The selected remedy to achieve the remedial action objectives included the following elements: a landfill cap; a shoreline protection system; a thin-layer sediment cap in the intertidal area of Clam Bay; and removal of contaminated soil and structures in the Former Fire Training Area. In addition, a restriction on subsistence-level shellfish harvesting was put into place until it can be determined that the shellfish are safe for consumption.

## **Remedy Protectiveness and Future Actions**

The remedy at the Old Navy Dump/ Manchester Annex Site is protective of human health and the environment.

The remedial action construction is complete and the remedy is functioning as intended. Exposure pathways that would result in unacceptable risks are being controlled by institutional controls. The landfill cap and the shoreline protection system are functioning as intended and the former fire training area has met the cleanup requirements.

The next Five-Year Review for the Old Navy Dump/ Manchester Annex Site will cover the time period from October 2014 through September 2019.

*Table of Contents*

---

- List of Tables..... i**
- List of Figures..... i**
- List of Appendices..... i**
- Acronyms and Abbreviations .....iii**
- Five-Year Review Summary Form..... v**
  
- 1.0 Introduction ..... 1-1**
- 2.0 Site Chronology..... 2-1**
- 3.0 Site Background..... 3-1**
  - 3.1 Physical Characteristics..... 3-1
  - 3.2 Land and Resource Use..... 3-1
  - 3.3 History of Contamination ..... 3-2
  - 3.4 Initial response ..... 3-2
  - 3.5 Basis for Taking Remedial Action ..... 3-2
- 4.0 Remedial Actions ..... 4-1**
  - 4.1 Remedial action objectives..... 4-1
  - 4.2 Remedy description..... 4-4
    - 4.2.1 Landfill Area and Clam Bay Sediments..... 4-4
    - 4.2.2 Former Fire Training Area..... 4-4
    - 4.2.3 Institutional Controls ..... 4-4
  - 4.3 Remedy implementation..... 4-5
    - 4.3.1 Landfill and Clam Bay Sediments ..... 4-5
    - 4.3.2 Former Fire Training Area..... 4-7
    - 4.3.3 Compliance Monitoring Plan ..... 4-7
    - 4.3.4 Institutional Controls ..... 4-8
  - 4.4 Inspection and Maintenance..... 4-10
    - 4.4.1 Landfill Cap & Hydraulic Cutoff System (including vents, drainage, and roads) 4-10
    - 4.4.2 Shoreline Protection System..... 4-12
    - 4.4.3 Systems operations/I&M operational summary ..... 4-12
    - 4.4.4 Summary of costs of system operations/O&M effectiveness ..... 4-13
- 5.0 Progress Since the Last Five-Year Review..... 5-1**
  - 5.1 Protectiveness statements from last review ..... 5-1
  - 5.2 Status of recommendations and follow-up actions from last review ..... 5-1
- 6.0 Five-Year Review Process ..... 6-1**
  - 6.1 Administrative Components..... 6-1
  - 6.2 Community Involvement ..... 6-1
  - 6.3 Document review ..... 6-1

---

6.4	Data Review .....	6-1
6.4.1	Clam Tissue Sampling .....	6-1
6.4.2	Sediment Sampling.....	6-3
6.4.3	Porewater Sampling.....	6-3
6.5	Site Inspection .....	6-4
6.6	Interviews .....	6-4
6.7	EPA and Suquamish Tribe Review, Comment, and Response .....	6-5
<b>7.0</b>	<b>Technical Assessment.....</b>	<b>7-1</b>
7.1	Question A: Is the remedy functioning as intended by the decision documents? ....	7-1
7.1.1	Landfill Cap, Hydraulic Cutoff System, and Shoreline Protection System.....	7-1
7.1.2	Former Fire Training Area.....	7-2
7.2	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? .....	7-2
7.2.1	Changes in Applicable and Relevant and Appropriate Requirements and To Be Considered Criteria.....	7-3
7.2.2	Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics	7-6
7.3	Question C: Has any other information come to light that could call into question the protectiveness of the remedy? .....	7-8
7.4	Technical Assessment Summary.....	7-8
<b>8.0</b>	<b>Issues.....</b>	<b>8-1</b>
<b>9.0</b>	<b>Recommendations and Follow-up Actions.....</b>	<b>9-1</b>
<b>10.0</b>	<b>Protectiveness Statements.....</b>	<b>10-1</b>
<b>11.0</b>	<b>Next Review .....</b>	<b>11-1</b>
<b>12.0</b>	<b>References.....</b>	<b>12-1</b>

## List of Tables

---

Table 1. Chronology of Site Events .....	2-1
Table 2. Chemicals of concern .....	3-3
Table 3. Summary of Cumulative Baseline Cancer Risks and Hazard Indices .....	3-4
Table 4. Summary of Manchester Annex Site Cleanup Levels and Goals .....	4-3
Table 5 Summary of I&M costs .....	4-13
Table 6. Changes in Chemical-Specific Requirements.....	7-3
Table 7. Changes in Action-Specific Requirements.....	7-4
Table 8. Toxicity Values for COCs .....	7-6
Table 9. Issues.....	8-1
Table 10. Recommendations and Follow-up Actions.....	9-1

## List of Figures

---

Figure 1. Site map and vicinity map
Figure 2. Clam tissue sampling locations from 2010 sampling event.
Figure 3. Sediment and clam tissue sampling locations and results for August 2013 sample event.
Figure 4. Box Plot for PCB Clam Tissue
Figure 5. Sediment PCB Concentration VS Clam Tissue PCB Concentration from Feasibility Study
Figure 6. PCB in Clam Tissue Vs PCB in Sediments with data from 2013 sampling event

## List of Appendices

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Appendix A. Site Inspection Checklist
Appendix B. Interview Records
Appendix C. Site Inspection Photos
Appendix D. Third Five-Year Review News Release
Appendix E. PA and Suquamish Tribe Review, Comment, and Response

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## Acronyms and Abbreviations

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ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CG	Cleanup Goal
CGI	Combustible Gas Indicator
CL	Cleanup Level
CLARC	Cleanup Level and Risk Calculations
CMP	Compliance Monitoring Plan
CO	Cleanout
COPCs	Chemical of Potential Concern
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
FFTA	Former Fire Training Area
FS	Feasibility Study
FUDS	Formerly Used Defense Sites
FYR	Five-Year Review
HRS	Hazard Ranking Score
I&M	Inspection and Maintenance
IAG	Interagency Agreement
ICP	Institutional Control Plan
LEL	Lower Explosive Limit
MFS	Minimum Functional Standards
MTCA	Model Toxics Control Act
NCP	National Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NWFSC	Northwest Fisheries Science Center
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated biphenyl
PSD	Perimeter Surface Ditch
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SDS	Swale Drainage System
SPLP	Synthetic Precipitation Leaching Procedure
SQS	Sediment Quality Standards
SWQS	Surface Water Quality Standards
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons

TPP	Technical Project Planning
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USC	United States Code
UST	Underground Storage Tank
UU/UE	Unlimited Use/ Unrestricted Exposure
WAC	Washington Administrative Code
WDOH	Washington State Department of Health
WHO	World Health Organization

## Five-Year Review Summary Form

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SITE IDENTIFICATION		
<b>Site Name:</b> Old Navy Dump/ Manchester Annex Site		
<b>FUDS ID:</b> F10WA011902 <b>EPA ID:</b> WA8680030931		
<b>Region:</b> 10	<b>State:</b> WA	<b>City/County:</b> Manchester, Kitsap County
SITE STATUS		
<b>NPL Status:</b> Final		
<b>Multiple OUs?</b> No	<b>Has the site achieved construction completion?</b> Yes	
REVIEW STATUS		
<b>Lead agency:</b> Other Federal Agency If "Other Federal Agency" was selected above, enter Agency name: U.S. Army Corps of Engineers		
<b>Author name (Federal or State Project Manager):</b> Mirek Towster		
<b>Author affiliation:</b> U.S. Army Corps of Engineers		
<b>Review period:</b> 11/20/2013 – 9/25/2014		
<b>Date of site inspection:</b> 02/24/2014		
<b>Type of review:</b> Statutory		
<b>Review number:</b> 3		
<b>Triggering action date:</b> 9/25/2009		
<b>Due date (five years after triggering action date):</b> 9/25/2014		

## Five-Year Review Summary Form (continued)

Issues/Recommendations				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): N/A	<b>Issue Category: Remedy Performance</b>			
	<b>Issue:</b> Shellfish consumption rates used in the human health risk assessment were from other tribes in Puget Sound. The Suquamish Tribe has since identified shellfish consumption rates which may affect calculated site risks.			
	<b>Recommendation:</b> Reassess risk looking at all exposure assumptions from original risk assessment.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	No	Federal Facility	EPA	September 2016

Sitewide Protectiveness Statement	
<i>For sites that have achieved construction completion, enter a site-wide protectiveness determination and statement.</i>	
<i>Protectiveness Determination:</i> Protective	<i>Addendum Due Date (if applicable):</i> Click here to enter date.
<i>Protectiveness Statement:</i> The remedy at Old Navy Dump/ Manchester Annex Site is protective of human health and the environment.  The remedial action construction is complete and the remedy is functioning as intended. Exposure pathways that would result in unacceptable risks are being controlled by institutional controls. The landfill cap and the shoreline protection system are functioning as intended and the former fire training area has met the cleanup requirements.	

## 1.0 Introduction

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This report presents the Third Five-Year Review for the Formerly Used Defense Site (FUDS) known as the Old Navy Dump/ Manchester Annex Site (Site) near Manchester, Washington. The review is conducted in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Pollution Contingency Plan (NCP).

The United States Army Corps of Engineers (USACE), Kansas City and Seattle Districts, have conducted the third five-year review of the remedial actions implemented at the Site in Manchester, Washington (FUDS No. F10WA011902). The Site, is considered one operable unit (OU) and consisted of a Former Fire Training Area (FFTA), a landfill, a former submarine net and boat depot (the Net Depot), and adjacent marine sediments in Clam Bay.

Executive Order 12580 delegates CERCLA authority to the U.S. Department of Defense as the lead agency. Under authorization of the U.S. Department of Defense, the U.S. Army Corps of Engineers (USACE) is the lead agency and the Northwestern Division, Kansas City District is responsible for design, implementation, and maintenance of remedial actions at the Site. The U.S. Environmental Protection Agency (EPA) is a support agency responsible for reviewing site activities, reviewing reports, and concurring with the remedy selections at the Site.

The USACE is preparing this Five-Year Review report pursuant to the CERCLA § 121 and the National Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300). CERCLA § 121(c) states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The agency interpreted this requirement further in the NCP; 40 CFR 300.430(f)(4)(ii):

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

Because hazardous substances have been placed in the on-site landfill that prevents unlimited use and unrestricted exposure (UU/UE), five-year reviews are required to be performed. The purpose of this Third Five-Year Review is to evaluate the performance of the Site to determine if the remedy continues to be protective of human health and the environment. The methods, findings, and conclusions of this Five-Year Review are documented in this report. In addition, this report identifies any issues encountered since the Second Five-Year Review and the recommendations to address them. This review was conducted from November 2013 through September 2014.

The United States Army Corps of Engineers has conducted two five-year reviews of the remedial actions implemented at the Site in Manchester, Kitsap County, Washington. This is the third five-year review for the Site. The triggering action for this review is the signature date previous five-year review: September 25, 2009.

## 2.0 Site Chronology

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Table 1 provides a chronological list of important site events and relevant dates.

**Table 1. Chronology of Site Events**

Event	Date
U.S. Army establishes ownership of site	1898
Ownership of site is transferred to U.S. Navy	1919
State of Washington, EPA , and National Oceanic and Atmospheric Administration (NOAA) acquire portions of the property	1970s
Discovery of site	March 1, 1987
Preliminary Assessment	March 25, 1988
Hazard Ranking Score (HRS) Package complete	October 29, 1993
Final listing on National Priorities List (NPL)	May 31, 1994
Remedial Investigation (RI)/ Feasibility Study (FS)	October 1994 to December 1996
Interagency Agreement (IAG) negotiations and final agreement	July 6, 1997 to July 30, 1997
Record of Decision (ROD) signed	September 30, 1997
Non-time-critical removal action (concrete simulator structures, underground piping, and petroleum-contaminated soil at the FFTA)	June 8, 1998 to September 29, 1998
Compliance Monitoring Plan finalized	April 1999
Remedial Design	November 18, 1997 to June 22, 1999
Remedial Action –Construction dates (start and finish)	June 1999 to October 2001
Technical Specification for Phase II Construction	June 2001
Inspection and Maintenance Manual	January 2002
Preliminary close-out report	September 30, 2002
First Five-Year Review report signed.	September 29, 2004
Remedial Action Report	March 8, 2005
Second Five-Year Review report signed.	September 25, 2009
Engineering Review performed by USACE	2010
Institutional Control Plan Final	February 2011
Maintenance to Landfill Cap and Shoreline Work	October to December 2011
Institutional Control Plan Revised	March 2012
Repair to damaged shoreline protection system	September 2012
Addendum to Second Five-Year Report Finalized	March 2013
Revised Inspection and Maintenance Manual	January 2014

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## 3.0 *Site Background*

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### 3.1 *Physical Characteristics*

The Site, located approximately one mile north of Manchester, Washington, is situated on the western shore of Clam Bay in Puget Sound (see Figure 1). Clam Bay is a sensitive marine estuary, used primarily by recreational shellfishers. Threatened and endangered species have been observed in the area. There is a wetland on the southwestern edge of the landfill that is mostly within the boundaries of Manchester State Park.

### 3.2 *Land and Resource Use*

The U.S. Army established ownership of the Site in 1898, and then transferred ownership to the U.S. Navy in 1919. The Navy used the Site for submarine net and boat construction and maintenance, firefighting training, and waste disposal of on-site waste and waste generated from the Puget Sound Naval Shipyard in Bremerton, Washington. As shown on Figure 1, the landfill area is bordered to the north by the former Net Depot, to the south by the former fire training area (FFTA), to the west by Manchester State Park, and to the east by Clam Bay.

In the 1970s, the EPA and National Oceanographic and Atmospheric Administration (NOAA) acquired parts of the property and currently operate an analytical laboratory and a fisheries research laboratory, respectively. As of 2000, approximately 100 employees were employed at the laboratories. The EPA's property encompasses the northern 17.5 acres of the Site. The EPA Manchester Laboratory, an associated concrete parking pad, and other facilities occupy the northern-most five acres of the EPA property, which is the location of the former Net Depot. The landfill is located within the central 12.5 acres of the Site and a small portion of the northwestern corner of the landfill area extends onto Manchester State Park property. The former Navy Fire Training School was situated on the southern 22.5 acres of the Site, and is currently occupied by the Northwest Fisheries Science Center, NOAA.

By virtue of the Treaty of Point Elliott, the Suquamish Tribe's right to fish and interests in their habitat were recognized to include the marine waters of Puget Sound. Tribal members engage in subsistence, ceremonial, and commercial harvesting of a wide variety of marine resources throughout the federally adjudicated "usual and accustomed" fishing grounds. The Site is within Suquamish exclusive usual and accustomed fishing grounds. Intertidal bivalves (specifically clams) have been identified as the resource of concern, at this site.

Future use of the Site assumes continued operation of the laboratories, and subsistence-level shellfish harvesting by the Suquamish Tribe once the polychlorinated biphenyl (PCB) levels in shellfish tissue reach subsistence gathering levels.

### ***3.3 History of Contamination***

When the Navy owned the Site, the primary activities were submarine net construction and maintenance, fire fighting training, and waste disposal. The Net Depot operated from the 1940s to the 1950s and included additional operations such as sand blasting, painting, and machining. The fire training area was used to train Navy personnel on procedures for extinguishing ship fires. Diesel, gasoline, and waste oil were used in fire training exercises and stored in underground storage tanks (USTs). The use and burning of fuel resulted in soil contaminated primarily with polychlorinated dioxins and furans (hereafter called dioxin) and total petroleum hydrocarbons (TPH).

From roughly 1946 to 1962, the Navy formed the landfill by using the tidal lagoon area between the Net Depot and the fire training area to dispose of approximately 70,000 cubic yards of demolition debris. The landfill soil was contaminated with dioxins, PCBs, metals, vinyl chloride, and asbestos. Over time, waste from the southeastern landfill edge eroded into Clam Bay and subsequently contaminated the water, sediment, and shellfish with PCBs, metals, and polycyclic aromatic hydrocarbons (PAHs). Currently, the landfill occupies roughly six acres, has an average debris thickness of six feet, and has an engineered cover that is approximately four feet thick.

### ***3.4 Initial response***

As an initial response measure to minimize contact with landfill waste, the Navy placed a one-foot thick soil cap over the landfill in the late 1950s/early 1960s. Further investigation into site contamination, however, was not formally conducted until 1987. Between 1987 and 1994, several investigations and a UST removal and closure action were undertaken by the USACE, EPA and NOAA. Based on the finding, the Manchester site was listed on the CERCLA National Priorities List (NPL) in 1994. The Remedial Investigation/Feasibility Study (RI/FS) for the Site was conducted by the USACE and overseen by EPA in accordance with Interagency Agreement (IAG) in 1996. The CERCLA remedial activities are being conducted under the FUDS program.

### ***3.5 Basis for Taking Remedial Action***

The chemicals of concern (COCs) as identified by the ROD [see Table 15 in ROD] in site media that exceeded risk-based screening levels and have Site-specific cleanup levels and cleanup goals are listed below in Table 2 below.

**Table 2. Chemicals of concern**

<b>Landfill Area Seeps</b>	<b>Fire Training Area Soil</b>	<b>Clam Bay Sediment</b>	<b>Clam Bay Clam Tissue</b>
Copper	2,3,7,8-TCDD Equiv.	Copper	Total PCBs
Nickel	TPH (as diesel)	Lead	
Zinc		Silver	
Total PCBs		Zinc	
		2,4-Dimethylphenol	
		Total PCBs	

These chemicals were identified by screening validated sampling data from the Site against the following risk-based criteria:

- Model Toxics Control Act (MTCA) cleanup levels for soil, groundwater, and surface water [Washington Administrative Code (WAC) 173-340];
- State surface water quality standards [WAC 173-201A] and federal Clean Water Act criteria [40 CFR 131, the National Toxics Rule]
- EPA Region 3 screening levels for soil, water, and fish/shellfish tissue [Smith, 1995]
- Plant and wildlife protection screening values for soils obtained from Will and Suter [1994] and Oak Ridge National Laboratory [1994]
- Washington State Department Ecology Sediment Management Standards [WAC 173-204]

Human health and ecological risk assessments were performed as part of the remedial investigation and are presented in the Final Remedial Investigation (Hart Crowser 1996). The results of these assessments were used to determine appropriate site cleanup requirements based on the current non-residential use of the Site.

The risk assessment identified the following routes of exposure:

- Incidental ingestion of soil;
- Dermal contact with soil;
- Inhalation of particulates and volatiles released from soil;
- Consumption of locally obtained drinking water; and
- Consumption of local fish and/or shellfish.

The human health risk assessment evaluated three scenarios (Table 3): risk to an on-site worker; risk to a subsistence consumer of shellfish; and risk to an occasional site visitor (including children). The risk assessment established that an on-site worker and occasional site visitor (child) had risk primarily associated with potential skin contact and incidental ingestion of waste materials (soil and debris from the landfill and FFTA) containing elevated metals and dioxin/furan concentrations. Health risks for the subsistence consumer of shellfish,

while lower, were still above concentrations targeted by the State of Washington cleanup program. Health risks to the subsistence consumer of shellfish primarily resulted from consumption of PCBs in shellfish collected from the intertidal area of Clam Bay. The reasonable maximum harvesting rates assumed in the exposure assessment were 22 meals (3.4 kilograms) per year and 150 meals (23 kg) per year for recreational and subsistence consumption, respectively, based on a draft shellfish consumption survey of the Tulalip and Squaxin Island Tribes.

**Table 3. Summary of Cumulative Baseline Cancer Risks and Hazard Indices**

Exposure Scenario	Cancer Risk		Hazard Index	
	Average Exposure	Reasonable Maximum Exposure	Average Exposure	Reasonable Maximum Exposure
On-Site Worker	0.000004	0.0009	0.4	260
Occasional Site Visitor (Child)	-	0.001	-	1000
Subsistence Fisher	0.00005	0.00006	0.7	3

Results of the risk assessment performed during the RI/FS and presented in the ROD, documented that remedial actions were not necessary for some portions of the Manchester site, as described below:

- **Net Depot and Manchester State Park.** Although metals were detected at low concentrations in the soil and seeps in the Net Depot area, the potential health risks were determined to be minimal. Consequently, no additional actions were proposed for the Net Depot or Manchester State Park.
- **Former Fire Training Area-TPH contaminated Soil.** A limited amount of TPH contaminated soil was excavated during the UST closure. However, the bulk of the TPH contaminated soil at the FFTA was left in place for the following reasons: TPH was tested using the Synthetic Precipitation Leaching Procedure (SPLP) and considered to be no longer leachable because they were highly weathered and consisted primarily of heavy petroleum constituents (very low aqueous solubility); and no petroleum constituents were detected during sampling of shallow groundwater beneath the TPH impacted soil. Thus, the TPH-impacted soils were considered not to pose a risk to neighboring private and public water supply wells. In addition, the risk assessment concluded that the elevated levels of TPH in the soil would not pose a threat to human health.

Groundwater in the area is used to supply local residents with drinking water. Shallow groundwater beneath the FFTA and the Outwash Aquifer near the FFTA was tested for contaminants. The risk assessment confirmed that the incremental lifetime cancer risk was less than 1 in 1,000,000 ( $1 \times 10^{-6}$ ) and that the hazard index was less than 0.3, indicating that risks from contaminants in the groundwater were below the threshold of concern. Consequently, no remedial action objectives were developed for the groundwater in this area.

The ecological risk assessments established that metals, PCBs, and dioxin/furans in the landfill could negatively impact microbial and soil processes, plant growth, earthworms, and small rodents. Metals leaching from the landfill, as well as PCBs and 2,4-dimethylphenol detected in marine sediment, could result in acute and/or chronic toxicity to marine life and pose a risk to wildlife whose entire diet consisted of prey located in Clam Bay.

In summary, the human health and ecological risk assessments concluded that there could be a current or potential threat to human health and the environment if actual or threatened releases from the Site were not addressed.

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## 4.0 Remedial Actions

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### 4.1 Remedial action objectives

Based on the RI/FS and the risk assessments, a set of remedial action objectives (RAOs) was developed for the Site areas. The RAOs, as specified in the ROD, are listed below by area:

#### **Landfill and Clam Bay Areas**

- Prevent human and wildlife contact with solid wastes and soils/sediments in the landfill;
- Prevent fugitive dust emissions containing asbestos;
- Prevent shoreline erosion of landfill wastes;
- Reduce solubilization and migration of landfill contaminants to Clam Bay by eliminating seeps or by improving the quality of the seeps so that they meet water quality criteria;
- Reduce concentrations of metals, PCBs and 2,4-dimethylphenol to below cleanup levels for sediments in the biologically active zone (0-10 centimeter depth) [in Clam Bay]; and
- Prevent subsistence-level harvesting of shellfish in the near-shore areas of Clam Bay until the shellfish are determined to be safe to consume at subsistence level.

Since capping the landfill would not be sufficient by itself to achieve all identified RAOs, chemical-specific cleanup levels and cleanup goals were developed for aquatic exposure pathways which will achieve overall risk management goals as follows:

- A cumulative cancer risk goal under future RME (Reasonable Maximum Exposure) conditions of  $1 \times 10^{-5}$  (MTCA Method C criterion), considering combined seafood ingestion, sediment contact, and incidental sediment ingestion pathways;
- A cumulative hazard index under future RME conditions of 1, also based on a cumulative pathway analysis;
- No identified risk to aquatic biota and other wildlife; and
- Compliance with applicable or relevant and appropriate requirements (ARARs), including State of Washington surface water quality standards (Chapter 173-201A WAC) and sediment management standards (Chapter 173-204 WAC).

The cleanup levels and cleanup goals relevant to the Landfill and Clam Bay areas of the Site are summarized in Table 4.

#### **Former Fire Training Area**

- Prevent human and wildlife contact with simulator debris and soils containing dioxin/furan concentrations greater than the cleanup level; and
- Minimize solubilization and migration of total petroleum hydrocarbons (TPH) into groundwater.

Chemical-specific cleanup levels and cleanup goals were developed for the FFTA are of the Site using baseline risk assessment along with the following risk management goals:

- A cumulative cancer risk goal under future RME conditions of  $1 \times 10^{-5}$  (MTCA Method C criterion), considering cumulative soil contact, incidental soil ingestion, inhalation, and drinking water pathways;
- A cumulative hazard index under future RME conditions of 1, also based on a cumulative pathway analysis;
- Compliance with applicable or relevant and appropriate requirements (ARARs), including State of Washington MTCA Method C soil cleanup levels for non-industrial sites (WAC 173-340-740)

The cleanup levels and cleanup goals relevant to the FFTA are summarized in Table 4. A soil cleanup goal for TPH was established for the Site based on the MTCA Method A (routine) cleanup level. However, since the site-specific risk assessment and leachability testing indicated a low risk from TPH, no chemical-specific cleanup levels is necessary.

**Table 4. Summary of Manchester Annex Site Cleanup Levels and Goals**

Chemical of Concern	Cleanup Level	Basis	Cleanup Goal	Basis	Point of Compliance
Landfill Area-Seeps -Copper -Nickel -Zinc -Total PCBs	10.6 µg/L 7.9 µg/L 77 µg/L 0.03 µg/L	Regional Background WAC 173-201A marine chronic WAC 173-201A marine chronic WAC 173-201A marine chronic			Seep Discharge Seep Discharge Seep Discharge Seep Discharge
Clam Bay-Sediments -Copper -Lead -Silver -Zinc -2,4-Dimethylphenol -Total PCBs	390 mg/kg dry 450 mg/kg dry 6.1 mg/kg dry 410 mg/kg dry 29 µg/kg dry 130 µg/kg dry	WAC 173-204 SQS WAC 173-204 SQS WAC 173-204 SQS WAC 173-204 SQS WAC 173-204 SQS Lowest AET	40 µg/kg dry	Bioaccumulation correlation	0 to 10 cm depth 0 to 10 cm depth
Clam Bay- Tissue -Total PCBs	N/A (a)		42 µg/kg wet (b)	Subsistence fishing	Intertidal clams
Fire Training Area-Soil -2,3,7,8-TCDD Equiv -TPH (as diesel)	270 ng/kg N/A (d)	WAC 173-340 Method C	200 mg/kg	WAC 173-340 Method A	0 to 15 ft depth

Notes:

- a) Existing site concentrations are at or below risk-based cleanup levels except for the subsistence fishing scenario.
- b) A tissue PCB cleanup goal of 42 µg/kg wet weight is associated with a cumulative cancer risk of  $1 \times 10^{-5}$  for subsistent fishing scenario. Risks associated with subsistence fishing can be controlled by implementing temporary limitations on subsistence-level consumption during the initial recovery period
- c) Site-specific risk assessment and leachability testing indicated only a low risk associate with TPH; consequently, no chemical-specific cleanup level is necessary.

## 4.2 *Remedy description*

### 4.2.1 *Landfill Area and Clam Bay Sediments*

The selected remedy for the landfill area and Clam Bay sediments in the ROD called for the following:

- 1) Excavation and relocation of the debris in the intertidal zone of Clam Bay and establishment of a stable shoreline protection system, with a goal of no net loss of aquatic habitat;
- 2) The shoreline protection system to be designed to achieve seep cleanup levels, provide the best possible habitat for marine organisms, and maximize long-term beach stability;
- 3) Placement of a clean thin-layer sediment cap over intertidal Clam Bay sediment areas which exceed cleanup levels; and
- 4) The upland portion of the landfill to be capped in accordance with the State of Washington's Minimum Functional Standards (MFS) for solid waste landfill closures and a hydraulic cutoff system to be installed up-gradient of the landfill area.

### 4.2.2 *Former Fire Training Area*

The selected remedy for the former fire training area in the ROD called for the following:

- 1) Removal of dioxin-contaminated debris from the main simulator complex in the Former Fire Training Area and disposal in a RCRA hazardous waste landfill;
- 2) Inspection of the simulators for cracks, and if leaks are identified, test soil for dioxins;
- 3) Demolition of simulator and excavation of soil beneath the simulators if concentrations of dioxin exceed the cleanup levels;
- 4) Testing of the near-surface soils adjacent to the main simulator complex and soil/debris piles north of the main complex for dioxins and excavation if cleanup levels are exceeded; and
- 5) Closure in-place of concrete USTs remaining in the Former Fire Training Area.

### 4.2.3 *Institutional Controls*

The selected remedy called for the implementation of the following institutional controls:

- A description of the activities or prohibitions required for continued maintenance and protection of the remedial action, including the landfill cap, shoreline protection system, and hydraulic cutoff system, will be prepared during remedial design. These requirements will be subsequently placed in the General Services Administration files, the County Land records, and all applicable public files for the property, including location at the Site, EPA regional office, and EPA headquarters. In addition, deed covenants prohibiting future residential use of the property, and describing the maintenance and protection requirements, will be prepared and submitted for EPA approval. The deed covenants shall be executed upon any future transfer of the property out of federal government ownership.
- A restriction of subsistence-level harvesting of shellfish until the Washington State Department of Health and the Suquamish Tribe determine that the shellfish are safe for subsistence level

harvesting. The Suquamish Tribe will be responsible for prohibiting subsistence-level harvesting of shellfish.

- An institutional control plan, including deed covenants as necessary, will be prepared and submitted for NOAA approval to address TPH impacted soil left in-place in the Fire Training Area. The institutional control plan shall include the following (as appropriate):
  - Execution of a deed covenant prohibiting future residential use of the property, and describing the presence of TPH-impacted soils, including information on location/depth, concentrations, and health and safety concerns;
  - All contractors and employees working in future subsurface excavations within and adjacent to the UST areas of the Site will be notified of the requirement to utilize health and safety precautions normally applicable in UST removals;
  - Temporary storm water controls and other best management practices such as temporary soil covers and subsurface liners will be used during future soil excavation activities in these areas to minimize infiltration and runoff of soil materials;
  - Subsurface soil excavations within these areas will be observed by a qualified environmental professional to determine if such soils contain free product. If free product is encountered, off-Site landfill disposal of these materials will be the prospective remedy. If free product is not encountered, the soils will be allowed to be returned to the original excavation, or very close to the original excavation in a substantially similar environment; and
  - Future storm water runoff systems at the Site will be designed to divert runoff away from the former UST areas.

### **4.3 Remedy implementation**

The remedial design was finalized on June 22, 1999. The remedial design addressed the practical implementation of the remedial actions described above. The initial construction work (known as “Phase I construction”) was awarded in June 1999 and terminated in early 2001 with the majority of the remedial work having been completed. In October 2001, the remaining remedial work (known as “Phase II construction”) was completed. Other construction tasks that were performed during remedial construction included decommissioning of wells used during the RI, inspection for and closure of any drain lines in the shoreline area that could have served as conduits of landfill leachate, and construction of a service road behind the EPA facility.

The status of the remedial actions is described below. Any design changes to original ROD construction elements are discussed below as well.

#### **4.3.1 Landfill and Clam Bay Sediments**

- 1) **Excavation and Relocation.** All debris, soil, and sediment was found suitable for placement on the upland landfill area and placed in accordance with the specifications. The final volume of material to be placed was much larger than originally estimated. As a result, the final finished

slope of the landfill area (approximately 7%) was greater than the 5% specified by remedial design. This slightly steeper slope did not compromise compliance with the MFS for Washington State solid landfill closures.

Because these activities include removing contamination that could contain cultural resources the ROD required a Cultural Resource Management Plan be prepared during remedial design. A Cultural Resource Construction Management Plan was completed in April 1999.

- 2) **Shoreline Protection and Seeps.** The shoreline protection system abuts the landfill along its southern edge and extends nearly 1200 feet along the Clam Bay shoreline. It consists of layers of granular material, drainage filter fabric, design fill, loose riprap, pit run/cobbles, and a fine-grained beach fill.
- 3) **Sediment Cap.** A six-inch minimum thickness cap of clean sediment was placed over the intertidal area identified as the “thin cap” area in the design plans and in an intertidal depression area known as the “silt basin” to create an even transition to the main capped area. Capping materials were tested to verify compliance with Ecology’s sediment quality standards (SQS) for metals prior to application.
- 4) **Landfill Cap and Hydraulic Cutoff System.** The landfill cap and hydraulic cutoff system was completed in summer/fall of 2001.

The final landfill cap system consisted of the following layers (from top to bottom):

- Grass and shrub vegetation
- 12-inch minimum topsoil layer to support the vegetation
- 18-inch minimum fill layer to protect the underlying geosynthetics
- Geocomposite layer to drain water and filter out any soil particles in the draining water
- 50-mil PVC geomembrane
- 12-inch minimum granular vent and bedding layer to route landfill gases to vents and protect the geomembrane from the landfill debris

The landfill cap contains six passive gas vents that are constructed from three-inch diameter PVC pipe and facilitate equalization of gas pressure above and below the geomembrane. The landfill cap is traversed by the EPA laboratory access road (902 linear feet) and a service road (less than 50 linear feet).

For the hydraulic cutoff system, a cutoff wall, with varying depths, and a two foot key into hard silt was constructed along the upland perimeter of the landfill using soil bentonite slurry trench technology to prevent groundwater from seeping into the landfill. A perimeter drainage system was installed immediately upgradient of the cutoff wall to route water around the landfill perimeter and into Clam Bay. The system addresses both surface and subsurface drainage and consists of ditches, drainpipes, drainpipe cleanouts, manholes, catch basins, culverts, and outfalls.

The ROD required that a post-closure plan be developed to address inspection and maintenance (I&M), monitoring, and inspection requirements for the landfill cap, hydraulic system, and shoreline protection system. An Inspection and Maintenance Manual and Technical Specifications and Compliance Monitoring Plan for Phase II Constructions were developed, which jointly satisfy the requirement for a post-closure plan.

#### **4.3.2 Former Fire Training Area**

- 1) **Simulator Debris Removal.** In 1998, a removal action took place at the FFTA, which included removal of the debris located within the main simulator complex; demolition of the simulator to below ground surface and in-place closure of the sub-grade foundations; closure of some concrete USTs and vaults; and removal of associated inactive underground piping, hydrocarbon-contaminated wastewater, and TPH contaminated soil. The liquids were characterized in accordance with local, state, and federal regulations prior to transport at off-site for recycle or disposal.

The USACE, Washington State Department of Ecology (Ecology), and EPA determined that the remaining work to be completed as part of remedial construction would include off-site disposal of dioxin-contaminated debris piles within and near the northern simulator; six-inch excavation and off-site disposal of soil below the debris piles and soil around the northern simulator perimeter; and sampling and analysis of soil from eight locations within the FFTA to confirm that the dioxin cleanup level had been achieved.

- 2) **Soil Testing.** After construction was completed eight samples were to be taken from the FFTA to confirm that the dioxin cleanup level had been achieved. However, at the end of the early removal action before samples were taken, the landowner of the FFTA (NOAA) paved over the main simulator complex area to expand parking availability, which inadvertently reduced the available sampling locations to four. The USACE, Ecology, and EPA subsequently decided that sampling in the paved area was not necessary because the asphalt provided a sufficient barrier to soil exposure, and institutional controls would prohibit future residential use and restrict subsurface excavations.
- 3) **UST Closure.** Several concrete USTs and vaults, near the main simulator complex, were closed and associated piping was removed. Approximately 100 linear feet of asbestos-clad piping were discovered during the removal and subsequently removed in accordance with applicable regulations. In addition, one vault contained approximately 300 gallons of sludge that had to be disposed of as Washington State Dangerous Waste because it failed the Toxicity Characteristic Leaching Procedure (TCLP) for lead (regulatory level is 5 mg/L). During the FFTA work the monitoring wells used during the RI were also decommissioned.

#### **4.3.3 Compliance Monitoring Plan**

A Compliance Monitoring Plan (CMP) for Manchester Annex Site was completed in April 1999. This document provides details on the sampling activities that should be performed as part of the construction and post-construction monitoring and sampling activities associated

with long-term compliance monitoring. Field procedures applicable to all sampling activities are also summarized in the CMP. A brief summary of the long-term monitoring activities as described in the CMP are as follows:

- Monitor seeps at the foot of the finished construction, if observed, until compliance with seep discharge cleanup levels is established and implement additional remedial measures if compliance has not been achieved. The CMP recommended that in the first year after cap placement, quarterly observations for seeps should occur. If no seeps are observed in the first year, then observations will continue once a year for five years. If seeps are observed, they should be tested for dissolved metals (As, Cd, Cr, Cu, Hg, Pb, Ni, and Zn) and total PCBs, and the samples should be collected from up to three locations. Thereafter, the sampling should occur semi-annually for two years, followed by annual monitoring for three years. The CMP also recommends analysis of total suspended solids (TSS), temperature, pH, salinity, turbidity, and dissolved oxygen to facilitate interpretation of the primary results.
- Monitor sediment and shellfish tissue until compliance with PCB cleanup goals for sediment and shellfish tissue is achieved, or until the WDOH and the Suquamish Tribe determine that the shellfish are safe for subsistence-level harvesting, whichever occurs first.
- According to the CMP, sampling of sediments should occur initially immediately after cap placement. Thereafter, shellfish tissue and sediment should be sampled for compliance with PCB cleanup goals four, seven, and ten years after cap placement. In addition, the CMP recommends analysis of total lipids (in tissue) and total organic carbon (in sediment) to facilitate interpretation of the PCB results. The CMP recommends collecting the following clams (in order of decreasing preference): Manila, Littleneck, Butter, Horse, and Cockles.

Actual long-term monitoring began in 2005, four years after construction of the remedy was completed in 2001. Sediment sampling occurred in 2005 (year 4), 2009 (year 8) and 2013 (year 12). Clam tissue surveys occurred in 2005, 2006, and 2009 and determined that there was insufficient shellfish biomass to support sampling. In 2010, it was determined that clam sampling could be conducted by compositing clams across the beach instead of the area suggested in the CMP. Clam tissue sampling was conducted in 2010 (year 9) and 2013 (year 12). While the CMP required monitoring of any observed seeps in the nearshore area, no seeps have been observed since construction completion. In the absence of seeps, porewater sampling in the intertidal marine sediments near the Landfill Area was conducted in 2009 and 2010. In a Technical Project Planning (TTP) meeting held on June 19, 2012, it was determined that seep sampling would be discontinued because it was not considered representative of water that might enter Clam Bay from the landfill. The CMP is currently being revised to reflect current site conditions and sampling frequency.

#### ***4.3.4 Institutional Controls***

The ICP completed in March 2012 fulfills the institutional controls listed above in Section 4.2.3. The ICP includes the following three objectives: 1) to prevent human contact with and the distribution of total petroleum hydrocarbon (TPH) contaminated soils; 2) to protect the

integrity of the landfill cap, hydraulic cutoff system, and shoreline protection system; and 3) to prevent human consumption of unsafe levels of contaminated shellfish.

The ICP covers the TPH contaminated areas, the landfill cap, hydraulic cutoff system, shoreline protection system, and shellfish harvesting.

### **TPH Contaminated Areas**

The ICP describes the following restrictions for land/resource use in the Former Fire Training Area:

- The property on which the FFTA was located shall not be used in the future as residential property or a day care facility;
- Future storm water runoff systems shall be designed to divert runoff away from the UST areas; and
- In the event of future subsurface excavations in the restricted areas requiring signage, certain precautions, which are outlined in the ICP, will be implemented.

The ICP instructs the NOAA to fabricate and install signage in the area of the FFTA which is now the current parking lot, to ensure that staff and contractors are aware of the restrictions for land use. During the site inspection on February 24, 2014 multiple signs were observed in the TPH contaminated areas.

### **Landfill Cap, Hydraulic Cutoff System, and Shoreline Protection System**

The ICP describes the following restrictions for land/resource use in this area:

- No excavation or drilling shall take place on the landfill cap area below the topsoil layer, except for the purpose of cap maintenance/repair;
- No construction shall take place on the landfill cap area unless it is first demonstrated that neither the construction activities nor the finished construction will compromise the integrity of the cap;
- No excavation shall take place in the shoreline protection system area, except for the purpose of system maintenance/repair;
- The landfill cap, hydraulic cutoff system, and shoreline protection system shall be inspected and maintained in accordance with the I&M Manual; and
- The property on which the landfill cap and shoreline protection system are located are not be used in the future as a residential property.

As part of its on-site Awareness Program, consisting of the New Employee Orientation, and the yearly refresher Health and Safety Training for EPA employees, Ecology employees, and contractors, EPA developed a training plan describing how personnel are to comply with the ICP. The Manchester Lab will fabricate and install signage along the boundary of the landfill to ensure that staff and contractors are aware of the restrictions.

## Shellfish Harvesting

The ROD for the Site states that monitoring of sediment and shellfish tissue should occur until compliance with PCB cleanup goals as defined in the ROD have been met, or until the WDOH and the Suquamish Tribe have determined that the shellfish are safe for subsistence-level harvesting, whichever comes first.

Washington State regulation WAC 220-56-350, together with a Tribal policy on shellfish harvesting, closed Clam Bay to subsistence level shellfish harvesting until the Suquamish Tribe and WDOH determine that shellfish in Clam Bay are safe for subsistence-level harvesting.

- WAC 220-56-350 closes Little Clam Bay for collection of clams and mussels the entire year.
- The Tribe follows WDOH certification regarding what areas are open for harvest (all areas are considered closed unless specifically opened). The WDOH has to certify or recertify an area for the Tribes to consider opening an area for shellfish harvesting. If an area is open, the Tribe's shellfish program will manage how the area is harvested.

### 4.4 *Inspection and Maintenance*

This section describes the general and specific I&M requirements, as outlined in the Inspection and Maintenance Manual [USACE, 2014], for the remedy components, summarizes I&M activities of the last five years, and describes any problems that have been identified through I&M. This section lists the costs associated with I&M for the most recent five years.

Inspection requirements, associated maintenance requirements, and current status for each specific remedy component are described below.

#### 4.4.1 *Landfill Cap & Hydraulic Cutoff System (including vents, drainage, and roads)*

The I&M Manual specifies that the cap area should be inspected for the following:

- Differential settlement (i.e., localized depressions significant enough to be discerned with the naked eye);
- Wet or saturated areas (indicated by soft ground, abnormally high vegetation, or ponded water);
- Sloughing
- Tension cracks (i.e., cracks related to soil movement);
- Bulging;
- Erosion;
- Exposure of geosynthetic materials;
- Signs of burrowing animals (e.g., rodent holes);

- Distressed (e.g., discolored or dying) grasses; and
- Volunteer plants with potential to establish deep root systems (e.g., trees or large bushes).

Special attention will be paid to areas where there are breaks in slopes or steep slopes, since these areas are most susceptible to surface erosion and slope stability problems. Depth and size of any animal burrow will be inspected to determine if there is potential for penetration or damage to the geosynthetic layers. Maximum attention should be given to this item since burrowing activity may not be readily detected without a thorough inspection. The cap area will be inspected for intrusive damage, such as excavation, grading, and drilling activities.

Vegetation on the landfill cap will be evaluated by a USACE biologist to determine if there are any new invasive species that may necessitate changes to vegetation and invasive species maintenance and removal procedures.

In addition to visually inspecting the cap for differential settlement, selected points on the landfill cap shall be periodically surveyed to determine if differential settlement is occurring that is not visible during scheduled monitoring tasks. Surveying on the landfill cap may be completed on an as-needed basis if warranted by visual observations. There may be damage to the geosynthetics if more than 18 inches of differential settlement has occurred within a horizontal distance of six feet.

The passive gas vents will be inspected for evidence of damage or animal intrusion. The vent port screens should be inspected for evidence of damage or clogging.

Portions of the laboratory access road and service road overlying the cap should be inspected for localized depressions, cracking, raveling, potholes, the buildup of debris or sediment and the presence of vegetation.

A visual inspection of the perimeter surface ditch (PSD) and swale drainage system (SDS) for ponding, sloughing, erosion, signs of burrowing animals, distressed vegetation, and the presence of vegetation is required based on the 2006 I&M Manual. The perimeter drainage pipes should be flushed with water on an annual basis with a minimum of 500 gallons injected into a pipe cleanouts (CO) CO-1 through CO-4 and a minimum of 700 gallons into CO-5 through CO-8 at a rate of 370 gallons per minute. The injections should be logged onto a Drainpipe Water Injection Log. The drainage ditches should be inspected for excessive sediment or debris deposition or any other condition that may impede the flow of water or otherwise affect their operational efficiency. Culverts and outfalls should be checked for general structural condition.

#### **4.4.2 Shoreline Protection System**

The interface between the landfill cap and the shoreline protection system should be inspected for sloughing of the landfill vegetative cover. The I&M Manual requires inspection of the beach area for exposed riprap, exposed geosynthetics, or any other evidence of significant beach erosion. Photographs should be taken of the beach to document potential beach dynamics over time. The shoreline protection system shall be surveyed and evaluated against the 2012 as-built slope measurement to determine if significant erosion has occurred. During the first three years following the SPS repairs (2014-2016) a survey of the shoreline consisting of land based beach profile surveys along 100 foot transects will be conducted twice a year (in the summer and winter) to provide baseline data on seasonal and dynamic processes on the shoreline and will include:

- The beach profile should follow and meet the minimum requirements shown in Figure 4b of the I&M Manual.
- The survey should obtain higher spatial resolution near geomorphic features such as escarpments or newly formed berms.
- Conduct higher resolution (every 25 feet) in the area adjacent to the hard point north of Sta. 9+50.

After baseline is established the SPS shall be surveyed at a frequency no greater than once every three years. There may be damage to the geosynthetics if the SPS erodes to greater than 2:1 slope.

#### **4.4.3 Systems operations/I&M operational summary**

Inspection and maintenance of the landfill is required on a semi-annual basis, per the I&M Manual (2014). During the last five years, the I&M activities were completed by CTI and Associates, Inc. under contract to the USACE. Annual I&M reports indicate that inspections and maintenance work were performed routinely each year from 2010 through 2013. The annual reports also indicate that the contractor inspected the landfill cap, the drainage system, and the shoreline protection system as required by the I&M Manual.

Based on I&M activities performed to date, the primary concern is movement of beach material placed as part of the shoreline protection system. In addition, a recurring issue is growth of sporadic Scotch broom on the landfill cap. Removal of Scotch broom occurred during many I&M events. I&M events also included removal of deep-rooted and invasive vegetation occurred along the western perimeter subsurface drainage, around culverts, and along the gravel shoulders of the laboratory access road.

The drainage pipes were flushed with water injections on an annual basis, as required by the I&M Manual. Reports indicate that pipe flushing was performed September 2009, July 2010, August 2011, August 2012, and July 2013.

More substantive non-routine maintenance work was performed in 2011 and completed in 2012. The work completed in 2011 included drainage repairs; fence maintenance; collapse feature inspection; culvert repairs, including a newly installed box culvert; exposed fabric investigation; monitoring well vault removal; and manhole repairs. The repair work completed in 2012 included drainage swale repairs, culvert maintenance, road crack repairs, planting wildflowers, and shoreline protection system repairs.

#### 4.4.4 Summary of costs of system operations/O&M effectiveness

Current annual inspection and maintenance costs average \$41,933 (average of 2009 through 2013). These costs include removal of scotch broom, blackberry shrubs, and unwanted tree growth; application of herbicide; weed-whacking heavy growth of grass in culverts; maintenance of landfill drainage system; and inspection of shoreline protection system and landfill cap. Actual I&M costs for the period between June 2009 and January 2014 are summarized in Table 5.

**Table 5 Summary of I&M costs**

Dates		Area of I&M Activity	Contract Cost (\$)¹ rounded to the nearest \$100
From	To		
Mar 2009	Feb 2010	Landfill cap, hydraulic cutoff system, and shoreline protection system	\$38,700
Mar 2010	Feb 2011	Landfill cap, hydraulic cutoff system, and shoreline protection system	\$40,300
Mar 2011	Feb 2012	Landfill cap, hydraulic cutoff system, and shoreline protection system	\$41,900
Mar 2011	Apr 2012	Landfill Cap, hydraulic cutoff system, and FFTA (non-routine repairs)	\$387,100
Mar 2012	Feb 2013	Landfill cap, hydraulic cutoff system, and shoreline protection system	\$43,500

<b>Dates</b>		<b>Area of I&amp;M Activity</b>	<b>Contract Cost (\$)¹ rounded to the nearest \$100</b>
<b>From</b>	<b>To</b>		
May 2012	Mar 2013	Clam Bay area (below MHHW), shoreline protection system, roads, fence (non-routine repairs)	\$343,600
Mar 2013	Feb 2014	Landfill cap, hydraulic cutoff system, and shoreline protection system	\$45,300

1- Costs do not include QA oversight

## 5.0 Progress Since the Last Five-Year Review

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### 5.1 Protectiveness statements from last review

The protectiveness statement in the Second Five-Year Review Report (2009) reads as follows:

*A protectiveness determination of the remedy at the Site cannot be made at this time until further information is obtained. Further information will be obtained once review of seep water, sediment, and clam tissue sampling analysis has been performed. This data shall determine if the remedy is protective of human health while considering: a restriction on subsistence-level harvesting of intertidal bivalve organisms is in place; and the landfill cap and shoreline protection systems are intact, and the cleanup requirements for the Former Fire Training Area have been met. The shellfishing restriction, however, was intended only as a temporary measure during the initial recovery period. Seep, sediment, and tissue sampling data are necessary to evaluate the current status and the long-term protectiveness of the actions implemented for the landfill and Clam Bay. The compliance monitoring plan, which will be completed and implemented during fiscal year 2010 (subject to the availability of funds), will address the status of PCBs and metals in sediment, seeps, and shellfish tissue in Clam Bay. As sufficient biomass for sampling becomes available, clam tissue samples will be taken for the sake of documenting the removal of the shell-fishing restriction.*

In March 2013, a five-year review addendum was completed. The protectiveness statement from the Five-Year Review Report (FYR) addendum reads as follows:

*The remedy is protective of human health and the environment. Elements of the remedy that protect human health and the environment include the landfill cap, the shoreline protection system, and the achievement of cleanup requirements at the former fire training area and the implementation of institutional controls which prevents exposure to site contaminants and restricts intrusive activities by employees or contractors at the site. Further sampling and analysis conducted during long-term operation and maintenance of the site may determine the cause and significance of PCBs in clam tissue and sediment to help identify what actions, if any, need to be taken which would result in achieving remediation goals in a reasonable time-frame.*

### 5.2 Status of recommendations and follow-up actions from last review

The Second FYR presented several recommendations for issues that affected the remedy protectiveness. The following provide a status update of these recommendations:

- 1) **Recommendation:** Finalize and implement an institutional control plan

**Status:** An institutional control plan (ICP) was finalized in February 2011, and a recent update was completed in March 2012. The ICP has been implemented, except for the warning signs that need to be placed at the landfill.

- 2) **Recommendation:** Revise the Compliance Monitoring Plan (CMP) with a monitoring schedule that complies with the ROD, and provides adequate information to monitor site conditions, progress toward RAOs and protectiveness. Monitor sediment, seeps, and clam tissue at the toe of the landfill on the slated schedule. Develop a supplemental report to this FYR with data presentation for the 2009 data gathered.

**Status:** Technical project planning (TPP) meetings to revise the CMP occurred on June 19, 2012, August 12, 2012, and November 8, 2012 to clarify project objectives in accordance with the current site conditions. The revision of the CMP is ongoing. Sampling of sediment occurred in 2009 and 2013, and sampling of clam tissue occurred in 2010 and 2013. Results from these events show that there are still exceedances of the 95% UCL PCBs in the sediment. Results show that the 95% UCL for clam tissue is below the current cleanup goal; however, the Suquamish tribe has since identified shellfish consumption rates which may affect calculated site risks. No seeps were observed at the sampling events. As a replacement of seep samples, porewater samples were collected. During a TPP meeting, it was determined that porewater sampling should be discontinued because it was not representative of water that would be coming from the landfill.

The CMP is not reflective of current site conditions. The seep component of the CMP should be eliminated in the revised CMP as seeps were not observed after construction was completed. In addition, the frequency and locations for clam tissue sampling in the CMP was not followed in recent sampling events. The CMP should be updated to reflect clam tissue sampling frequency and locations based on current site conditions. Other aspects of the CMP will be discussed during CMP planning meetings.

- 3) **Recommendation:** Remove unwanted vegetation from the landfill cap.

**Status:** Unwanted vegetation from the landfill cap is being removed annually through inspection and maintenance.

- 4) **Recommendation:** Consult with the Suquamish Tribe (and other state and federal agencies as appropriate) to evaluate the continued need for a shell-fishing restriction.

**Status:** Consultation with the Suquamish Tribe is on-going at the staff level. The Tribe actively participated in the technical project planning for the CMP revision.

- 5) **Recommendation:** Consult with the Suquamish Tribe regarding the consumption rate of shellfish as it relates to the clam tissue goal.

**Status:** Coordination with the Suquamish Tribe is on-going at the staff level. The Tribe actively participates in the CMP revision process.

- 6) **Recommendation:** Repair the damaged section of the shoreline protection system.

**Status:** An Engineering Review of the landfill toe was conducted in 2010 and included an evaluation of the seepage near station #5, the subsidence area along the upper part of the beach and the erosion of sediments making up the shoreline protection system. The review recommended that monitoring to identify seeps be continued, to continue annual visual monitoring of the shoreline protection system and to re-nourish the section of the beach with redistribution of materials. Repair to the damaged shoreline protection system occurred in September 2012. Repairs were in accordance with the original design from 2001.

A few administrative and operational issues and their recommendations were included in the second FYR. The following presents status updates for these recommendations.

- 1) **Recommendation:** Remove the weathered “Hazardous Area” sign.

**Status:** The sign was removed.

- 2) **Recommendation:** Reseed/replant drought resistant plants on the landfill cap.

**Status:** The landfill cap currently has a grass cover that is healthy and functioning as designed. An approved native grass seed mix was used for site restoration as part of the shoreline protection system repairs. New plantings will consist only of native grasses and forbs and the formerly approved planting plan will not be implemented as agreed by EPA Manchester Laboratory and USACE.

- 3) **Recommendation:** Complete a report of findings from the archaeological investigation that occurred during remedial construction and provide to the Suquamish Tribe.

**Status:** The archaeological investigation findings were initially drafted during the construction of the landfill. No completed report has been finalized; however, the Suquamish Tribe has agreed that this does not need to be a finalized document.

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## 6.0 *Five-Year Review Process*

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### 6.1 *Administrative Components*

The Old Navy Dump/ Manchester Annex Site Five-Year Review team was led by Mirek Towster, the USACE Kansas City District Project Manager. The following personnel from the USACE, Seattle District assisted with the review: May Carrell, Karah Haskins, Marlowe Laubach, Deborah Johnston, Cathy Martin, and John Wakeman.

### 6.2 *Community Involvement*

A public notice was placed in the *Kitsap Sun* and the *Port Orchard Independent* on May 16, 2014, notifying the public of the start of this five-year review process (Appendix D, “Third Five-Year Review News Release”). There were no responses received from the general public during the response time.

A notice will be issued in the local print media indicating the completion and availability of this Third Five-Year Review Report at the Manchester library.

### 6.3 *Document review*

A review of reports pertinent to this five-year review was conducted by the review team. The types of documents reviewed included decision documents, risk assessment documents, monitoring reports, and other supporting materials. Applicable cleanup standards, as listed in the 1997 ROD, were reviewed. Section 12 is a complete list of documents reviewed for this FYR.

### 6.4 *Data Review*

As part of the data review for this five-year review, clam tissue results from 2010 and 2013 sampling events, sediment results from 2009 and 2013 sampling events, and porewater results from 2009 and 2010 sampling events were evaluated. There was also a sampling event for current and wave data in December 2013 to determine if a relationship exists between PCB sediment concentrations and sediment transport. This data has not been finalized and will be included in the next five-year review.

#### 6.4.1 *Clam Tissue Sampling*

The cleanup goal for clam tissue (42 µg/kg-wet PCB) was based on a cumulative cancer risk goal under future reasonable maximum exposure conditions of  $1 \times 10^{-5}$  (Model Toxic Control Act Method C criterion), considering combined seafood ingestion, sediment contact and incidental

sediment ingestion pathways for subsistence fishers. Average and 95% UCLs of the arithmetic mean chemical concentrations were used in to evaluate data, per compliance with the ROD.

The purpose of the 2010 sampling event was to collect clam tissue samples of legal sized clams along the foreshore of the remediated landfill in nine sample grids that were the same as the sediment sampling grids and were in a clam-zone band determined by the Suquamish Tribe shellfish biologist to be the best sampling locations. In August 2010, clams were collected from 5 of the 9 grids and clams from each unique grid were composited into a discrete sample and analyzed for total PCBs. In addition, two field duplicates were collected from sample grids 5 and 7. Figure 2 shows the PCB concentrations and location of the clam tissue samples collected. Three of the five composited samples equaled or exceeded 42 µg/kg-wet PCB, the maximum concentration was 70 µg/kg-wet PCB, and the 95% UCL was 54.49 µg/kg-wet.

Sample grids from the 2010 clam sampling event were modified based on presence of clams prior to the 2013 sampling event. Sample grid 4 from the 2010 sampling (Figure 2) was located in the high intertidal zone where no clams were collected. Sample grids 4, 5 and 6 shown in Figure 2 were renumbered as grids 4 and 5 for sampling in 2013. In 2013, clam tissue samples were collected from eight grids (see Figure 3

**Figure 3).** Composite tissue samples per grid ranged from a minimum of 9.4 to a maximum of 48 µg/kg-wet PCB. Comparison of the results by grid revealed that only Grid 2 (48 µg/kg-wet PCBs) exceeded the ROD goal of 42 µg/kg-wet PCB in clam tissue. A boxplot for clam tissue PCB values identified the sample taken in Grid 2, located near NOAA property, as an outlier (see Figure 4). The 95% UCL for all grid samples was 28.31 µg/kg-wet PCBs in clam tissue (data normally distributed), which is less than the cleanup goal.

In addition, the Feasibility Study concluded that “tissue PCB concentrations are highly correlated with sediment concentrations ( $p < 0.01$ ; regression)” based on Figure 5

Figure 5. Data from the 2013 tissue and sediment sampling event shows that there is a correlation between tissue PCB concentrations and sediment concentrations when sediment concentrations are below 40 µg/kg-dry weight. However, when sediment concentrations are above 40 µg/kg dry weight the BSAF (as calculated in the FS) is approximately 0.28. These values indicate that PCB is not bioavailable at the same rate at higher PCB levels. When the tissue PCB concentration and sediment PCB concentrations for the entire site were compared there was a slightly positive slope which indicates that there is some relation of tissue concentrations and sediment concentrations. A flat slope would indicate that clams and sediment are not related (Figure 6).

### 6.4.2 Sediment Sampling

In 2009, eighteen sediment samples were located across the Manchester Annex intertidal beach. All eighteen sediment samples met the ROD-specified cleanup level of 130 µg/kg-dry for total PCBs. The ROD states that the sediment cleanup level for PCBs for the Site was based on the recreational exposure condition at that time. However, the sediment cleanup goal for PCBs was developed assuming a possible long-term subsistence fishing use of Clam Bay (see page 20 and Table 15 of the ROD). The sediment PCB goal for the Site is 40 µg/kg-dry. Of the eighteen samples, three exceeded the 40 µg/kg-dry cleanup goal.

In 2013, sediment samples were collected at each clam collection hole and composited into one sample per grid for a total of eight sediment samples (see Figure 3). Two field duplicates and 1 MS/MSD sample were collected and an additional three random samples for statistical robustness were also collected (single sided t-Test approximate minimum sample size was 11). All sediment samples met the ROD-specified cleanup level of 130 µg/kg-dry for total PCBs. Three grids exceeded the ROD PCB sediment goal of 40 µg/kg, (74, 61, and 49 µg/kg PCBs), not including the random samples. The 95% UCL for all samples was 54.41 µg/kg-dry PCBs in sediment.

### 6.4.3 Porewater Sampling

The ROD states that "Seeps at the foot of the finished construction, if observed, will be monitored until compliance with seep discharge cleanup levels is established". No seeps were observed during visits to the Site in the FYR time period. Porewater sampling was performed in 2009 and 2010 due to the absence of seeps at the Site. There are no cleanup levels to compare the results to, however there was a reference sample collected in Manchester State Park which would not be affected by the contamination on site.

In 2009, ten porewater samples were collected with Henry samplers along the Manchester foreshore, including both the landfill shoreline and the adjacent NOAA facility and analyzed for metals (lead, copper, and zinc) and PCBs. In addition, a reference sample in Manchester State Park was taken. Most concentrations were similar or lower than the reference sample except Sample ID 09MANSEP05, which consistently had concentrations higher than the reference sample. Three of the ten shallow porewater samples, had detected concentrations of Total PCBs.

The two Stations for the 2010 sampling event were established based on the highest analytical results from the 2009 porewater sampling event to determine current conditions. The first Station identified as 5 (the same station as the 2009 sampling event), and a flanking Station located 10 feet away identified as 5.1. The purpose of the flanking Station was to confirm the results from Station 5.

The results from the 2010 sampling event were similar to the results from the 2009 sampling event. The 2010 discrete samples collected at low tide had results similar to those of the time-integrated samples; porewater quality may not be significantly affected by tidal stage. Station 5.1 had results comparable to Station 5. After the 2010 sampling event, it was determined during a TPP meeting that porewater sampling was no longer necessary, as it did not portray characteristics of water coming from the landfill. The salinity levels in the porewater samples were approximately the same as sea water, and therefore, do not represent groundwater that could have been in contact with landfill materials.

## ***6.5 Site Inspection***

The most recent site inspection was conducted on February 24, 2014. Participants included Mark Ader (Remedial Project Manager and Manchester Lab Facility Manager), Thomas Flagg (NOAA Facilities Manager), and Marlowe Laubach and Karah Haskins with USACE-Seattle District. The site inspection checklist is presented in Appendix A. Photos from the site inspection are presented in Appendix C.

The landfill cap was observed to be in good condition with no obvious signs of settlement, sloughing or erosion. The vegetative cover appeared to be in good condition with only some areas having some sporadic Scotch broom and blackberry shrubs. There were no animal burrows observed on the landfill cap. The Manchester State Park side of the fence appeared to have some fallen branches that were protruding through the fence. The perimeter surface drainage ditch contained some insignificant standing water, but all the pipes were clear of grass or fill material. There were no signs observed warning personnel of contaminants.

Regarding the shoreline protection system, tidal action and stormy weather since placement of beach fill material during September 2012 continue to redistribute the material and create significant differences in topography and depressions primarily at the northern end of the beach.

NOAA constructed a new building with utility work that was in compliance with ICP. Repaving of the cuts from the utility lines will be completed when they remove one of the remaining Navy buildings. Demolition is slated for summer 2014 and will be in compliance with the ICP. Warning signs were placed in TPH contaminated areas as required by the ICP.

## ***6.6 Interviews***

Interviews were conducted with the following individuals connected to the Site:

- USEPA Manchester Lab Director, Barry Pepich; conducted at the Manchester Laboratory during the site visit on February 24, 2014,

- USEPA Remedial Project Manager (RPM)/Lab Facility Manager, Mark Ader; conducted at the Manchester Laboratory during the site visit on February 24, 2014,
- NOAA Facilities Manager, Thomas Flagg; interviewed at the NOAA Facility during the site visit on February 24, 2014, and
- The Suquamish Tribe Environmental Scientist, Denice Taylor; interviewed via telephone March 4, 2014.

Documentation of the interviews is provided in Appendix B. Additional comments from the Suquamish Tribe on the Five-Year Review, received September 5, 2014, are also provided in Appendix B.

Generally, concerns were raised about tribal shellfish consumption rates and the PCB cleanup levels/ cleanup goals associated with the shellfish restriction. In addition, Ms. Denice Taylor was hopeful that the natural recovery process will be improved with the removal of the hard point. Overall, it seemed that those interviewed were with happy with the amount of communication and involvement with the USACE.

### ***6.7 EPA and Suquamish Tribe Review, Comment, and Response***

The Suquamish Tribe reviewed the draft Five-Year Review report. USACE received review comments on July 2, 2014.

The EPA reviewed the draft Five-Year Review report. USACE received review comments on July 3, 2014.

USACE addressed the review comments and provided the responses to EPA and the Suquamish Tribe on August 8, 2014. The comments and responses to these comments are presented in Appendix E.

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## 7.0 Technical Assessment

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The technical assessment of a remedy is required by the EPA in accordance with the *Comprehensive Five-Year Review Guidance* (EPA, 2001). The technical assessment provides a framework for organizing and evaluating data and information to ensure that relevant issues are considered when determining the protectiveness of the remedy.

### 7.1 Question A: Is the remedy functioning as intended by the decision documents?

Question A is used to determine if the appropriate performance standards, institutional controls, or maintenance activities are being achieved. This determination is done to ensure that the protectiveness of the remedy is not at risk and the exposure pathways are being controlled.

**Yes.** The remedy is functioning as intended. A discussion by site area follows:

#### 7.1.1 Landfill Cap, Hydraulic Cutoff System, and Shoreline Protection System

Remedial action objectives for these areas are outlined in Section 4.1. The landfill cap is preventing human and wildlife contact with landfill waste and dust, and is functioning as intended by the ROD. Inspection and maintenance of the landfill cap occurs routinely, with the primary issue continuing to be the persistent presence of Scotch broom, alder, and blackberries on the cap. These plants/trees have roots that could damage the membrane if allowed to continue to grow, thus monitoring, spraying, and hand removal will continue. Minor ponding of water was observed at the northern area of the landfill and southern end of the landfill swale on the eastern side of the landfill. So far, the ponding has been minor and will continue to be monitored.

The shoreline protection system was in good condition. The only issue that may affect the remedy in the future is wave erosion. Since the summer 2012 repair work was performed, there has been redeposition of the slope material downcoast of the hard point (located at the south corner of the Manchester Laboratory parking lot). The re-alignment of the hard point has been procured and construction is planned for summer of 2015. This work will potentially change sediment transport and change the dynamics of the wave action on the shoreline.

The results of the 2013 clam tissue monitoring indicated that the 95% UCL for all grid samples was 28.31 µg/kg-wet PCB (data normally distributed) which is below the ROD cleanup goal. One grid location exceeds the tissue cleanup goal of 42 µg/kg-wet PCB. The results of the sediment sampling showed that total PCBs in sediments have met the cleanup level of 130 µg/kg-dry for total PCBs. There are still some intertidal areas that exceed the cleanup goal of 40 µg/kg-dry for total PCBs. Further sampling will be conducted to establish cleanup trends.

There were no seep samples collected over the FYR time period because no seeps were observed. Porewater sampling was conducted as a potential substitute for seep sampling but the results were later determined to be unrepresentative of the seeps. The ROD required monitoring for seeps "if observed" and no seeps were observed.

The institutional controls have been implemented and are functioning as intended by the ROD. The temporary restriction placed on subsistence level harvesting of shellfish is still enforced. The most recent version of the ICP was completed in March 2012 and is discussed above in Section 4.3.4. The ICP has been implemented, except for the warning signs that need to be placed at the landfill.

### ***7.1.2 Former Fire Training Area***

Remedial action objectives for the FFTA are outlined in Section 4.1. Testing of the soils for dioxins indicate that compliance with the cleanup level of 270 ng/kg had been achieved. Therefore, the remedy has functioned as intended by the ROD to prevent human and wildlife contact with simulator debris and soils containing dioxin concentrations greater than the cleanup levels.

The most recent version of the ICP was completed in March 2012 and is discussed above in Section 4.3.4. The institutional controls in place are functioning as described in the ROD and ensure compliance with the ROD.

### ***7.2 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?***

**Yes.** The exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the ROD were reviewed to determine their continuing validity and the results are discussed below.

Some factors used to calculate the risk associated with subsistence level shellfish consumption have changed since the time of the ROD. Consumption rates that were used to determine the risk values and cleanup goals in the ROD were based on the Tulalip and Squaxin Island Tribes. The Suquamish Tribe has recently presented consumption rates which are higher than those used during the initial risk assessment. Consumption rates, as well as other assumptions from the initial risk assessment, will be considered in a reassessment of risk.

### 7.2.1 Changes in Applicable and Relevant and Appropriate Requirements and To Be Considered Criteria

A review of the Applicable and Relevant and Appropriate Requirements (ARARs) was conducted as part of the five-year review. The objective of the ARAR review was to identify federal or state regulatory standards promulgated since the remedy was implemented that might affect the protectiveness of the remedy. EPA's *Comprehensive Five-year Review Guidance* (U.S. EPA, 2001) specifies that newly promulgated or revised regulatory standards, which may affect previous conclusions about the protectiveness of the remedy, be identified and evaluated during the five-year review. Requirements that are promulgated or modified after ROD signature must be attained (or waived) only when determined to be applicable or relevant and appropriate and necessary to ensure that the remedy is protective of human health and the environment [40 CFR 300.430(f)(ii)(B)(1)] .

There have been changes to ARARs since the ROD. As discussed below, they do not affect protectiveness of the remedy. Chemical-specific ARARs are presented in Table 6 below.

**Table 6. Changes in Chemical-Specific Requirements**

Contaminant	Media	Cleanup Level or Goal in ROD	Citation	Current Value in Regulations
Copper	Landfill Area-Seeps	10.6 µg/L (CL)	Regional Background (1997 ROD)	Unchanged
Nickel	Landfill Area-Seeps	7.9 µg/L (CL)	WAC 173-201A marine chronic	8.2 µg/L (less stringent)
Zinc	Landfill Area-Seeps	77 µg/L (CL)	WAC 173-201A marine chronic	81.0 µg/L (less stringent)
Total PCBs	Landfill Area-Seeps	0.03 µg/L (CL)	WAC 173-201A marine chronic	Unchanged
Copper	Clam Bay-Sediments	390 mg/kg dry (CL)	WAC 173-204 SQS	Unchanged
Lead	Clam Bay-Sediments	450 mg/kg dry (CL)	WAC 173-204 SQS	Unchanged
Silver	Clam Bay-Sediments	6.1 mg/kg dry (CL)	WAC 173-204 SQS	Unchanged
Zinc	Clam Bay-Sediments	410 mg/kg dry (CL)	WAC 173-204 SQS	Unchanged
2,4-Dimethylphenol	Clam Bay-Sediments	29 µg/kg dry (CL)	WAC 173-204 SQS	Unchanged

Contaminant	Media	Cleanup Level or Goal in ROD	Citation	Current Value in Regulations
Total PCBs	Clam Bay-Sediments	130 µg/kg dry (CL) 40 µg/kg dry (CG)	Lowest AET (Ecology, 1988) Bioaccumulation correlation	12,000 µg/kg (WAC 173-204 SQS) (less stringent)
Total PCBs	Clam Bay-Tissue	42 µg/kg wet (CG)	Site-specific (1997 ROD)	N/A
2,3,7,8-TCDD Equiv.	Fire Training Area-Soil	270 ngTEQ <sup>1</sup> /kg dry (CL)	WAC 173-340 Soil Method C Cancer	1,680 ngTEQ <sup>1</sup> /kg (less stringent)
TPH (as diesel)	Fire Training Area-Soil	200 mg/kg (CG)	WAC 173-340 Method A Soil Cleanup Levels for Residential/Industrial Properties (Diesel Range Organics)	2,000 mg/kg (less stringent)

1-TEQ-Toxic equivalent

The following is a list of contaminants with chemical-specific ARAR values that have changed since the ROD and how the change affects protectiveness of the value:

- Nickel: SWQS increased from 7.9 to 8.2 µg /L This new value indicates a lower risk from exposure than previously considered, and the change has no impact on the remedy's protectiveness;
- Zinc: SWQS increased from 77 to 81 µg/L This new value indicates a lower risk from exposure than previously considered, and the change has no impact on the remedy's protectiveness;
- 2,3,7,8-TCDD Equiv: The soil cleanup level for dioxin at the time of the ROD was 270 ngTEQ/kg. This value was based on the MTCA Method C. The current MTCA Method C cleanup level is 1,680 ng/kg. This increased value indicates that the ROD's soil cleanup value for dioxin is protective.
- TPH (as diesel): Under the MTCA Method A, the soil cleanup level for diesel was 200 mg/kg at the time the ROD was signed. This value increased to 2,000 mg/kg, effective in 2001. This new value indicates a lower risk from exposure than previously considered, and the change has no impact on the remedy's protectiveness.
- Total PCBs: At the time of the ROD there was not a sediment quality standard for total PCBs in marine sediments. Currently, the SQS is 12,000 µg/kg which is higher and less stringent than the current cleanup level and cleanup goal. This new value indicates a lower risk from exposure than previously considered, and the change has no impact on the remedy's protectiveness.

Table 7 lists the action-specific ARARs that are still applicable to the Site.

**Table 7. Changes in Action-Specific Requirements**

Action	Requirement	Description	Citation/Year	Affects Protectiveness
Landfill Area, Clam Bay, and Fire Training Area	The State of Washington Hazardous Waste Cleanup-Model Toxics Control Act (MTCA; Chapter 70.105D RCW)	Establishes requirements for the identification, investigation, and cleanup of facilities where hazardous substances have come to be located.	ROD	Any recent changes will be recorded above in the chemical specific ARARs.

Action	Requirement	Description	Citation/ Year	Affects Protectiveness
	The State of Washington Sediment Management Standards (SMS; Chapter 173-204 WAC)	Establishes chemical-specific sediment quality standards (SQS) which are applicable within Clam Bay to control potential adverse effects on biological resources.	ROD	Recent updates to the SMS are recorded in Table 6. There have been administrative changes to the SMS since the ROD. A brief summary is provided below. These changes do not affect protectiveness.
	Section 401 and 404(b)(1) of the Federal Clean Water Act and Section 10 of the Rivers and Harbors Act	Protect marine environments and prevent unacceptable adverse effects on shellfish beds, fisheries, wildlife, and recreational areas during dredging activities. These regulations are applicable to excavation, dredging, and fill activities.	ROD	No changes that affect protectiveness.
	The Kitsap County Shoreline Master Plan (WAC-173-19-2604)	Covers fill, dredging, and other remedial activities conducted within 200 feet of the shoreline	ROD	No changes that affect protectiveness.
	State of Washington (WISHA) and Federal (OSHA)	Applicable standards establishing safe operating procedures and requirements for the conduct of all remedial actions at the site.	ROD	No changes that affect protectiveness.
	The State of Washington Minimal Functional Standards (MFS) for Solid Waste Handling	Standards for the design of landfill containment and long-term operations and maintenance requirements within the landfill cap area	ROD	No changes that affect protectiveness.
	Endangered Species Act	Conserves threatened or endangered species	ROD	No changes that affect protectiveness.

The Sediment Management Standards (Chapter 173-204 WAC) was used to determine chemical-specific cleanup levels for Clam Bay sediments at the Site. Ecology adopted the revised Sediment Management Standards rule on February 22, 2013 and the new rule became effective on September 1, 2013.

The following are adopted amendments that are relevant at the Site:

- 1) Integrate the SMS and MTCA, Chapter 173-340 WAC, cleanup requirements where appropriate.
- 2) Clarify requirements for protection of human health from sediment contamination.
- 3) Clarify requirements for protection of higher trophic level species from sediment contamination.
- 4) Clarify requirements for coordinating source control and cleanup actions at cleanup sites.

The amendments clarify methods and policies for establishing risk-based cleanup standards, establish procedures for incorporating background concentrations, and integrate the requirements

in the MTCA and SMS rules for sediment cleanup. The SMS rule has six sections and the amendments focus on Part V: Sediment Cleanup Standards. The amendments add to the SMS decision framework a mechanism for setting standards to protect human health and the environment in both marine and freshwater sediment. Currently, the administrative amendments to the SMS do not affect the protectiveness of the remedy.

Below are other criteria, advisories or guidance to-be-considered (TBCs):

- Executive orders 11990 and 11988, which are intended to avoid adverse effects, minimize potential harm and restore and preserve natural and beneficial uses of wetlands and floodplains.
- Critical toxicity values and U.S. Food and Drug Administration action levels for concentrations of mercury and PCBs in edible seafood tissue.
- EPA Wetland Action Plan describing the National Wetland Policy and primary goal of “no net loss”
- Puget Sound Storm Water Management Program
- Draft Puget Sound Estuary Program Protocols, as amended for sample collection, laboratory analyses and quality assurance/quality control (QA/QC) procedures.

There have not been any significant changes to the above mentioned TBCs that would affect the protectiveness of the remedy.

### 7.2.2 Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics

No new pathways of exposure have been identified in this FYR. No changes have been identified with respect to ecological protection.

Since the ROD, the World Health Organization has made minor changes to the methods by which toxicity equivalents are calculated. There are no changes to toxicity values that would negatively affect the protectiveness. All of the values that changed were less toxic than the values in the ROD. Table 8 is a comparison to toxicity values in the ROD compared to the most recent values.

**Table 8. Toxicity Values for COCs**

Contaminant	Toxicity values in ROD <sup>1</sup>	Changes in Toxicity Values <sup>2</sup>
Copper and compounds	Oral RfD <sup>3</sup> : 3.7-02 mg/kg-day	Oral RfD <sup>4</sup> : 4.0E-02 mg/kg-day (less toxic)
Nickel (soluble salts)	Oral RfD <sup>5</sup> : 2.0E-02 mg/kg-day	IUR <sup>5</sup> : 2.6E-04 (ug/m <sup>3</sup> ) <sup>-1</sup> (new) Oral RfD <sup>5</sup> : 2.0E-02 mg/kg-day (unchanged) Inhalation RfC <sup>6</sup> : 9.0E-05 mg/m <sup>3</sup> (new)

<b>Contaminant</b>	<b>Toxicity values in ROD<sup>1</sup></b>	<b>Changes in Toxicity Values<sup>2</sup></b>
Zinc and compounds	Oral RfD <sup>5</sup> : 3.0E-01 mg/kg-day	Oral RfD <sup>5</sup> : 3.0E-01 mg/kg-day (unchanged)
Total PCBs	Oral CPF <sup>5</sup> : 2.0E+00 (mg/kg-day) <sup>-1</sup> Oral RfD <sup>5</sup> : 2.0E-05 mg/kg-day (based on Aroclor 1254)	Oral SF <sup>5</sup> : 2.0E+00 (mg/kg-day) <sup>-1</sup> (unchanged) IUR <sup>5</sup> : 5.7E-04 (ug/m <sup>3</sup> ) <sup>-1</sup> (new) Oral RfD <sup>5</sup> : 2.0E-05 mg/kg-day (based on Aroclor 1254) (unchanged)
Silver and compounds	Oral RfD <sup>5</sup> : 5.0E-03 mg/kg-day	Oral RfD <sup>5</sup> : 5.0E-03 mg/kg-day (unchanged)
2,4-Dimethylphenol	Oral RfD <sup>5</sup> : 2.0E-02 mg/kg-day	Oral RfD <sup>5</sup> : 2.0E-02 mg/kg-day (unchanged)
2,3,7,8-TCDD Equiv	Oral CPF <sup>4</sup> : 1.5E+05 (mg/kg-day) <sup>-1</sup> Inhalation CPF <sup>4</sup> : 1.5E+05 (mg/kg-day) <sup>-1</sup>	Oral SF <sup>7</sup> : 1.3E+05(mg/kg-day) <sup>-1</sup> (less toxic) IUR <sup>7</sup> : 3.8E+01(ug/m <sup>3</sup> ) <sup>-1</sup> (less toxic) Oral RfD <sup>5</sup> : 7.0E-10 mg/kg-day (new) Inhalation RfC <sup>7</sup> : 4.0E-08 mg/m <sup>3</sup> (new)
TPH (as diesel)	Inhalation RfD <sup>8</sup> : 8.0E-02 mg/kg-day Oral RfD <sup>8</sup> :8.0E-03 mg/kg-day	

1-Toxicity values were not provided in the ROD. Therefore, this evaluation uses the values listed in the 1996 Final Remedial Investigation/Feasibility Study Vol 1A Remedial Investigation Table 6-10 and Table 6-11.

2-New toxicity values are from the November 2013 EPA RSLs which reflect the most recent EPA IRIS toxicity values; different units for inhalation toxicity values have been published, as EPA no longer uses inhalation reference doses or inhalation cancer slope factors, but rather inhalation reference concentrations and inhalation unit risks. MTCA equations continue to use the older units. These toxicity values are used to determine all screening and cleanup levels.

3-Source is Division of Workers Compensation

4-Source is Health Effects Assessment Summary Tables

5-Source is Integrated Risk Information System (IRIS)

6-Source is Agency for Toxic Substance and Disease Registry (ATSDR)

7-Source is California EPA

8-Source is Environmental Criteria and Assessment Office

RfD-Reference Dose

IUR-Inhalation Unit Risk

RfC-Inhalation Reference Concentration

CPF-Cancer Potency Factor

### ***7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?***

**No.** No additional information has come to light that could call into question the protectiveness of the remedy.

### ***7.4 Technical Assessment Summary***

According to the site assessment and documents and data reviewed, the remedy at the Site is functioning as intended by the ROD. The landfill cap, hydraulic cutoff system, and shoreline protection system are in good condition and working as expected. The continuing routine erosion at the northern portion of the shoreline protection system is predicted to diminish with the realignment of the hard point in summer 2015. The institutional controls are in place with the finalization of the ICP, except for warning signage on the landfill cap. All the cleanup levels/goals and toxicity values used during the time of the ROD are still protective. There is no other information that calls into question the protectiveness of the remedy.

The most recent tissue sampling event showed that the 95% UCL for all grid samples was 28.31 µg/kg-wet (data normally distributed) which is below the ROD tissue cleanup goal of 42 ug/kg-wet PCBs. The results of the 2013 tissue monitoring show that there is one grid location that exceeds the tissue cleanup. The results of the sediment sampling show that total PCBs have met the cleanup level of 130 µg/kg-dry for total PCBs. There are still some discrete samples in the intertidal areas that exceed the cleanup goal of 40 µg/kg-dry for total sediment PCBs.

The FFTA remedy is functioning as of February 2011 when the ICP was implemented. The signage in place will warn contractors and employees that there is contamination and to follow the requirements listed in the ICP.

## 8.0 Issues

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This section presents issues that require follow-up actions.

**Table 9. Issues**

<b>Issues</b>	<b>Affects Current Protectiveness (Y/N)</b>	<b>Affects Future Protectiveness (Y/N)</b>
Shellfish consumption rates used in the human health risk assessment were from other tribes in Puget Sound. The Suquamish Tribe has since identified shellfish consumption rates which may affect calculated site risks.	N	N

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## 9.0 Recommendations and Follow-up Actions

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Recommendations and follow-up actions are as follows:

**Table 10. Recommendations and Follow-up Actions**

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Shellfish consumption rates used in the human health risk assessment were from other tribes in Puget Sound. The Suquamish Tribe has since identified shellfish consumption rates which may affect calculated site risks	Reassess risk looking at all exposure assumptions from original risk assessment	USACE	EPA	September 2016	N	N

Recommendations not affecting protectiveness or its determination include:

- The CMP should be updated to reflect current conditions at the Manchester NPL Site. The tentative completion is in 2016.
- Beach material redistribution should continue to be monitored to ensure that the shoreline protection system is functioning as intended.
- EPA Manchester Laboratory must install warning signs on the landfill cap to be in compliance with the ICP.

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## *10.0 Protectiveness Statements*

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The remedy at Old Navy Dump/ Manchester Annex Site is protective of human health and the environment.

The remedial action construction is complete and the remedy is functioning as intended. Exposure pathways that would result in unacceptable risks are being controlled by institutional controls. The landfill cap and the shoreline protection system are functioning as intended and the former fire training area has met the cleanup requirements.

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## *11.0 Next Review*

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The next five-year review for the Old Navy Dump/ Manchester Annex site is due September 25, 2019.

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## 12.0 References

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- CTI and Associates. 2010. *2009 Annual Report, Inspection and Maintenance Activities for the Landfill Cap and Shoreline Protection System*. Manchester Annex Superfund Site, Manchester, WA. March 2010.
- CTI and Associates. 2011. *2010 Annual Report, Inspection and Maintenance Activities for the Landfill Cap and Shoreline Protection System*. Manchester Annex Superfund Site, Manchester, WA. March 2011.
- CTI and Associates. 2012. *2011 Repairs-2011 Completion Report Final*. Landfill Cap and Shoreline Protection System, Manchester Annex Superfund Site, Manchester, WA.
- CTI and Associates. 2012. *2011 Annual Report, Inspection and Maintenance Activities for the Landfill Cap and Shoreline Protection System*. Manchester Annex Superfund Site, Manchester, WA. June 2012.
- CTI and Associates. 2013. *2012 Repairs Construction Completion Report Final*. Shoreline Protection System Maintenance Repairs, Manchester Annex Superfund Site, Manchester, WA.
- CTI and Associates. 2013. *2012 Annual Report, Inspection and Maintenance Activities for the Landfill Cap and Shoreline Protection System*. Manchester Annex Superfund Site, Manchester, WA. May 2013.
- CTI and Associates. 2014. *Draft 2013 Annual Report, Inspection and Maintenance Activities for the Landfill Cap and Shoreline Protection System*. Manchester Annex Superfund Site, Manchester, WA. January 2014.
- DoDM, 2012. *Defense Environmental Restoration Program (DERP) Management*, DoDM 4715.20, March 2012 (Update Jun 2014).
- Ecology, 2007. *Background Document for the Proposed Amendments to the Model Toxics Control Act Cleanup Regulation Chapter 173-340 WAC*, April 2007
- Ecology, 2009. Cleanup Levels and Risk Calculations (CLARC), [www.fortress.epa.gov](http://www.fortress.epa.gov)
- Hart Crowser. 1996. *Final Remedial Investigation /Feasibility Study, Manchester Annex Superfund Site. Volume IA, IB, and II*, December 1996.
- Hart Crowser. 1999a. *Compliance Monitoring Plan, Manchester Annex Superfund Site*. March 1999.
- Hart-Crowser. 1999b. *Cultural Resources Construction Management Plan, Manchester Annex Superfund Site*. April 1999.

- Hart Crowser. 2002. *Inspection and Maintenance Manual, Landfill Cap and Shoreline Protection System, Manchester Annex Superfund Site*. January 2002.
- Suquamish Tribe. 2000. *Fish Consumption Survey of the Suquamish Indian Tribe of the Port Madison Indian Reservation, Puget Sound Region*. August 2000.
- USACE. 1993. *Preliminary Assessment*. Manchester Field Station, Manchester. October 1993.
- USACE. 1997a. U.S. Army Corps of Engineers. *Record of Decision – Manchester Annex Superfund Site*. September 1997.
- USACE. 1997b. U.S. Army Corps of Engineers. *Proposed Plan for Site Cleanup*. March 1997.
- USACE 2005a. U.S. Army Corps of Engineers. *Clam Survey Field Report – Manchester Annex Superfund Site*. February 2005.
- USACE 2005b. U.S. Army Corps of Engineers. *2005 Monitoring Report – Manchester Annex Superfund Site*. February 2005.
- USACE 2006. U.S. Army Corps of Engineers, *Clam Survey Field Report – Manchester Annex Superfund Site*, May 2006
- USACE. 2010a. Final 2010 Monitoring Data Summary Report. Pore-Water Manchester Annex Superfund Site
- USACE. 2010b. Memorandum for Record DERP-FUDS FI0WA011902 Manchester Annex-Engineering Review of the Landfill Toe. September 29, 2010.
- USACE. 2012. Institutional Control Plan-Old Navy Dump/Manchester Annex Superfund Site. Updated March 2012.
- USACE. 2013. *Addendum to Second Five Year Review Report*. Manchester Annex Superfund Site, Manchester, WA. March 2013.
- USACE. 2014. *Inspection and Maintenance Manual, Landfill Cap and Shoreline Protection System*. Manchester Annex, Manchester, WA.
- USEPA. 2001. U.S. Environmental Protection Agency. *Comprehensive Five-Year Review Guidance*. EPA 540-R-01-007 / OSWER No. 9355.7-03B-P. June 2001.
- USEPA. 2007. *Framework for Selecting and Using Tribal Fish and Shellfish Consumption Rates for Risk-Based Decision Making at CERCLA and RCRA Cleanup Sites in Puget Sound and the Strait of Georgia*. 2007
- World Health Organization (WHO). 2005. *Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds*. ToxSci Advance Access published online July 7, 2006. [http://www.who.int/ipcs/assessment/tef\\_update/en/](http://www.who.int/ipcs/assessment/tef_update/en/)

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## *Figures*

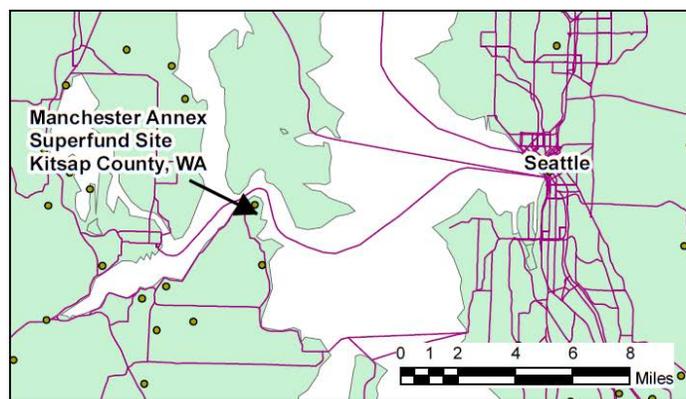
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SITE MAP



VICINITY MAP



Figure 1. Site map and vicinity map



Figure 2. Clam tissue sampling locations from 2010 sampling event.



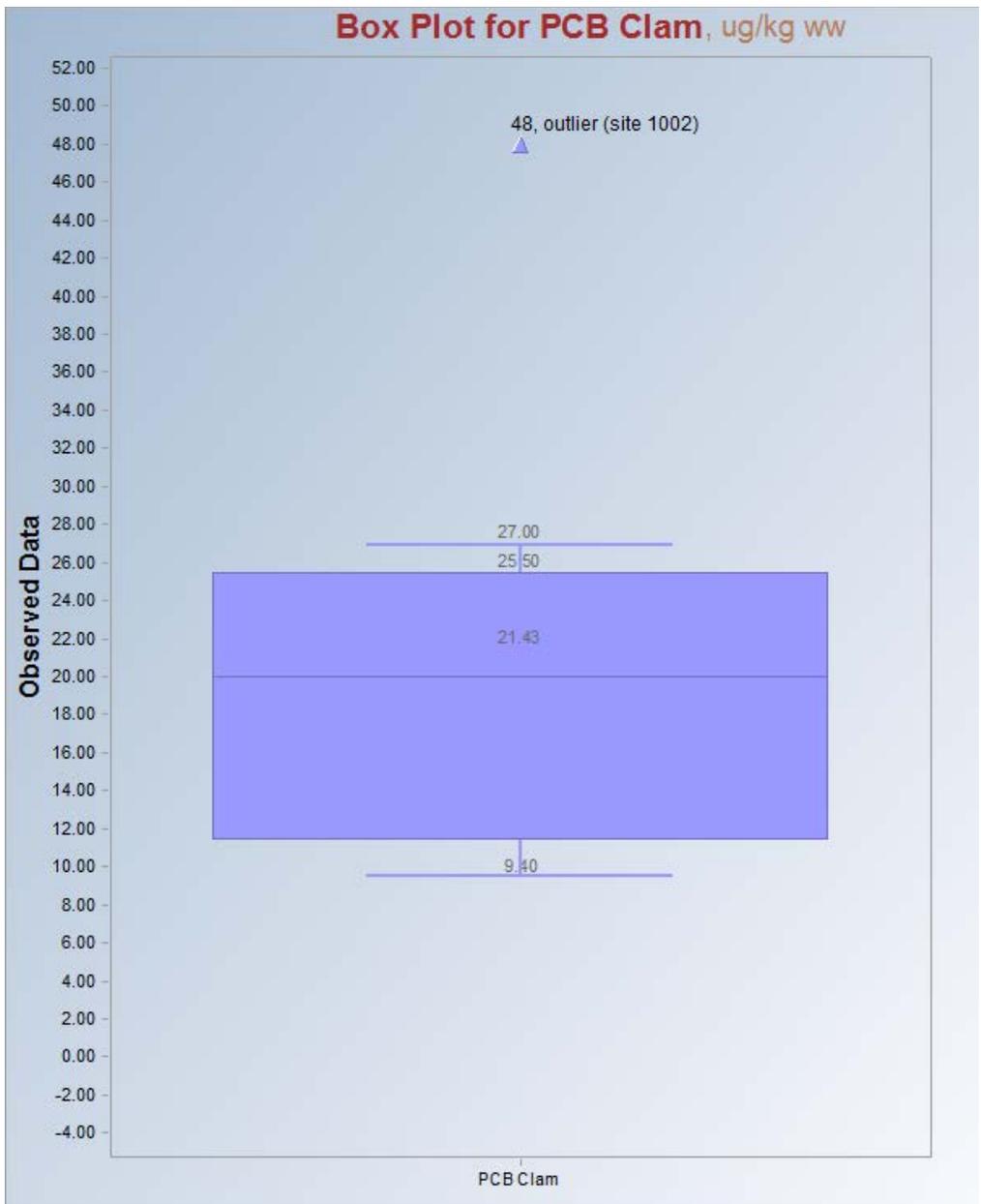
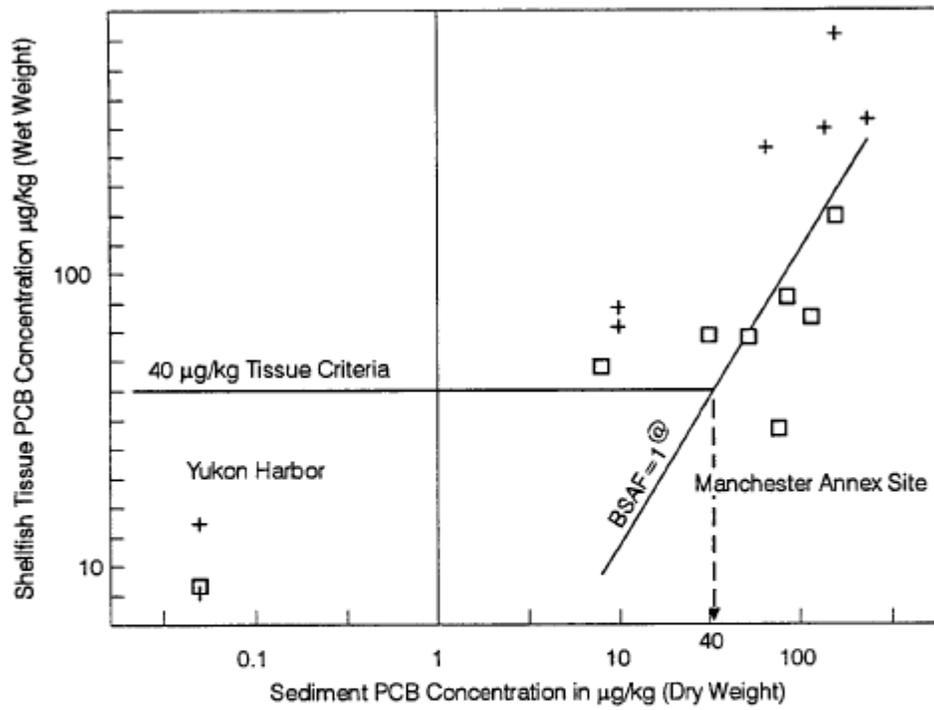


Figure 4. Box Plot for PCB Clam Tissue



□ Edible Species

+ Macoma Sp.

© Note: BSAF calculated as:  $\frac{\mu\text{g/kg tissue (wet weight)}}{\mu\text{g/kg sediment (dry weight)}}$

Figure 5. Sediment PCB Concentration VS Clam Tissue PCB Concentration from Feasibility Study

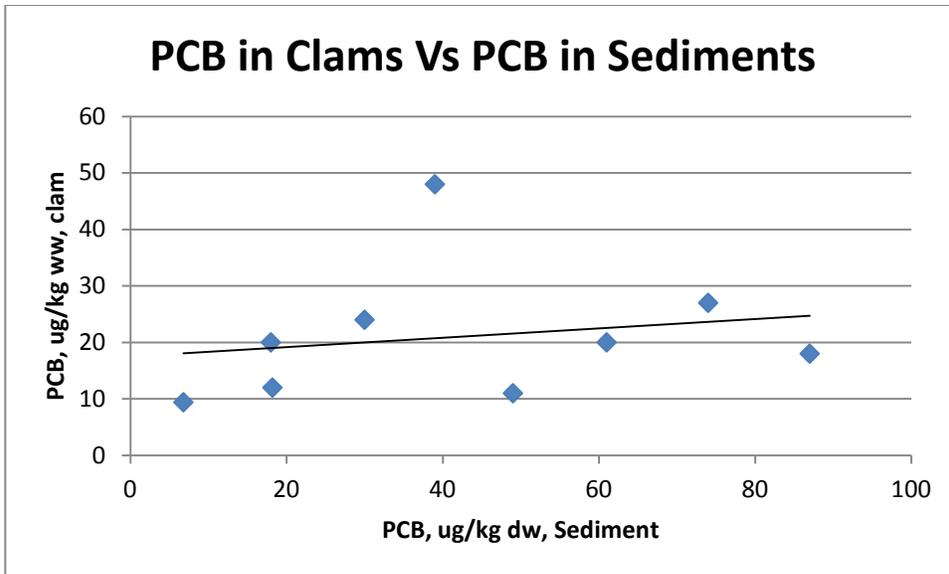


Figure 6. PCB in Clam Tissue Vs PCB in Sediments with data from 2013 sampling event

*Appendix A*  
*Site Inspection Checklist*

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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 NOAA  
 Contact Tom Flagg Station Manager 2/24/2014 360-871-8306  
 Name Title Date Phone no.  
 Problems; suggestions;  Report attached

Agency Suquamish Tribe  
 Contact Denice Taylor Environmental Scientist 3/6/2014 360-394-8449  
 Name Title Date Phone no.  
 Problems; suggestions;  Report attached

Agency EPA  
 Contact Barry Pepich Manchester Lab Director 2/24/2014 360-871-8701  
 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.

A questionnaire was sent to the Manchester State Park Ranger, but no response was received.

**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

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.	<b>O&amp;M and OSHA Training Records</b> Remarks	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
4.	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remarks	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
8.	<b>Leachate Extraction Records</b> Remarks	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
10.	<b>Daily Access/Security Logs</b> Remarks EPA has a sign in/ sign out sheet at the receptionist desk.	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A

**IV. O&M COSTS**

**1. O&M Organization**

- |  |   |
|--|---|
| <input type="checkbox"/> State in-house            | <input type="checkbox"/> Contractor for State                       |
| <input type="checkbox"/> PRP in-house              | <input type="checkbox"/> Contractor for PRP                         |
| <input type="checkbox"/> Federal Facility in-house | <input checked="" type="checkbox"/> Contractor for Federal Facility |
| <input type="checkbox"/> Other                     |   |

**2. O&M Cost Records**

- 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 <u>June 2009</u>	To <u>January 2010</u>	<u>\$38,700</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From <u>April 2010</u>	To <u>January 2011</u>	<u>\$40,300</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From <u>May 2011</u>	To <u>January 2012</u>	<u>\$41,900</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From <u>April 2012</u>	To <u>January 2013</u>	<u>\$43,500</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From <u>April 2013</u>	To <u>January 2014</u>	<u>\$45,300</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

**3. Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons:

In 2011, aerial photography, Culvert and landfill drainage repairs, and well abandonment cost approximately \$116,600.  
 In 2012, plantings, shoreline protectino system repairs, road repairs, and fence maintenance cost approximately \$564,900.  
 In 2013, aerial photography and the completion report for repairs cost approximately \$13,000.

**V. ACCESS AND INSTITUTIONAL CONTROLS**     Applicable     N/A

**A. Fencing**

- 1. Fencing damaged**       Location shown on site map       Gates secured       N/A

Remarks Fence was in good condition. Some plants were growing near fence boundary and will be removed during I&M. The secured gate is open during business hours and was functioning during the site visit. About a month ago they had some issues with the gate not working and some trespassing on the beach area occurred.

**B. Other Access Restrictions**

- 1. Signs and other security measures**       Location shown on site map       N/A

Remarks

**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) Inspection and maintenance  
Frequency varies, 2 to 4 times per year  
Responsible party/agency USACE  
Contact \_\_\_\_\_  
Name Title Date 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

The Institutional Control Plan was most recently updated in March 2012. This plan outlines specific institutional controls for the site.

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 There was one trespassing event that occurred in early 2014. The secure gate was malfunctioning and did not close after business hours. Some people drove their Escalade onto the beach. No damage was seen to any remedies in the area.

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

**B. Other Site Conditions**

Remarks

**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 **There are some small animal burrows. They do not seem to be affecting the protectiveness of the cap. They are inspected during routine I&M.**

5. **Vegetative Cover**  Grass  Cover properly established  
 No signs of stress  Trees/Shrubs (indicate size and locations on a diagram)  
Remarks **There is still some scottsbroom, oregon grape, some small trees growing near west half of landfill. Horsetail was growing in the drainage ditch.**

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.	<b>Wet Areas/Water Damage</b> <input checked="" type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks	<input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map    Areal extent _____ <input type="checkbox"/> Location shown on site map    Areal extent _____ <input type="checkbox"/> Location shown on site map    Areal extent _____ <input type="checkbox"/> Location shown on site map    Areal extent _____	
	There were some wet areas along the perimeter drain, but no ponding was evident.		
9.	<b>Slope Instability</b> Areal extent _____ Remarks	<input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of slope instability
<b>B. Benches</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Applicable (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.	<b>Flows Bypass Bench</b> Remarks	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
2.	<b>Bench Breached</b> Remarks	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
3.	<b>Bench Overtopped</b> Remarks	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
<b>C. Letdown Channels</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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.	<b>Settlement</b> Areal extent _____    Depth _____ Remarks	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
2.	<b>Material Degradation</b> Material type _____    Areal extent _____ Remarks	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
3.	<b>Erosion</b> Areal extent _____    Depth _____ Remarks	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion

4.	<b>Undercutting</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
5.	<b>Obstructions</b>	Type _____	<input type="checkbox"/> No obstructions <input type="checkbox"/> Location shown on site map
	Areal extent _____	Size _____	
	Remarks _____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	<input type="checkbox"/> No evidence of excessive growth		
	<input type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
<b>D. Cover Penetrations</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> N/A <input type="checkbox"/> Active <input checked="" type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning	
		<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> Evidence of leakage at penetration	
	Remarks <b>The gas vents were originally sampled for %LEL but it has been determined there is not any concern.</b>		
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition	
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A	
	Remarks _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition	
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A	
	Remarks <b>All monitoring wells have been decommissioned and paved over.</b>		
4.	<b>Leachate Extraction Wells</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition	
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A	
	Remarks _____		
5.	<b>Settlement Monuments</b>	<input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed <input checked="" type="checkbox"/> N/A	
	Remarks _____		

<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Gas Treatment Facilities</b> <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Collection for reuse <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks	
2.	<b>Gas Collection Wells, Manifolds and Piping</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks	
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks	
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Outlet Pipes Inspected</b> Remarks	<input type="checkbox"/> Functioning <input type="checkbox"/> N/A
2.	<b>Outlet Rock Inspected</b> Remarks	<input type="checkbox"/> Functioning <input type="checkbox"/> N/A
<b>G. Detention/Sedimentation Ponds</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Siltation</b> <input type="checkbox"/> N/A <input type="checkbox"/> Siltation not evident Areal extent _____      Depth _____ Remarks	
2.	<b>Erosion</b> Areal extent _____      Depth _____ <input type="checkbox"/> Erosion not evident Remarks	
3.	<b>Outlet Works</b> Remarks	<input type="checkbox"/> Functioning <input type="checkbox"/> N/A
4.	<b>Dam</b> Remarks	<input type="checkbox"/> Functioning <input type="checkbox"/> N/A

<b>H. Retaining Walls</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement _____	Vertical displacement _____	
	Rotational displacement _____		
	Remarks _____		
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks _____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Siltation not evident
	Areal extent _____	Depth _____	
	Remarks _____		
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
		<input type="checkbox"/> Vegetation does not impede flow	
	Areal extent _____	Type _____	
	Remarks _____	The drainage ditches are being monitored for vegetation that may impede flow of water.	
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
	Areal extent _____	Depth _____	
	Remarks _____		
4.	<b>Discharge Structure</b>	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks The outfall pipes and outfall box are clear of any obstructions. Part of the I&M work is to remove any sediment or debris blocking the pipes.		
<b>VIII. VERTICAL BARRIER WALLS</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Settlement not evident
	Areal extent _____	Depth _____	
	Remarks _____		
2.	<b>Performance Monitoring</b>	Type of monitoring _____	
	<input checked="" type="checkbox"/> Performance not monitored	<input type="checkbox"/> Evidence of breaching	
	Frequency _____	Head differential _____	
	Remarks _____		
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Pumps, Wellhead Plumbing, and Electrical</b>		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> All required wells properly operating	<input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A
	Remarks _____		

2.	<b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks
<b>C. Treatment System</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks

3.	<b>Tanks, Vaults, Storage Vessels</b>	<input type="checkbox"/> N/A	<input type="checkbox"/> Good condition	<input type="checkbox"/> Proper secondary containment	<input type="checkbox"/> Needs Maintenance
Remarks					
4.	<b>Discharge Structure and Appurtenances</b>	<input type="checkbox"/> N/A	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
Remarks					
5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A	<input type="checkbox"/> Good condition (esp. roof and doorways)	<input type="checkbox"/> Needs repair	
<input type="checkbox"/> Chemicals and equipment properly stored					
Remarks					
6.	<b>Monitoring Wells</b> (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A	
Remarks					
<b>D. Monitoring Data</b>					
1.	Monitoring Data	<input type="checkbox"/> Is routinely submitted on time		<input type="checkbox"/> Is of acceptable quality	
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained		<input type="checkbox"/> Contaminant concentrations are declining	
<b>D. Monitored Natural Attenuation</b>					
1.	<b>Monitoring Wells</b> (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A	
Remarks					
<b>X. OTHER REMEDIES</b>					
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 remedial objectives are to prevent human and wildlife contact with wastes in the landfill, prevent fugitive dust emissions containing asbestos, prevent shoreline erosion of landfill wastes, reduce migration of landfill contaminants through seeps, reduce concentrations of COCs, prevent subsistence-level harvesting of shellfish in Clam Bay until shellfish are determined to be safe, prevent human and wildlife contact with simulator debris and soils containing dioxin, and minimize solubilization of TPH into groundwater. The landfill cap is effective. There are some persisting issues with scottsbroom and there were a few trees planted on the outside the west edge of the landfill between the road and the edge of the landfill cap. The shoreline protection system is effective. In 2012 they did repair work to the shoreline protection system by adding more beach sediments to return the grade to the original design. There are still issues with erosion, but there are plans to remove the hardpoint next year. This should help with deposition of sediment. The ICP and is in place at the FFTA. Sampling is continuing to determine if the concentrations of COCs are below the cleanup goals.

### 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.

There do not seem to be any issues with the procedures in place to keep protectiveness. One issue that is still be discussed is the tribal consumption rates and how they relate to the cleanup goals listed in the ROD.

### 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.

There was repair done in 2011 and 2012 that was not included in the original I&M manual. This work should not be expected to reoccur if I&M work is performed routinely.

### D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

One opportunity is the removal of the hardpoint. This work is expected to take place in Summer 2015. Removing the hardpoint will hopefully replenish the beach naturally with sediment. There is also a boat launch that seems to be keeping sediment from distributing along the beach. The removal of this would also create a more natural environment.

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*Appendix B*  
*Interview Records*

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# Interview Records

Five-Year Review Interview Record				
<b>Site:</b>	Manchester Annex NPL Site	<b>EPA ID No:</b>	WA8680030931	
Interview Type: Visit Location of Visit: Manchester Laboratory, Manchester, WA Date: February 24, 2104 Time: 1040				
Interviewers				
Name	Title	Organization		
Karah Haskins	Physical Scientist	USACE		
Marlowe Laubach	Chemical Engineer	USACE		
Interviewees				
Name	Organization	Title	Telephone	Email
Mark Ader	EPA	RPM/Lab Facility Manager	360-871-8724	<a href="mailto:Ader.Mark@epa.gov">Ader.Mark@epa.gov</a>
Summary of Conversation				
<p>1) What is your overall impression of the project?                      Overall the project is going well and there is a spirit of cooperation. The Corps process is frustrating and slow compared to [sites that are] PRP or EPA-lead.</p> <p>2) What effects have site operations had on the surrounding community?                      No public involvement. Public crabbers are present at the end of the pier [during crab season.]</p> <p>3) Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.                      No.</p> <p>4) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office? If so please give purpose and results.                      None. The Corps always notifies us when they will be on site. There has been good communications between the Corps and EPA.</p> <p>5) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.                      No. Only complaints related to fish consumption rates.</p> <p>6) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details.                      A group of Russian foreign nationals drove their Escalade onto the beach and started a bon fire. The police was notified. The gate at the time was not working which was how they were able to gain access to the beach.</p> <p>7) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the remedy?                      No.</p> <p>8) Do you feel well informed about the site's activities and progress?                      Yes.</p> <p>9) Do you have any comments, suggestions, or recommendations regarding the project?                      EPA and the [Suquamish] Tribe would like to review the cleanup goal/cleanup goal regarding related to consumptions rates. I am working with other Puget Sound sites. The Corps is slow producing documents which may be a result of the command structure. However, there is a spirit of cooperation.</p> <p>EPA would like to add native wild flowers on the landfill cap. A wildflower meadow would be the result. However, past mowing practices to control scotch broom removed the wild flowers. The CMP [compliance monitoring plan] still needs to be completed. &lt;Mr. Ader asked for the schedule for that work.&gt; For the last sampling event, EPA approved multi-incremental sampling but the Corps did not do this sampling scheme because they wanted to collect discrete samples to be collected for direct comparison to past sampling events. Mr. Ader felt blind-sided by the reversal in sampling procedures.</p>				
Additional Site-Specific Questions				
<i>[If needed]</i>				

Five-Year Review Interview Record					
<b>Site:</b>	Old Navy Dump/Manchester Annex NPL Site			<b>EPA ID No:</b>	WA8680030931
Interview Type: Visit					
Location of Visit: NOAA Marine Fisheries Research Facility, Manchester, WA					
Date: February 24, 2104					
Time: 1155					
Interviewers					
<b>Name</b>			<b>Title</b>	<b>Organization</b>	
Karah Haskins			Physical Scientist	USACE	
Marlowe Laubach			Chemical Engineer	USACE	
Interviewees					
<b>Name</b>	<b>Organization</b>	<b>Title</b>	<b>Telephone</b>	<b>Email</b>	
Tom Flagg	NOAA	Station Manager/Supervisory Fish Biologist	360-871-8306	<a href="mailto:Tom.Flagg@noaa.gov">Tom.Flagg@noaa.gov</a>	
Summary of Conversation					
<p>1) What is your overall impression of the project? Project has gone through a slight period of inactivity. The last 5 -6 years working with May has been good; she always makes sure I'm notified in advance.</p> <p>2) What effects have site operations had on the surrounding community? No community effects. The site is under state or federal ownership so no private neighbors. The closest private neighbors to the west [of the site] aren't aware of us as this [site] has been a government facility for years..</p> <p>3) Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. No.</p> <p>4) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office? If so please give purpose and results. No.</p> <p>5) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. No.</p> <p>6) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details. I'm sure you heard of the Russian nationals getting on site. The gate has been fixed and has been working well in the last 6 to 8 months.</p> <p>7) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the remedy? No.</p> <p>8) Do you feel well informed about the site's activities and progress?. Yes. I am notified when Corps and contractors are on site.</p> <p>9) Do you have any comments, suggestions, or recommendations regarding the project? Things are a little easier because there is no recent activity compared to the EPA property. We make sure that no digging is conducted in areas of past contamination as presented in the ICP.</p>					
Additional Site-Specific Questions					
<i>[If needed]</i>					

Five-Year Review Interview Record					
<b>Site:</b>	Old Navy Dump/Manchester Annex NPL Site			<b>EPA ID No:</b>	WA8680030931
Interview Type: Visit Location of Visit: Manchester Laboratory, Manchester, WA Date: February 24, 2104 Time: 1100					
Interviewers					
<b>Name</b>			<b>Title</b>	<b>Organization</b>	
Karah Haskins			Physical Scientist	USACE	
Marlowe Laubach			Chemical Engineer	USACE	
Interviewees					
<b>Name</b>	<b>Organization</b>	<b>Title</b>	<b>Telephone</b>	<b>Email</b>	
Barry Pepich	EPA	Manchester Lab Director	360-871-8701	<a href="mailto:Pepich.Barry@epamail.epa.gov">Pepich.Barry@epamail.epa.gov</a>	
Summary of Conversation					
<p>1) What is your overall impression of the project? Overall the project is going well. I am pleased with the progress; I came in 2008. We need to determine the long-term plans for the future; since we are not meeting cleanup goals. We had technical project planning to help determine these goals. We asked EPA's lead risk assessor for assistance to help determine what is baseline [for sediment] in Puget Sound and what these should goals be. I'm excited about the hard point removal as an improvement to the remedy. The removal of the boat launch would help, as well.</p> <p>2) What effects have site operations had on the surrounding community? No, since we are pretty isolated here. In my mind, the community includes the [Suquamish] Tribe. We are cleaning up for the Tribe. EPA will be happy when the Tribe will be able to harvest clams.</p> <p>3) Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. I received a call about 3 years ago from someone, unsure if it was a community member or reporter, regarding a cancer cluster at the Manchester elementary school. The community was concerned that the Superfund site could be the cause. I had to tell them that the remedy at this Superfund site was already in place and likely not a potential cause for this cluster.</p> <p>4) Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office? If so please give purpose and results. Yes, with the Corps.</p> <p>5) Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. See Question 6 below.</p> <p>6) Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency response from local authorities? If so, please give details. A group of Russian foreign nationals came onto the site around 11 pm [a few years ago] and drove their Escalade onto the beach at the toe of the cap and started a bon fire. The sheriff was notified. It is unknown what came of them. However, no arrests were made. There is a police record of the incident. The gate at the time was not working which was how they were able to gain access to the beach. The only emergency response was related to an ambulance response for a suspected heart attack.</p> <p>7) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the remedy? No.</p>					

8) Do you feel well informed about the site's activities and progress?

Yes, well informed. The relationship (between EPA and the Corps) has been good. It (the relationship) was not always good especially during the initial shoreline design and biological assessment, which was performed without consultation with stakeholders. But things have worked out and the relationship has been good. Enjoy working with the people from the Seattle District.

9) Do you have any comments, suggestions, or recommendations regarding the project?

Keep open communications and engage stakeholders early on [in the process.]

**Additional Site-Specific Questions**

*[if needed]*

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Five-Year Review Interview Record					
<b>Site:</b>	Manchester Annex NPL Site			<b>EPA ID No:</b>	WA8680030931
Interview Type: Teleconference Location of Visit: Teleconference Date: March 6, 2014 Time: 0900					
Interviewers					
<b>Name</b>			<b>Title</b>	<b>Organization</b>	
Karah Haskins			Physical Scientist	USACE	
Marlowe Laubach			Chemical Engineer	USACE	
Interviewees					
<b>Name</b>	<b>Organization</b>	<b>Title</b>	<b>Telephone</b>	<b>Email</b>	
Denice Taylor	Suquamish Tribe	Environmental Scientist/ Program Manager for DOD Cooperative Agreement	360-394-8449	<a href="mailto:dtaylor@suquamish.nsn.us">dtaylor@suquamish.nsn.us</a>	
Summary of Conversation					
<p>1. What is your overall impression of the project? (general sentiment) Overall, the project team is much more focused on long-term management and developing strategies for optimizing the remedy to achieve the goals of the ROD. The hydraulic cut-off system is working as designed and implemented. SPS had a major repair and still seeing issues with erosion. A good option with the removal of the hard point to encourage biological process. I'm really excited about that. Monitoring is more regular than previous. Still need to have discussions on the monitoring; the hard point removal will change how we view the site and will need look at how the removal of the hard point would affect monitoring. Part of the remedy included natural recovery; we didn't see what was expected. Hoping that this [hard point removal] would promote natural recovery.</p> <p>2. What effects have site operations had on the surrounding community? The site lies within the exclusive rights of the usual and accustomed harvest area for the Suquamish Tribe. The Tribe would be the only tribe that would harvest from those waters (Clam Bay). Any harvest restrictions prevent the harvest of fish and shellfish.</p> <p>3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. When I represent the Tribe, I work to improve the quality of habitat, improve access and remove any expressions to treaty rights for harvest. The exposure scenarios used at the time of the ROD have since been updated. Previous exposures assumptions in the ROD are out-dated.</p> <p>3a. Does the gate maintained by NOAA affect access for harvest? If the fisheries were open, the Tribe would coordinate with owner for access.</p> <p>4. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results. Yes. Because the Tribe participates on the project team, we participate in site decisions. In the past, we helped the USACE with shellfish sampling.</p> <p>5. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. There are different levels of responses. Complaints don't necessarily come from community members. There have been communications glitches with site management issues, but [the project team] have worked it out.</p> <p>6. Do you feel well informed about the site's activities and progress? Yes. The project team is working much for effectively. Previously things had fallen through the cracks [at this site.]</p> <p>7. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? Really great opportunity for the removal of the hard point.</p>					

A couple things from the last FYR because of the hard point that got bumped in the future

1. CMP (compliance monitoring plan). The project team need to evaluate the monitoring goals and exit strategies, and how to conduct monitoring. If risk assessment is to be used in this process, this needs be consulted with the Tribe.

2. [The project team] will need to revisit that part of the ROD (risk assessment) to come up with more relevant goals. EPA risk assessor ran some numbers related to natural background. There are a couple of ways to determine cleanup goals for the site.

1. Health based/risk-based cleanup levels

2. If health-based/risk-based cleanup levels are less than a natural background then there is a default number for background.

Then the discussion would lead to using the natural background as the cleanup goal.

7a. What studies have been used to determine natural background in Puget Sound?

The BOLD data set, which collected data (for sediment) from non-urban areas in Puget Sound. For tissue, there is no existing data set for natural background.

This (cleanup goals) has also come up as comments in previous FYRs. There has been some reluctance from the USACE to change the ROD but we need to this.

7b. Any new exposure data from the Tribe?

The Tribe conducted a consumption survey in 2000. Results were incorporated with EPA's Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories.

This is a CERCLA/FUDS. However, the State Department of Health and Department of Ecology are not involved. State sediment standards are part of the ROD. These have been updated recently. They referred to using Tribal requirements (natural background).

<Ms. Taylor inquired about discussions with the Tribe regarding the issues/recommendations for the Five-Year Review. The review team responded that yes, a discussion with site stakeholders is included in the schedule for the Five-Year Review.>

I also review I&M inspection reports and know that there is use of some herbicides to kill the weeds, specifically Round-Up. I understand that the application is upland however in light of the proximity of the shore could an alternative to Round-Up be used?

**Additional Site-Specific Questions**

*[If needed]*



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## THE SUQUAMISH TRIBE

PO Box 498 Suquamish, WA 98392-0498

September 5, 2014

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RE: Draft Final Third Five-Year Review Report  
Manchester Annex NPL Site

Dear Ms. Carrell and Mr. Towster:

The Suquamish Tribe (Tribe) has reviewed the Corps' responses to EPA and Suquamish's comments on the draft Third Five-Year Review Report (5YR) for the Manchester Annex site, and the revised draft final report. In addition, the Tribe and the Corps have had several project manager level discussions focusing on the Corps' conclusions as the DoD lead agency for the 5YR process, and the Tribe's priority of ensuring that there are no long-term site-related impacts to treaty-protected resources and rights.

The primary purpose of this letter is to identify points of agreement and to re-state the Tribe's position where we do not concur with the Corps. The Corps and the Tribe have agreed that this letter will be included with the initial interview record in Appendix B of the final 5YR. In summary, the key points on which the Tribe does not concur are:

- The remedy component comprised of the thin layer sediment cap and enhanced natural recovery has not performed as intended by the ROD. Fifteen years after the remedial action, site conditions do not support unrestricted use and tribal harvest.
- Changes in Suquamish tribal exposure parameters, as well as changes in the WA SMS, are relevant to determining protectiveness for the reasonably anticipated future use of tribal harvest. Consideration of these changes is likely to lead to a re-evaluation of site compliance levels and goals.
- The remedy cannot be said to be protective of future uses. The protectiveness determination should be deferred until after the re-alignment of the SPS, when monitoring and analysis confirm natural recovery and the achievement of relevant compliance levels.

This letter also proposes project team actions that the Tribe believes will establish a clear path forward and lead to the long-term goals of unrestricted use and tribal harvest. Those actions include the development of work plans and schedules for re-evaluating site-related risks; reviewing /revising site compliance levels and goals; and revising the Compliance Monitoring Plan (CMP). The Tribe believes these actions will not impact the milestone dates of September 2016 for completing both the risk evaluation and the CMP update.

For a more detailed discussion of the key issues summarized above and for ease of comparison with 5YR, the attached comments are organized to correspond to the following components of the 5YR: the technical assessment (Section 7), issues, recommendations and follow up actions (Sections 8 and 9), and the protectiveness statement (Section 10).

The Tribe requests a response regarding implementation of the proposed project team actions. Please contact me if you have any questions, or would like to schedule further discussion.

Sincerely,

*Denice Taylor*

Denice Taylor  
Environmental Programs  
Fisheries Department  
Suquamish Tribe  
360-394-8449  
dtaylor@suquamish.nsn.us

cc: Mark Ader, USEPA Region 10  
Barry Pepich, USEPA Manchester Lab  
Lori Morris, USACE Seattle District Tribal Liaison

**Technical Assessment**

***Question A: Is the remedy functioning as intended by the decision documents?***

The Tribe agrees that the landfill cap, hydraulic cutoff system and shoreline protection system (SPS) were implemented as intended by the ROD. The landfill cap and hydraulic cutoff system are in good condition and are working as expected. The SPS is also working as expected, although there has been a persistent problem with erosion due to wave dynamics at the southern end, adjacent to the Manchester Laboratory parking lot (this is also referred to as the “hard point”.) While the erosion has not impacted the effectiveness of the SPS to date, the Tribe believes that the planned re-alignment of the hard point will address the issue and support natural shoreline processes.

The Tribe does not agree with the description and discussion of the thin layer sediment cap in the 5YR and recommended that these sections be revised to clarify that the thin layer sediment cap was intended to enhance natural recovery in onsite sediments rather than to provide containment. The Tribe cited references from the ROD and the first 5YR establishing that the overall objective of the remedy was to sufficiently reduce surface sediment and shellfish tissue concentrations to support unrestricted use of the thin-layer cap area within several years of completion of the remedial action. Sediment and tissue cleanup goals were predicted to be met 3 to 5 years after remedial construction, and limitations on subsistence-level harvest were to be used temporarily to control risks during the initial recovery period.

After 15 years, however, conditions do not support the reasonably anticipated future use of tribal harvest. The thin layer cap has not resulted in the degree of enhanced natural recovery intended in the ROD. The continued reliance on an IC restricting harvest to control exposure and ensure protectiveness is also contrary to the timeframe described in the ROD, as well as to CERCLA guidance. Most importantly, the fact that the site does not support unrestricted use and unlimited access continues to impact the Tribe’s treaty-protected rights to harvest and access, which were guaranteed in perpetuity under the Treaty of Point Elliott.

***Question B: Are the exposure assumptions, toxicity data, clean up levels and RAOs used at the time of the remedy selection still valid?***

The Tribe agrees that site-related risks should be re-evaluated to consider changes in exposure parameters since the time of the ROD. The 5YR establishes a reasonable milestone date of September 2016 for completing the re-evaluation.

The Tribe disagrees with the Corps’ conclusions that changes in the exposure parameters will not affect future protectiveness. Initial calculations provided by EPA’s human health risk assessor, Lon Kissinger, have demonstrated that current site sediment and tissue goals would not be considered to be protective of Suquamish tribal exposure via ingestion of shellfish. If these conclusions are confirmed, the Tribe believes it will be necessary to revise the compliance levels and goals specified in the original ROD to support unrestricted use and future tribal harvest of shellfish.

### **Technical Assessment**

#### ***Question B (cont'd): Are the exposure assumptions, toxicity data, clean up levels and RAOs used at the time of the remedy selection still valid?***

In addition to changes in exposure parameters, there have been changes in ARARs relevant to the site. The Tribe disagrees with the Corps' interpretation that changes to the WA SMS rule are "administrative" and will not affect the future protectiveness of the remedy. The Tribe believes that meeting the updated SMS will affect site compliance levels and goals. In particular, the current SMS clean up level for PCBs (as well as the cleanup level specified in the ROD) applies only to the protection of benthic organisms. It cannot be considered a criterion protective of human health or higher trophic levels. Under the revised SMS rule, the Tribe expects clean up levels and goals for human health and higher trophic levels will be lower than those established in the ROD. It is likely that this will trigger the default to natural background concentrations as compliance levels for the site.

### **Issues, Recommendations and Follow Up Actions**

The Tribe believes the following issues affect the reasonably anticipated future use of tribal harvesting:

- The re-alignment of the SPS is expected to support natural shoreline processes, which in turn are expected to enhance natural recovery at the site.
- The re-evaluation of site risks based on Suquamish exposure parameters is expected to result in risk levels for tribal harvesters higher than those estimated in the original risk assessment. If the re-evaluation confirms this conclusion, site compliance levels and goals must also be re-evaluated.
- Considering changes in the WA SMS rule since the time of the ROD, if revised risks for tribal harvesters are higher than corresponding natural background concentrations in sediments, compliance levels and goals will default to natural background levels.

Following the re-alignment of the SPS, the re-evaluation of site-related risks, and any formal changes in compliance levels and goals, the Tribe agrees that it will be necessary to revise the long-term compliance monitoring plan (CMP) to ensure that unrestricted use, including tribal harvest of shellfish, is achieved in a reasonable timeframe.

**Issues, Recommendations and Follow Up Actions (cont'd)**

The 5YR establishes milestone dates of September 2016 for both re-evaluating site risks and revising the CMP. The Tribe recommends that project managers from the Corps, EPA and the Tribe develop an overall scope of work and project schedule to support these efforts, as well as formalizing any changes in site compliance levels and goals.

**Protectiveness Statement**

The Tribe agrees with the Corps' conclusion that elements of the remedy which include the landfill cap, the hydraulic cutoff system, and the SPS have been implemented as intended by the ROD and remain protective of current uses. The Tribe disagrees that the remedy component related to the enhanced natural recovery of site sediments has performed as anticipated. However, because the remedy provides for the temporary restriction of tribal harvesting of shellfish, it can be considered to be currently protective of human health and the environment, in that it administratively avoids tribal exposure to contaminated sediments and shellfish.

Based on Suquamish tribal exposure parameters, the Tribe does not believe that site conditions have been demonstrated to be protective of the future use of tribal harvesting. The protectiveness determination should be deferred until after the re-alignment of the SPS, when monitoring and analysis confirm natural recovery and the achievement of relevant compliance levels.

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*Appendix C*  
*Site Inspection Photos*

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## Site Inspection Photos



View of NOAA dock and unused boat launch (facing east).



Unused boat launch where sediment settles (facing southwest).



**Previously filled in depression at southeast corner of hard point.**



**View of beach from hard point (facing southwest).**



**Sediment redistribution from waves (facing north).**



**View of hard point and redistributed material (facing northeast).**



**Additional view of beach material redistribution (facing northwest).**



**View of beach material redistribution (facing northwest).**



**View of beach material redistribution (facing northeast).**



**View of beach (facing southwest).**



**Pipe outfall. There was no debris observed to be blocking the outfall pipes.**



**Box culvert installed in September 2012 (facing northwest).**



**Stream from outfall pipe (facing south).**



**Southwest drain that is part of perimeter drainage.**



**Fence near west side of landfill (facing west).**



**Perimeter drainage.**



**Perimeter drainage with some standing water.**



**Oregon grapes on landfill cap. Oregon grape was part of the original landfill cap plantings.**



**View of landfill cap (facing northeast).**



**View of landfill cap (facing southwest).**



**Landfill gas vent with intact screen.**



**Small tree planted outside the northeast perimeter of landfill cap (facing southwest).**



**More trees planted near landfill cap (facing northwest).**



**Northeast portion of perimeter drainage.**



**Northeast portion of perimeter drainage.**



**Building in FFTA that will be cut to ground level and filled as part of upcoming construction work (facing west).**



**Cut in pavement where pipes to new building were installed. The cuts in the FFTA will be paved over during upcoming construction (facing south).**



**Warning sign in FFTA (facing east).**



**Warning sign in FFTA (facing west).**

*Appendix D*  
*Third Five-Year Review News Release*

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## **U.S. Army Corps of Engineers Conducts Third Five-Year Review for Manchester Annex**

The U.S. Army Corps of Engineers and the Environmental Protection Agency, Region 10, have initiated the third five-year review process at the Manchester Annex National Priorities List Site, which is located on the western shore of Clam Bay, near Manchester, Wash. The review is required by the Superfund law to verify that the cleanup continues to be protective of human health and the environment.

The Manchester site, also known as the Old Navy Dump/Manchester Laboratory Site, was historically owned by the U.S. Navy and consists of a former fire training area, a landfill, and a former submarine net and boat depot. The activities in these areas resulted in various types of contamination, with contaminants such as dioxins, polychlorinated biphenyls, and metals. In 1999 and 2000, the U.S. Army Corps of Engineers remediated the three main areas. The cleanup consisted of a landfill cap and shoreline protection system, a sediment cap in the intertidal area, and removal of contaminated soil and structures in the former fire training area.

In an effort to ensure the cleanup work continues to protect human health and the environment, the U.S. Army Corps of Engineers is conducting the third five-year review and will make the Five Year Review Report available upon completion, anticipated to be available October 2014 at:

**Manchester Library**  
8067 E Main St, Port Orchard, WA 98366  
(360) 871-3921

For more information or if you have comments about the Manchester Annex, please contact:

**Seattle District, Corps of Engineers**  
Ms. May Carrell, Project Lead  
4735 E. Marginal Way S.  
Seattle, Washington 98134-2385  
206.764.3418  
[may.g.carrell@usace.army.mil](mailto:may.g.carrell@usace.army.mil)

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*Appendix E*  
*EPA and Suquamish Tribe Review, Comment, and Response*

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**Old Navy Dump/Manchester Annex Third Five-Year Review  
Response to EPA and Suquamish Tribe Comments  
Aug 8, 2014**

Comment Type	Section	Line Number	Comment Author	Comment	Response to Comment
Bubble Comment	Title Page		Karen Keeley	Global: Revise the site name throughout the FYR to the "Old Navy Dump/Manchester Laboratory" as listed on the NPL. The ROD does say "Manchester Annex" in a few spots but we need to call the site by its NPL name. OK to acknowledge the site is sometimes referred to as "Manchester Annex."	Text revised. "OLD NAVY DUMP/MANCHESTER ANNEX" (name used in the IAG) and added "FUDS No. F10WA011902" before the EPA ID. Deleted reference to Kitsap County.
Bubble Comment	After Title Page		Karen Keeley	After this blank page, insert signatory page for Cami Grandinetti (similar to 2009 FYR).  Cami Grandinetti, Program Manager Remedial Cleanup Program Office of Environmental Cleanup U.S. Environmental Protection Agency, Region 10	Comment noted. USACE, as the lead agency, has the signature authority.
Bubble Comment	ES	4-5	Karen Keeley	Make this change globally throughout the document. Add sentence in Intro that the site is sometimes referred to as the "Manchester Annex Site."	Text revised. "OLD NAVY DUMP/MANCHESTER ANNEX" (name used in the IAG) and added "FUDS No. F10WA011902" before the EPA ID. Deleted reference to Kitsap County.
Bubble Comment	ES	6	Karen Keeley	The site is still on the NPL and has not been de-listed. Confirmed with Lynne Kershner.	Comment noted.
Text revision	ES	9-10	Karen Keeley	The purpose of this FYR is to determine whether the remedial action implemented at the Manchester Annex site is functioning as designed, and continues to be protective of human health and the environment.	Accept revision.
Text revision	ES	11-12	Karen Keeley	Hazardous substances remain on-site above the risk-based levels determined in the 1997 Record of Decision (ROD) for the Site, thereby preventing long term unlimited use and unrestricted exposure.	Accept revision.
Text revision	ES	23-24	Karen Keeley	The triggering action for this review is the signature date of EPA's concurrence of the second five-year review, September 28, 2009.	Comment noted. Text will remain: The triggering action for this review is the signature of the second five-year review, which is September 25, 2009.
Text revision	ES	29-30	Mark Ader	Revised to say: The Old Navy Dump/Manchester Laboratory Training Area (FFTA), a landfill, and a former	Comment noted.
Text revision	ES	35-36	Karen Keeley	Upland sources from the Landfill area resulted in sediment contamination in Clam Bay.	Accept revision.
Bubble Comment	ES	38	Karen Keeley	Global for Report: Change all "minimal" to "below the threshold of concern" when used in this context.	Comment noted. "Minimal" is used in the ROD to describe risk.
Bubble Comment	ES	49-53	Karen Keeley	Revise language per pg viii	Comment noted. The protectiveness statement reads: "The remedy at Manchester Annex Site is protective of human health and the environment.  The remedial action construction is complete and the remedy is functioning as intended. Exposure pathways that would result in unacceptable risks are being controlled by institutional controls. The landfill cap and the shoreline protection system are functioning as intended and the former fire training area has met the cleanup requirements."
Bubble Comment	ES	49-53	Mark Ader	Need to describe subsistence consumption issue and trends or sample results.	Comment noted. This discussion does not belong in protectiveness statement.
Bubble Comment	List of Figures		Karen Keeley	Revise all titles and labels for Figures 4 through 6 to the term Clam (not Shellfish, which is a broader category of invertebrates); text should refer to PCB Concentrations in Clam Tissue. Figures need to completely identify media, sampling date, etc.	Accept revision.
Bubble Comment	Summary Form	Triggering Action		Change to 9/28/2009, Signature of concurrence	Comment noted
Text revision	Summary Form	Issue Category		Issue: Clam consumption rates used in the human health risk assessment were from other tribes in Puget Sound. The Suquamish Tribe has since identified clam consumption rates which may affect calculated site risks.  Recommendation: Reassess human health risk looking at all exposure assumptions from original risk assessment for the shellfish consumption pathway.	Text revised. Changed issue language to what EPA suggests. Keep recommendation language from Corps.
Text revision	Summary Form	Protectiveness Statement	Karen Keeley	The remedial action construction is complete and the remedy is functioning as intended. The remedy is protective of human health and the environment, and exposure pathways that would result in unacceptable risks are being controlled by institutional controls and restrictive covenants.  The institutional controls prevent exposure to site contaminants. Also, the landfill cap and the shoreline protection system are functioning as intended and the former fire training area has met the achieved cleanup requirements.	Comment noted. The restrictive covenants are only recorded when property is transferred to non-federal entity per ROD and ICP.

**Old Navy Dump/Manchester Annex Third Five-Year Review  
Response to EPA and Suquamish Tribe Comments  
Aug 8, 2014**

Comment Type	Section	Line Number	Comment Author	Comment	Response to Comment
Bubble Comment	Summary Form	Protectiveness Statement	Karen Keeley	Use this protectiveness statement throughout. I did not change the language in subsequent sections. EXCEPT if you decided to say protective in the short term because the risk needs to be re-done.  USACE should read guidance:  <a href="http://www.epa.gov/superfund/cleanup/postconstruction/pdfs/Clarifying%20the%20Use%20of%20Protectiveness%20Determinations%20for%20CERCLA%20FYs.pdf">http://www.epa.gov/superfund/cleanup/postconstruction/pdfs/Clarifying%20the%20Use%20of%20Protectiveness%20Determinations%20for%20CERCLA%20FYs.pdf</a> NOTE: I don't see documentation that ICs (restrictive covenants) are all in place.	Comment noted. The protectiveness statement reads: "The remedy at Manchester Annex Site is protective of human health and the environment.  The remedial action construction is complete and the remedy is functioning as intended. Exposure pathways that would result in unacceptable risks are being controlled by institutional controls. The landfill cap and the shoreline protection system are functioning as intended and the former fire training area has met the cleanup requirements."
Bubble Comment	Summary Form	Protectiveness Statement	Karen Keeley	Clarify if there really are restrictive covenants at site – if so, what is title? Date? Content? If Fed Fac don't have 'restrictive covenants' then use alternate term.	Comment noted. The restrictive covenants are only recorded when property is transferred to non-federal entity per ROD and ICP.
Bubble Comment	1.0	1	Karen Keeley	Global: Typically, "Site" is capitalized when referring to the "Site".	Text revised. Site will have a captial S when referred to as a proper noun and lower case s when it is referring to the location.
Text revision	1.0	12-13	Karen Keeley	former submarine net and boat depot (the Net Depot), and adjacent marine sediments in Clam Bay.	Accept revision.
Text revision	1.0	26	Karen Keeley	No less often	Accept revision.
Text revision	1.0	45-46	Karen Keeley	This review was conducted from December 2013 through March 2014. This report documents the results of the review.	Accept
Text revision	1.0	49-51	Karen Keeley	This is the third five-year review for the Manchester Annex NPL Site. The triggering action for this review is the signature date of EPA's concurrence of the previous five-year review: September 28, 2009.	Comment noted. USACE, as the Lead Agency, follows the updated DoD guidance for Five-year Review Procedures, Jun 2014, and the EPA Comprehensive Five-Year Review Guidance, June 2001.
Bubble Comment	2.0	Table 1	Karen Keeley	Incorporate any deed covenants/LUC/etc. that were completed for Landfill area and TPH-contaminated soil in FFTA	Comment noted. The restrictive covenants are only recorded when property is transferred to non-federal entity per ROD and ICP.
Text revision	2.0	Table 1	Karen Keeley	(Date of EPA concurrence) added and date changed for First and Second Five-Year Review	Comment noted. USACE, as the Lead Agency, follows the updated DoD guidance for Five-year Review Procedures, Jun 2014, and the EPA Comprehensive Five-Year Review Guidance, June 2001.
Text revision	3.0	5-6	Karen Keeley	Clam Bay is a sensitive marine estuary, in which clams are harvested by recreational shellfishers and customary and traditional users. Threatened and endangered species have been observed in the area.	Comment noted. Language used is consistent with ROD.
Bubble Comment	3.0	5-6	Karen Keeley	This is term some tribes have preferred because there is more to clamming than 'subsistence harvesting'.	Comment noted. Language used is consistent with ROD.
Bubble Comment	3.0	5-6	Mark Ader	Response to previous comment: According to Joan Shirley we should use the language from the ROD.	Comment noted. Language used is consistent with ROD.
Bubble Comment	3.0	34	Karen Keeley	The point of compliance concept is introduced later, not part of Land and Resource Use.	Accept revision.
Bubble Comment	3.0	34	Karen Keeley	List clam common names and genus species in this paragraph, since this is an important component of the FYR.	Comment noted. ROD does not specify clam species.
Bubble Comment	3.0	35	Karen Keeley	Recommend customary and traditional use, as well as commercial use. Right? Perhaps the Suquamish isn't sensitive about the term subsistence, but other tribes I worked with prefer customary and traditional use.	Comment noted. Language used is consistent with ROD.
Bubble Comment	3.0	35	Mark Ader	According to Joan Shirley we should use language from ROD	Comment noted. Language used is consistent with ROD.
Text revision	3.0	37	Karen Keeley	in clam tissue reach	Global fix - Used Clam Bay-Tissue or shellfish to be consistent with language in ROD.
Bubble Comment	3.0	69	Mark Ader	Page 3-3, 3.5.1 Contaminated media: Citations for the risk assessments upon which these conclusions are based should be provided. Ideally these documents should be made accessible to reviewers. It would be helpful if a web based document repository were created. The actual risks and hazards associated with these pathways should be stated. Direct contact risks were determined to be "minimal," the risks associated with shellfish consumption should be noted. There should be a recalculation of risks based on Suquamish consumption rates.	Accept. Table added of summary of cumulative baseline cancer risks and hazards.
Bubble Comment	3.0	Table 2	Karen Keeley	These are the COCs (they match Table 15 in ROD) not COPCs.	Accept revision.
Text revision	3.0	86	Karen Keeley	The risk assessment	Accept revision.

**Old Navy Dump/Manchester Annex Third Five-Year Review  
Response to EPA and Suquamish Tribe Comments  
Aug 8, 2014**

Comment Type	Section	Line Number	Comment Author	Comment	Response to Comment
Text revision	3.0	90-96	Karen Keeley	were associated primarily with subsistence-level consumption of clams contaminated with PCBs. The risk assessment used a consumption rate for clams of X grams per day, based on a draft shellfish consumption survey of the Tulalip and Squaxin Island Tribes that was available at that time.	Accept. Text revised: The risk assessment established that an on-site worker and occasional site visitor (child) had risk primarily associated with potential skin contact and incidental ingestion of waste materials (soil and debris from the landfill and FFTA) containing elevated metals and dioxin/furan concentrations. Health risks for the subsistence consumer of shellfish, while lower, were still above concentrations targeted by the State of Washington cleanup program. Health risks to the subsistence consumer of shellfish primarily resulted from consumption of PCBs in shellfish collected from the intertidal area of Clam Bay. The reasonable maximum harvesting rates assumed in the exposure assessment were 22 meals (3.4 kilograms) per year and 150 meals (23 kg) per year for recreational and subsistence consumption, respectively, based on a draft shellfish consumption survey of the Tulalip and Squaxin Island Tribes.
Bubble Comment	3.0	115	Karen Keeley	Recommend deleting this heading – you intro the eco risk assessment earlier in this section, and these are the eco risk assessment results.	Accept revision.
Text revision	3.0	120	Karen Keeley	consisted of prey located in Clam Bay	Accept revision.
Text revision	3.0	121	Karen Keeley	In summary, the human health and ecological risk assessments	Accept revision.
Bubble Comment	4.0	4	Mark Ader	Need to add table in this section with cleanup levels and goals	Accept revision.
Bubble Comment	4.0	4	Mark Ader	4-1: Why is MTCA Method C appropriate? If Method B is found to be appropriate, risks for an individual carcinogen should not exceed 1 in 1,000,000.	Comment noted.
Bubble Comment	4.0	11-14	Karen Keeley	If these bullets are directly from ROD, then clarifying text should be in brackets.	Accept revision.
Bubble Comment	4.0	66	Karen Keeley	It does not appear these were prepared – if not, this needs to be a Recommendation and Follow-up Action. If so, there needs to be information added to this FYR (it's not clear these were completed based on a quick review of prior FYR). Assume these restrictions apply to entire site where contamination remains, not just the TPH area. Clarify.	Text revised to be consistent with ROD.
Bubble Comment	4.0	66	Mark Ader	Need to have these in ICP, appendix L should have restricted covenants. Need all ICP appendices. Look at ICP.	Comment noted. The restrictive covenants are only recorded when property is transferred to non-federal entity per ROD and ICP.
Bubble Comment	4.0	102	Karen Keeley	Clarify if this was gravel, sand, mixture of sand and gravel (or were beneficial use sed from USACE river dredging used?). I am not aware of any sites where we have capped with actual 'sediment' unless we obtained clean dredged river "sediments", which were actually primarily sand.	Comment noted. Type of sediment used is not necessary in this context.
Bubble Comment	4.0	122	Mark Ader	Is the wall really only 2 feet deep??	Text revised: For the hydraulic cutoff system, a cutoff wall, with varying depths, and a two foot key into hard silt was constructed along the upland perimeter of the landfill using soil bentonite slurry trench technology to prevent groundwater from seeping into the landfill.
Bubble Comment	4.0	134-136	Mark Ader	In text, deleted: The ROD also required a Cultural Resource Management Plan be prepared during remedial design . A Cultural Resource Construction Management Plan was completed in April 1999. Comment: This was stated earlier, don't need to repeat here	Accept revision.
Text revision	4.0	171	Karen Keeley	A Compliance Monitoring Plan (CMP) for the Landfill and Clam Bay Areas was completed in April 1999.	Comment noted. Revised text: A CMP for Manchester Annex Site was completed..
Bubble Comment	4.0	197	Karen Keeley	Delete - 2010 sediment data are not included in the discussion in Section 6.4.2, and Mark indicates that no sediment data were sampled in 2010.	Accept revision.
Text revision	4.0	201-209	Karen Keeley	While the CMP required monitoring of any observed seeps in the nearshore area, no seeps have been observed since construction completion. In the absence of seeps, porewater sampling in the intertidal marine sediments near the Landfill Area was conducted in 2009 and 2010. In a Technical Project Planning (TTP) meeting held on June 19, 2012, it was determined that seep sampling would be discontinued because it was not considered representative of water that might enter Clam Bay from the landfill. .	Accept revision.
Bubble Comment	4.0	214-215	Karen Keeley	Deed covenants would also need to be prepared for the Landfill Area since this is contamination that is remaining onsite and residential use and subsurface digging must be restricted, right? I don't see this referenced in the FYR.	Comment noted. The restrictive covenants are only recorded when property is transferred to non-federal entity per ROD and ICP.
Bubble Comment	4.0	220	Karen Keeley	See earlier comment. It appears that there only deed covenants for the TPH area but not for the Landfill Area (which should have ICs)?	Comment noted. ICP covers both TPH and landfill areas.

**Old Navy Dump/Manchester Annex Third Five-Year Review  
Response to EPA and Suquamish Tribe Comments  
Aug 8, 2014**

Comment Type	Section	Line Number	Comment Author	Comment	Response to Comment
Bubble Comment	4.0	226	Karen Keeley	The ICP should also ensure that no one lives on the landfill, digs in the landfill, etc. See bullets below – ICP also protects people from contamination. Does ICP also need to be revised?	Comment noted. ICP covers both TPH and landfill areas.
Bubble Comment	4.0	255-259	Karen Keeley	In addition to signage and training, there needs to be accurate mapping of remaining contamination, and some sort of ‘deed restriction’ for the Landfill, since it’s future uses are very restricted.	Comment noted. The restrictive covenants are only recorded when property is transferred to non-federal entity per ROD and ICP.
Bubble Comment	4.0	273	Karen Keeley	This is key. Add a short description that ‘subsistence level’ evaluation would be the ‘most health protective’ so if you achieve that goal ceremonial and commercial harvest would be protective also – right?	Comment noted. Text revised to exclude the (subsistence, ceremonial, commercial).
Bubble Comment	4.0	295	Karen Keeley	Confirm that this is in I&M – didn’t appear to be discussed below, and no comments were made about whether or not burrows were observed/inspected during the recent site visit.	Text revised. Yes, this is in the 2014 I&M. Text added: There were no animal burrows observed on the landfill cap.
Text revision	4.0	297-298	Karen Keeley	Unwanted vegetation on the landfill cap will be removed on an annual basis	Text revised: Vegetation on the landfill cap will be evaluated by a USACE biologist to determine if there are any new invasive species that may necessitate changes to vegetation and invasive species maintenance and removal procedures
Bubble Comment	4.0	326	Mark Ader	Has this been done annually, if so say so if not explain	Text was updated to reflect 2014 I&M Manual.
Bubble Comment	4.0	327	Karen Keeley	I&M? O&M? Not sure what the difference is. Change section header to I&M?	Accept revision.
Bubble Comment	4.0	336	Karen Keeley	Why are these the primary concerns? Because they pose the most risk or they are most likely to occur?	Added text to clarify: In addition, a recurring issue is
Bubble Comment	4.0	340	Karen Keeley	Since Section 4.4.4 describes extensive work to remove unwanted vegetation, it seems that this should be mentioned in the summary of “I&M” work.	Accept revision.
Bubble Comment	4.0	Table 3	Karen Keeley	Was there really I&M in Clam Bay? It appears that Clam Bay was only ‘sampled’ so that wouldn’t be I&M. Does the \$343 K include Clam Bay costs? Beach area rip rap seems to be part of ‘shoreline protection system (not “Clam Bay”).	Accept. Work did occur below the MHHW mark so I would consider it as work occurring in Clam Bay. Sediments were removed from the box culvert and placed down current of that location.
Bubble Comment	5.0	37	Karen Keeley	Other text indicates that certain areas at the Site need signs and there don’t appear to be deed covenants for all areas that have contamination remaining onsite, so it does not seem that all requirements of the ICP are actually ‘in effect’; some of them have not been implemented.	Accept. Text revised: The ICP has been implemented, except for the warning signs that need to be placed at the landfill.
Bubble Comment	5.0	37	Mark Ader	In Response to previous comment: Are either of these signed by all parties. Should they be, I think they should.	Comment noted.
Bubble Comment	5.0	45	Mark Ader	Add the CMP to the issues table with a timeline to accomplish. Spring/summer 2016	Comment noted. A milestone date was added to the bullet below the issues table.
Bubble Comment	5.0	50	Karen Keeley	As provided via email, a 95% UCL cannot be done on less than 8 samples. Unless USACE can re-do calculations (per Anita Singh’s comments), all UCLs for clam tissue should be deleted.	Comment noted. This is a response from Anita Singh - From theoretical point of view, one can compute a UCL95 based upon a data set of size 3 (normal, lognormal, and nonparametric) and a data set of size 4 (gamma distribution). We had 8 samples therefore we met the concerns of the commentor.
Text revision	5.0	50-52	Mark Ader	the current cleanup goal; however, based on the Suquamish Tribes subsistence consumption rate the cleanup goal established at the time of the ROD is under review.	Comment noted. Text insert: the Suquamish tribe has since identified shellfish consumption rates which may affect calculated site risks.
Bubble Comment	5.0	55	Mark Ader	Risk based tissue concentrations need to be re-evaluated using Suquamish consumption rates. The site would likely not be in compliance using these tissue concentrations. Again, the rationale for evaluating this site will likely shift from risk to background.	Comment noted
Bubble Comment	5.0	64	Karen Keeley	The EPCs for exposure pathways associated with the Site are estimated, where appropriate, by aggregating concentration data from media samples collected over a relevant exposure area. The EPCs for aggregate risk estimation are calculated by using the best statistical estimate of an upper bound on the average exposure concentrations, in accordance with EPA guidance for statistical analysis of monitoring data (EPA, 1989; 1992; 2002b). EPA considers the 95 percent UCL on the mean concentration as a conservative upper-bound estimate that is not likely to underestimate the mean concentration. EPCs are calculated for each analyte using EPA’s statistical program ProUCL, Version 5.0 (EPA, 2013f). This procedure identifies the statistical distribution type (that is, normal, lognormal, or nonparametric) for each constituent within the defined exposure area (the area of interest) and computes the corresponding 95 percent UCL for the identified distribution type. Generally, at least 8 to 10 samples are needed to compute a meaningful UCL.	Comment noted. Components of the CMP will be addressed during CMP planning meetings.

**Old Navy Dump/Manchester Annex Third Five-Year Review  
Response to EPA and Suquamish Tribe Comments  
Aug 8, 2014**

Comment Type	Section	Line Number	Comment Author	Comment	Response to Comment
Text revision	5.0	61-67	Karen Keeley	(paired tissue and sediment samples should be collected), and the number of stations should be an appropriate number to allow for calculations of an Exposure Point Concentration based on the 95 percent UCL for the human health risk assessment. The CMP will also include identification of an appropriate location considered representative of background concentrations ( Rationale(Rationale for needed background samples?) The CMP should also be revised to include an appropriate 95th percentile consumption rate for clams that is considered representative for the Suquamish Tribe. ].	Comment noted. Components of the CMP will be addressed during CMP planning meetings.
Bubble Comment	5.0	67	Karen Keeley	Recommend adding text that defining grids is unnecessary. There is no basis for saying that a 'single clam' sample is representative of an arbitrarily defined grid. Unless you are using grids with MIS.	Comment noted. Components of the CMP will be addressed during CMP planning meetings.
Bubble Comment	5.0	83	Mark Ader	Add a discussion of Lon's analyses here to show the fact that we have put in considerable effort to understand and inform our path forward. See cover letter for more information on this issue.	Comment noted. The entire stakeholder team has not agreed to the conclusions Lon derived.
Bubble Comment	5.0	94	Mark Ader	Why no mention of damage since 2012 and plans to repair by removing hard point?	Comment noted.
Bubble Comment	5.0	113	Mark Ader	I remember that the Tribe has agreed that this does not need to be finalized, check with Denice and mention that here if I am correct.00	Accept. Text added: No completed report has been finalized, however the Suquamish Tribe has agreed that this does not need to be a finalized document
Bubble Comment	6.0	10	Karen Keeley	Specifically state whether you received any comments (or none) from the 'general public' as a result of this notice.	Accept. Text added: There were no responses received from the general public during the response time.
Bubble Comment	6.0	22	Mark Ader	Include 2010 sed data in table figures and text.	Comment noted. No 2010 sed data. Fixed in previous section
Bubble Comment	6.0	31	Karen Keeley	See Anita Singh comments emailed to you, re: its not recommended to do 95% UCL with fewer than 8 samples per ProUCL guidance.	Comment Noted. As stated by Anita it is ok to run UCL on as few as 3 data samples. We did collect 8 samples which formed the basis of the 95%UCL.
Bubble Comment	6.0	33	Karen Keeley	Nine sample grids that approximated sediment grids? What does that mean?	Text revised: nine sample grids that were the same as the sediment sampling grids
Bubble Comment	6.0	33-34	Karen Keeley	Add text clarifying the elevations of the the 'upper intertidal' zone line, and the 'lower intertidal' zone line (i.e., the long edge of the grid has an upper line and a lower line - and the elevations of that upper line and lower line are important and that it is presumed that clams do not live shoreward of the upper line or water ward of the lower line); also, clarify that the grids were not established based on any information about historical sediment data or upland sources). In the CMP, I recommend that the grids not be used; it doesn't provide any useful information – just present the data.	Comment noted: • There are locations of the grid boundaries that can be used to determine approximate tidal elevations. • The "presumption" was not presumed but based on the tribal shellfish biologist best professional judgment as to where native littleneck clam habitat was located. • Clam sample locations were recommended by the Suquamish shellfish biologist in the 2009 reconnaissance survey.
Bubble Comment	6.0	35	Karen Keeley	Clarify why clam samples were not collected in 4 of 9 grids – random? No clams?	Comment noted: No clams of sufficient number were collected in the 4 grids during the 2010 sampling event.
Bubble Comment	6.0	35	Karen Keeley	Is this added text accurate? CLARIFY if you have discrete samples from each 'grid', which appears to be true, given the way data are presented in Figure 2– (this is confusing given the original language).	Comment noted. Revised text: In August 2010, clams were collected from 5 of the 9 grids and clams from each unique grid were composited into a discrete sample and analyzed for total PCBs.
Text revision	6.0		Mark Ader	In addition, two Field Duplicates were collected ???	Comment noted. Field duplicates are used for data quality verification.
Bubble Comment	6.0	37	Mark Ader	Fig 2 shows 2 other samples in 2 grids – what are they?	Comment noted. Text revised: In addition, two field duplicates were collected from sample grids 5 and 7.
Bubble Comment	6.0	40	Karen Keeley	Delete ucl.	Comment noted. Keep UCL as adequate number of samples were collected as per Anita Singh's guidance.
Bubble Comment	6.0	41-42	Karen Keeley	Samples in 2010 were only collected in 5 grids, so they aren't 'the same 8 grids.' Need to point out that the 2010 grids are NOT the same as the 2013 grids- Grids 1,2,3 are pretty close, but grids 4-9 (or 4-8 in2013) are dissimilar.	Revised text: Sample grids from the 2010 clam sampling event were modified based on presence of clams at that time. Sample grid 4 from the 2010 sampling (Figure 2) was located in the high intertidal zone where no clams were collected. Sample grids 4, 5 and 6 shown in Figure 2 were renumbered as grids 4 and 5 for sampling in 2013. In 2013, clam tissue samples were collected from eight grids (See Figure 3).
Bubble Comment	6.0	42-43	Karen Keeley	Confusing. Figure 3 shows 8 sample results, one for each grid, including Grid 4.	Revised text: Sample grids from the 2010 clam sampling event were modified based on presence of clams at that time. Sample grid 4 from the 2010 sampling (Figure 2) was located in the high intertidal zone where no clams were collected. Sample grids 4, 5 and 6 shown in Figure 2 were renumbered as grids 4 and 5 for sampling in 2013. In 2013, clam tissue samples were collected from eight grids (See Figure 3).

**Old Navy Dump/Manchester Annex Third Five-Year Review  
Response to EPA and Suquamish Tribe Comments  
Aug 8, 2014**

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Bubble Comment	6.0	44	Karen Keeley	All values in this paragraph, and other sections, need to say 'sediment' or 'tissue' and say PCBs whenever you give the 'goal' or the sample result.	Comment noted. Section 6.4.1 is exclusive to clam sampling and 6.4.2 is exclusive to sediment sampling.
Bubble Comment	6.0	44	Karen Keeley	Consider dropping the grids. One sample isn't representative of what's going on in 'the grid.'	Comment noted. This will be determined in CMP discussions.
Bubble Comment	6.0	47	Karen Keeley	Even if an outlier, there are PCBs there – is there an ongoing source? Erosion of ENR material? I don't think it's appropriate to call this an outlier with so few samples.	Comment noted.
Bubble Comment	6.0	57	Karen Keeley	Clarify if this goal is enforceable per the ROD – is there a timeframe associated with this goal? Eg, achieve goal within 10 years?	Comment noted. There is no time frame associated with the meeting the cleanup goal, only that we continue monitoring until cleanup goal is met. The description of the selected remedy states: Clam Bay sediment and shellfish tissue will be monitored in intertidal areas currently exceeding the PCB cleanup goal for sediments (40 ug/kg (dry)) until compliance with cleanup goals is established, or until the Washington State Department of Health and the Suquamish Tribe determine that the shellfish are safe for subsistence-level harvesting, whichever comes first.
Bubble Comment	6.0	60	Karen Keeley	Three?	Comment noted. Figure will be revised.
Bubble Comment	6.0	61	Karen Keeley	I do not see a data value of 57 in Figure 3.	Comment noted. Figure will be revised.
Bubble Comment	6.0	61	Karen Keeley	This value is 49 in Figure 3.	Comment noted. Figure will be revised.
Bubble Comment	6.0	62	Karen Keeley	Re-calculate if incorrect concentrations were used (see prior comments).	Comment noted. Calculations were made with correct data.
				Moved: After the 2010 sampling event it was determined during a TPP meeting that porewater sampling was no longer necessary as it did not portray characteristics of water coming from the landfill.	Accept
Bubble Comment	6.0	104	Karen Keeley	Specifically state if landfill signs were present, or not. If not, this is a Recommendation and Future Action.	Accept. Text revised: There were no signs observed warning personnel of contaminants.
Bubble Comment	7.0	21	Mark Ader	Realignment change this to more assertive language stating that we expect this work to change sediment transport and protect the remedy from erosion.	Comment noted.
				deleted ;, therefore the remedy continues to function as intended without seep monitoring results over this FYR time period	Accept deletion
Bubble Comment	7.0	40	Karen Keeley	I'm not sure this is true – some signs not up, see IC guidance, etc., deed covenants/LUC	Text revised: The ICP has been implemented, except for the warning signs that need to be placed at the landfill
Bubble Comment	7.0	53	Mark Ader	Based on Suquamish consumption rates this is not correct thing to say. Need to change to properly reflect issue here. Like that cleanup goal would go down based on Tribal Consumption rate.	Answer to questions B is still yes, but the discussion of consumption rates was moved immediately after the answer to show that there have been changes in exposure assumptions but they do not affect protectiveness at this time.
Bubble Comment	7.0	56	Karen Keeley	Typical language we use (your call):  A review of the Applicable and Relevant and Appropriate Requirements (ARARs) was conducted as part of the five-year review. The objective of the ARAR review was to identify federal or state regulatory standards promulgated since the remedy was implemented that might affect the protectiveness of the remedy. EPA's Comprehensive Five-year Review Guidance (U.S. EPA, 2001) specifies that newly promulgated or revised regulatory standards, which may affect previous conclusions about the protectiveness of the remedy, be identified and evaluated during the five-year review. Requirements that are promulgated or modified after ROD signature must be attained (or waived) only when determined to be applicable or relevant and appropriate and necessary to ensure that the remedy is protective of human health and the environment [40 CFR 300.430(f)(ii)(B)(1)].	Accept
Bubble Comment	7.0	Table 4	Karen Keeley	Include language on new SMS that Hiltner recently provided.	Comment noted. The language provided by Hiltner on SMS is in draft form and not yet promulgated.
Bubble Comment	7.0	Table 4	Karen Keeley	The current value is 12 mg/kg-OC, as in carbon-normalized. Not 12,000 ppm.	Accept.
Bubble Comment	7.0	134	Karen Keeley	Make sure this wasn't calculated using the incorrect value of 57 (see earlier comment).	Comment noted. UCL was calculated using correct data.

**Old Navy Dump/Manchester Annex Third Five-Year Review  
Response to EPA and Suquamish Tribe Comments  
Aug 8, 2014**

Comment Type	Section	Line Number	Comment Author	Comment	Response to Comment
Bubble Comment	7.0	142	Mark Ader	There should be some acknowledgement that institutional controls are the least desired approach to reducing risk.	Comment noted.
Text revision	7.0	144	Karen Keeley	According to the site assessment and documents and data reviewed,	Accept
Bubble Comment	7.0	148	Karen Keeley	So is this a recommendation? Discuss.	Comment noted. The hard point is not a recommendation because it was already in the planning phase.
Bubble Comment	7.0	149	Mark Ader	There should be some acknowledgement that institutional controls are the least desired approach to reducing risk.	Comment noted. Institutional controls are addressed in 7.1
Text revision	7.0		Karen Keeley	There is no other information that calls into question the protectiveness of the remedy	Accept.
Bubble Comment		8 Table 7	Karen Keeley	Revise per earlier language.	Accept wording from Summary form.
Text revision	9.0	Table 8	Mark Ader	Add issue for CMP	Comment noted. Added tentative completion date of May 2016 to bullet.
Text revision	9.0	Bullet 1	Mark Ader	1. Ascertain the distribution of PCBs in Clam Bay sediments 2. Assess sediment, and consequent PCB transport, from points in Clam Bay to Manchester Annex sediments. 3. Obtain "natural" background and site clam tissue PCB concentrations sufficient for a statistical comparison of site and background clam tissue concentrations. (This objective may be subsidiary to objectives 1 and 2) 4. John Wakeman also had suggested adding evaluation of pore water PCB concentrations as an assessment tool.	Comment noted. Specific components of CMP will be discussed during CMP planning.
Text revision	9.0		Mark Ader	<ul style="list-style-type: none"> <li>• Beach material redistribution will should continue to be monitored to ensure that the shoreline protection system is functioning as intended.</li> <li>• Realignment of the hard point should allow for distribution of clean sediment along the shoreline in front of the landfill and eventually help lower clam tissue concentrations.– not clear what this is, but it seems to be discussed.</li> <li>• EPA Manchester Laboratory must install warning signs on the landfill cap to be in compliance with the ICP. – This language suggests that signs aren't done, which means ICs aren't complied with (basis for changing text earlier).</li> <li>• Deed covenants – add discussion, recommend updated ICP consistent with ICAP guidance.</li> </ul>	<ul style="list-style-type: none"> <li>• Comment noted. We are keeping "Should" instead of "will" because it is a recommendation not an action.</li> <li>• Comment noted. This is not a recommendation text changed in previous sections.</li> <li>• Comment noted. Deed covenants arent necessary until property is transferred to non-federal entity. Draft covenants are included in ICP.</li> </ul>
Bubble Comment	10	Protectiveness Statement	Karen Keeley	Revise per earlier language, pg viii..	Comment noted. The protectiveness statement reads: "The remedy at Manchester Annex Site is protective of human health and the environment.  The remedial action construction is complete and the remedy is functioning as intended. Exposure pathways that would result in unacceptable risks are being controlled by institutional controls. The landfill cap and the shoreline protection system are functioning as intended and the former fire training area has met the cleanup requirements."
Bubble Comment	10	Protectiveness Statement	Mark Ader	Add that while the site remains protective due to IC, IC are the least favorable method of protection and that additional action may be required for long term protectiveness.	Comment noted.

**Old Navy Dump/Manchester Annex Third Five-Year Review  
Response to EPA and Suquamish Tribe Comments  
Aug 8, 2014**

Comment Type	Section	Line Number	Comment Author	Comment	Response to Comment
	Response letter	Comment 1	Suquamish Tribe	<p>The Tribe does not agree with statements and conclusions that the remedy is functioning as intended by the ROD and is protective of future uses, as long as the IC restricting subsistence shellfish harvesting remains in place. Fifteen years after the completion of the remedial action, site conditions do not support the reasonably anticipated use of Clam Bay for subsistence harvest of shellfish by the Suquamish Tribe. The ROD clearly states that the overall objective of the remedy was to sufficiently reduce surface sediment and shellfish tissue concentrations to support unrestricted use of the thin-layer cap area within several years of completion of the remedial action (pg. 37). Sediment and tissue cleanup goals were predicted to be met 3 to 5 years after remedial construction (pg. 25), and limitations on subsistence-level harvest were to be used temporarily to control risks during the initial recovery period (pg. 20).</p> <p>The thin layer cap has not resulted in the enhanced natural recovery process assumed in the ROD. The continued reliance on an IC restricting harvest to control exposure and ensure protectiveness is contrary to the timeframe described in the ROD, as well as to CERCLA guidance that ICs are not intended to be a way around active measures to achieve compliance. Most importantly, the fact that the site does not support unrestricted use and unlimited access continues to impact the Tribe's treaty-protected rights to harvest and access, which were guaranteed in perpetuity under the Treaty of Point Elliott.</p> <p>The Third 5YR should be revised to identify that the remedy, specifically the thin layer cap/enhanced natural recovery and temporary harvest restriction IC components, has not functioned as intended by the ROD. In addition, because site conditions do not support unrestricted use, the remedy cannot be considered to be protective for the reasonably anticipated use of subsistence level harvest by the Suquamish Tribe. The Third 5YR should also be revised to identify issues relevant to achieving remedial objectives and clean up goals and should develop recommendations, including milestones, to address those issues. The USACE should work collaboratively with the Tribe and EPA on the revisions.</p> <p>In addition, descriptions and discussions of the sediment cap remedy component need to be revised to clarify that rather than serving as a traditional cap on contamination, the sediment placed in the intertidal area was designed to enhance natural recovery by immediately lowering PCB concentrations in surface sediments and by preventing re-contamination and re-suspension of any residual PCBs in unremediated sediments. (Note that this language is paraphrased from the description included on pg. 10 of the First 5YR.)</p>	<ul style="list-style-type: none"> <li>• The sediment cleanup level (130 µg/kg PCB sediment) was met. The cleanup goal for Clam Bay -tissue Total PCBs was also met.</li> <li>• Because hazardous substances have been placed in the on-site landfill that prevents it from being unlimited use and unrestricted exposure (UU/UE).</li> <li>• All of the ROD remedial action objectives have been met.</li> <li>• We are striving for a better beneficial working relationship and will continue to have meaningful participation with the Tribe.</li> <li>• Even though we have met the Clam Bay-tissue Total PCB cleanup goal, we are continuing to strive for the Clam Bay-sediment Total PCB cleanup goal.</li> <li>• Text added in Question A: The institutional controls have been implemented and are functioning as intended by the ROD. The temporary restriction placed on subsistence level harvesting of shellfish is still enforced.</li> <li>• Text added to interview section regarding the remedy functioning as intended: In addition, Ms. Denice Taylor was hopeful that the natural recovery process will be improved with the removal of the hard point.</li> </ul>
	Response letter	Comment 2	Suquamish Tribe	<p>The Third 5YR does not address the need to re-evaluate sediment and tissue clean up goals identified in the ROD based on Suquamish exposure parameters and natural background values.</p> <p>As discussed in the summary form and Sections 7 and 8, some parameters used to calculate risk via tribal exposure have changed since the time of the ROD. Of specific concern is the shellfish ingestion rate which was based on consumption rates for the Tulalip and Squaxin Island tribes rather than rates for the Suquamish Tribe. Manchester Annex is located in the exclusive usual and accustomed fishing area of the Suquamish Tribe. In other words, no other Tribe in the Puget Sound area can harvest shellfish for consumption in this area. This point, as well as the need to re-evaluate the risk-based compliance goals specified in the ROD based on the Suquamish Tribe's consumption rate, have been reiterated to the USACE over many years and have been identified as issues since the First 5YR in 2004 (pgs. 28-29).</p> <p>Furthermore, last year, Lon Kissinger, EPA Region 10 Human Health Risk Assessor, provided to the project team an initial calculation of risk-based compliance levels using Suquamish consumption rates. His analysis demonstrated that current site sediment and tissue goal would not be considered to be protective of Suquamish tribal exposure via ingestion of shellfish; that Suquamish risk-based levels may be below natural background values for sediments; and that it may be necessary to modify site compliance goals. Both the Suquamish Tribe and EPA have recommended that the USACE formalize these findings and develop appropriate compliance goals for the site. This report recommends only reassessing risks looking at all exposure assumption from the original risk assessment.</p> <p>The Third 5YR should be revised to include recommendations to re-evaluate site compliance goal based on potential risks to Suquamish tribal members and natural background values for sediments. If site compliance levels and goals change, the need to revise the ROD (via a memo, an ESD or an amendment) must be considered.</p> <p>The Suquamish Tribe expects to actively participate in the scoping and review of all risk assessments, as well as in site management decisions, as contemplated under the 1998 MOA and the USACE's trust responsibility.</p>	<ul style="list-style-type: none"> <li>• The reevaluation of risk will examine exposure assumptions and parameters to include, but not limited to, shellfish consumption rate and bioavailability of contaminants. This reevaluation will occur after the additional data have been collected and reported, and the hard point removal has been completed. The hard point removal is anticipated to be completed in the fall of 2015 .</li> <li>• In accordance with the CA, the Tribe will have the opportunity to review, comment and make recommendations on documents and data associated with the reassessment of risk.</li> </ul>

**Old Navy Dump/Manchester Annex Third Five-Year Review  
Response to EPA and Suquamish Tribe Comments  
Aug 8, 2014**

Comment Type	Section	Line Number	Comment Author	Comment	Response to Comment
	Response letter	Comment 3	Suquamish Tribe	<p>This report does not include recommendations or milestones for revising the CMP. Although the need to update the CMP was identified as an issue in both the First (2004) and Second (2009) 5YRs, the CMP has never been revised. Consequently, there is no formal agreement on appropriate long-term sampling strategies or compliance metrics. The conclusions included in Section 7 of the report represent the USACE's interpretation of site data, not a ROD-specified analysis or a shared project team perspective. It is ineffective and inefficient to continue to collect data and produce reports without clear objectives and decision criteria. The Third 5YR review should be revised to include recommendations and milestones for revising the CMP. This process should build on the TPP work already done by the project team. The Tribe recommends that the CMP be revised after the planned shoreline re-alignment and the recommended re-evaluation of site compliance goals. It is further recommended that the estimated rate of natural recovery be reassessed to inform site compliance goals and the development of appropriate long-term monitoring strategies.</p> <p>Additionally, the USACE should work collaboratively with the Suquamish Tribe and EPA to interpret site data presented in Section 7. Any conclusions should be discussed in the context of known data gaps and uncertainties.</p>	<p style="text-align: center;"><b>Response to Comment</b></p> <ul style="list-style-type: none"> <li>• CMP components and recommendations will be discussed during CMP planning meetings and preparation.</li> <li>• Text added: The CMP should be updated to reflect current conditions at the Manchester NPL Site. The tentative completion is in 2016.</li> </ul>
	Response letter	Comment 4	Suquamish Tribe	<p>This report does not address changes in the WA SMS, which is cited as an ARAR. In 2013, the Washington Department of Ecology made significant revisions to the SMS. The changes require assessing the impacts from contaminated sediments to human health and higher trophic levels in establishing site compliance levels. It should be noted that SMS generally requires natural recovery to occur less than 10 years following remediation. The Third 5YR should be revised to discuss the SMS rule revisions and the relevance to determining site protectiveness and the need to reassess natural recovery timeframes. (Incidentally, the SQS for PCBs provided in Section 7 should be corrected to read 12 mg/kg OC, rather than 12,000 mg/kg.)</p>	<ul style="list-style-type: none"> <li>• Text Added: The Sediment Management Standards (Chapter 173-204 WAC) was used to determine chemical-specific cleanup levels for Clam Bay sediments at the Site. Ecology adopted the revised Sediment Management Standards rule on February 22, 2013 and the new rule became effective on September 1, 2013.</li> </ul> <p>The following are adopted amendments that are relevant at the Site:</p> <ol style="list-style-type: none"> <li>1) Integrate the SMS and MTCA, Chapter 173-340 WAC, cleanup requirements where appropriate.</li> <li>2) Clarify requirements for protection of human health from sediment contamination.</li> <li>3) Clarify requirements for protection of higher trophic level species from sediment contamination.</li> <li>4) Clarify requirements for coordinating source control and cleanup actions at cleanup sites.</li> </ol> <p>The amendments clarify methods and policies for establishing risk-based cleanup standards, establish procedures for incorporating background concentrations, and integrate the requirements in the MTCA and SMS rules for sediment cleanup. The SMS rule has six sections and the amendments focus on Part V: Sediment Cleanup Standards. The amendments add to the SMS decision framework a mechanism for setting standards to protect human health and the environment in both marine and freshwater sediment. Currently, the administrative amendments to the SMS do not affect the protectiveness of the remedy.</p> <ul style="list-style-type: none"> <li>• Table was revised to show 12,000 micrograms per kg (12mg/kg)</li> </ul>