Final
March 2020

Fourth Five-Year Review for Sites 302, 303, and 304 and Tank 50

Fleet Logistics Center Puget Sound
Manchester Fuel Depot

Manchester, Washington

Department of the Navy
Naval Facilities Engineering Command Northwest
1101 Tautog Circle
Silverdale, WA 98315

Contract No. N44255-14-D-9013, Delivery Order No. N4425519F4017

This page intentionally left blank.

EXECUTIVE SUMMARY

The fourth five-year review (FYR) for Sites 302, 303, and 304 and Tank 50 at Fleet Logistics Center Puget Sound, Manchester Fuel Depot (MFD), Manchester, Washington has been completed pursuant to Washington Administrative Code 173-340-420(3) for periodic reviews:

- Site 302 – Polychlorinated Biphenyl (PCB) Site
- Site 303 – D-Tunnel Tanks
- Site 304 – Industrial Area
- Tank 50 – Release Site

This FYR report was prepared as part of the FYR process using U.S. Navy and U.S. Environmental Protection Agency (U.S. EPA) guidance (U.S. Navy, 2004b, 2011, 2013, 2014; U.S. EPA, 2001, 2012, and 2016).

MFD is not listed on the Comprehensive Environmental Response, Compensation, and Liability Action (CERCLA) National Priorities List. PCBs (i.e., found at Site 302) are a hazardous substance under CERCLA; however, Site 302 was voluntarily investigated and recommended for cleanup activities to comply with the U.S. Navy Installation Restoration Program, which is consistent with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986. All four sites (i.e., Sites 302, 303, and 304 and Tank 50) at MFD have been impacted by petroleum hydrocarbons (which are not hazardous substances under CERCLA) but are regulated under the Model Toxics Control Act with oversight from the Washington State Department of Ecology (Ecology). Ecology issued no further action (NFA) letters (Ecology, 1998, 2000, and 2001) for all four sites indicating that contaminants found during investigation of the sites were either properly remediated or do not pose a risk to human health or the environment. This determination was based primarily on their current and future land use (i.e., industrial/ fuel farm). As such, land use control (LUC) requirements were identified in the NFA letters to protect against exposure to residual contamination in soil and/or groundwater (Ecology, 1998, 2000, and 2001).

This FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the sites above levels that allow for unlimited use and unrestricted exposure. The purpose of the FYR is to ensure that the remedies identified (i.e., LUCs) in the NFA letters for the sites remain protective of human health and the environment.

Based on the technical assessment for Sites 302, 303, and 304 and Tank 50 at MFD, the remedies are functioning as intended by the NFA letters (Ecology, 1998, 2000, and 2001); exposure assumptions, toxicity data, and cleanup levels used at the time of the remedial actions are still valid (with the exception of Site 302); and no other information has come to light that compromises the protectiveness of the remedies at this time. As a result of this FYR process, no issues (and subsequent recommendations) were identified; however, other findings and recommendations are identified that may improve performance of the remedy, reduce costs, improve management of operation and maintenance, or accelerate site closeout, but do not affect current and/or future protectiveness of the remedy. Remedy construction has been completed at all four sites. The remedies (i.e., LUCs) remain protective of human health and the environment, preventing exposures to residual contamination in soil and/or groundwater, as documented through the annual LUC inspections. Table ES-1 presents a summary of the technical assessment and protectiveness determinations and statements for Sites 302, 303, and 304 and Tank 50 at MFD.

Table ES-1. Technical Assessment and Protectiveness Summary for Sites 302, 303, and 304 and Tank 50

Site	Question A: Is the remedy functioning as intended by the decision document?	Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used the time of the decision document still valid?	Question C: Has any other information come to light that could call into question the protectiveness of the remedy?	Protectiveness Determination
Site 302	Yes	No	No	Protective
	Protectiveness Statement: The remedy at Site 302 remains protective of human health and the environment because PCB source soil has been removed or capped; off-site contamination from surface water run-off has been effectively diminished from pre-remedy conditions; land use remains industrial; and LUCs are maintained to prevent exposure. In addition, Ecology issued an NFA letter in 2000 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment" which was based primarily on the current and future land use at the site (i.e., industrial). Additional sediment, surface water, seep/groundwater discharge sampling at Site 302 and/or along the western shoreline of Little Clam Bay are anticipated to confirm this protectiveness determination.			
Site 303	Yes	Yes	No	Protective
	Protectiveness Statement: Ecology issued an NFA letter in 2001 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." This determination was based primarily on the current and future land use at the site (i.e., industrial/fuel farm). LUC requirements are identified in the NFA letter to guard against exposure to residual petroleum hydrocarbon-contaminated soil (Ecology, 2001). The remedy (i.e., LUCs) at Site 303 is protective of human health and the environment, preventing exposures, as documented through the annual LUC inspections.			
Site 304	Yes	Yes	No	Protective
	Protectiveness Statement: Ecology issued an NFA letter in 2001 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." This determination was based primarily on the current and future land use at the site (i.e., industrial/fuel farm). LUC requirements are identified in the NFA letter to guard against exposure to residual petroleum hydrocarbon-contaminated soil (Ecology, 2001). The remedy (i.e., LUCs) at Site 304 is protective of human health and the environment, preventing exposures, as documented through the annual LUC inspections.			
Tank 50	Yes	Yes	No	Protective
	Protectiveness Statement: Ecology issued a NFA letter in 1998 stating "Based upon the information in the reports listed above and institutional controls placed at the facility, Ecology has determined that, at this time, the release of total petroleum hydrocarbons into the soil and groundwater near Tank 50 no longer appears to pose a threat to human health or the environment." The LUC requirements are referred to in the NFA letter and are to guard against exposure to residual petroleum hydrocarbon-contaminated soil and groundwater (Ecology, 1998). The remedy (i.e., LUCs) at Tank 50 is protective of human health and the environment, preventing exposures, as documented through the annual LUC inspections.			
Sitewide	**Protectiveness Statement:** Remedy construction is complete at Sites 302, 303, and 304 and Tank 50 of MFD. The selected remedy (i.e., LUCs) at Sites 302, 303, and 304 and Tank 50 is protective of human health and the environment, preventing exposures to residual contamination in soil and/or groundwater, as documented through the annual LUC inspections.			

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name (from WasteLAN): Sites 302, 303, and 304 and Tank 50, Fleet Logistics Center Puget Sound Manchester Fuel Depot (MFD), Manchester, Washington		
EPA ID (from WasteLAN): Not Applicable		
Region: 10	**State:** WA	**City/County:** Manchester/Kitsap

SITE STATUS	
NLP Status: Non-NPL	
Multiple Sites? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: U.S. Navy
Author name (Federal or State Project Manager): Joy Gryzenia
Author affiliation: Naval Facilities Engineering Command Northwest
Review period: January 2015 – January 2020
Date of site inspection: March 4 and 5, 2019
Type of review: Statutory
Review number: 4
Triggering action date: January 6, 2015
Due date: January 5, 2020

ISSUES/RECOMMENDATIONS
Sites without Issues/Recommendations Identified in the Five-Year Review:
Sites 302, 303, and 304 and Tank 50 did not have any issues/recommendations during this FYR period.

PROTECTIVENESS STATEMENT(S)	
Site: Site 302	**Protectiveness Determination:** Protective
Protectiveness Statement: The remedy at Site 302 remains protective of human health and the environment because PCB source soil has been removed or capped; off-site contamination from surface water run-off has been effectively diminished from pre-remedy conditions; land use remains industrial; and LUCs are maintained to prevent exposure. In addition, Ecology issued an NFA letter in 2000 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment" which was based primarily on the current and future land use at the site (i.e., industrial). Additional sediment, surface water, seep/groundwater discharge sampling at Site 302 and/or along the western shoreline of Little Clam Bay are anticipated to confirm this protectiveness determination.	

PROTECTIVENESS STATEMENT(S)	
Site: Site 303	**Protectiveness Determination:** Protective
Protectiveness Statement: Ecology issued an NFA letter in 2001 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." This determination was based primarily on the current and future land use at the site (i.e., industrial/fuel farm). LUC requirements are identified in the NFA letter to guard against exposure to residual petroleum hydrocarbon-contaminated soil (Ecology, 2001). The remedy (i.e., LUCs) at Site 303 is protective of human health and the environment, preventing exposures, as documented through the annual LUC inspections.	
Site: Site 304	**Protectiveness Determination:** Protective
Protectiveness Statement: Ecology issued an NFA letter in 2001 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." This determination was based primarily on the current and future land use at the site (i.e., industrial/fuel farm). LUC requirements are identified in the NFA letter to guard against exposure to residual petroleum hydrocarbon-contaminated soil (Ecology, 2001). The remedy (i.e., LUCs) at Site 304 is protective of human health and the environment, preventing exposures, as documented through the annual LUC inspections.	
Site: Tank 50	**Protectiveness Determination:** Protective
Protectiveness Statement: Ecology issued a NFA letter in 1998 stating "Based upon the information in the reports listed above and institutional controls placed at the facility, Ecology has determined that, at this time, the release of total petroleum hydrocarbons into the soil and groundwater near Tank 50 no longer appears to pose a threat to human health or the environment." The LUC requirements are referred to in the NFA letter and are to guard against exposure to residual petroleum hydrocarbon-contaminated soil and groundwater (Ecology, 1998). The remedy (i.e., LUCs) at Tank 50 is protective of human health and the environment, preventing exposures, as documented through the annual LUC inspections.	

SITEWIDE PROTECTIVENESS STATEMENT
Protectiveness Determination: Protective
Protectiveness Statement: Remedy construction is complete at Sites 302, 303, and 304 and Tank 50 of MFD. The selected remedy (i.e., LUCs) at Sites 302, 303, and 304 and Tank 50 is protective of human health and the environment, preventing exposures to residual contamination in soil and/or groundwater, as documented through the annual LUC inspections.

Five-Year Review
Concurrence and Signature Page

This Five-Year Review addresses Sites 302, 303, and 304, and Tank 50 at Fleet Logistics Center Puget Sound (FLCPS), Naval Base Kitsap, Manchester, Washington. The lead agency for this Review is the United States Navy (Navy).

Concurrence on this review is provided by Naval Base Kitsap.

DEC 19 2019

Richard G. Rhinehart
Captain, U.S. Navy
Commanding Officer
Naval Base Kitsap, Bremerton, Washington

This page intentionally left blank.

Contents

List of Figures

List of Tables

Appendices

This page intentionally left blank.

ACRONYMS AND ABBREVIATIONS

AET	Apparent Effects Threshold
AFFF	aqueous film forming foam
amsl	above mean sea level
ARAR	applicable or relevant and appropriate requirement
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene and total xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cPAH	carcinogenic PAH
CRP	community relations plan
CSL	cleanup screening level
DTP	depth to product
DTW	depth to water
Ecology	Washington State Department of Ecology
ESA	environmental site assessment
FCR	fish consumption rate
FYR	five-year review
HCID	hydrocarbon identification
IR	Installation Restoration
JP	jet petroleum
LHA	lifetime health advisory
LIF	laser-induced fluorescence
LNAPL	light non-aqueous phase liquids
LUC	land use control
MFD	Manchester Fuel Depot
MTCA	Model Toxics Control Act
NFA	no further action
NIRIS	Navy Installation Restoration Information Solution
PA	preliminary assessment
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid

PFOS	perfluorooctane sulfonate
ppm	part per million
ppt	part per trillion
PQL	practical quantitation limit
RAO	remedial action objective
RE	Reference Emitter
REC	recognized environmental condition
RME	reasonable maximum exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SCUM	Sediment Cleanup User's Manual
SI	site investigation
SMP	soil management plan
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
TOC	total organic carbon
TPH	total petroleum hydrocarbons
U.S. EPA	United States Environmental Protection Agency
UST	underground storage tank
UU/UE	unlimited use and unrestricted exposure
VOC	volatile organic compound
VPH	volatile petroleum hydrocarbons
WAC	Washington Administrative Code
WQC	water quality criteria
yd^3	cubic yard

1.0 INTRODUCTION

This report presents the results of the fourth five-year review (FYR) performed for the following four sites at Fleet Logistics Center Puget Sound, Manchester Fuel Depot (MFD), Manchester, Washington:

- Site 302 – Polychlorinated Biphenyl (PCB) Site
- Site 303 – D-Tunnel Tanks
- Site 304 – Industrial Area
- Tank 50 – Underground Storage Tank (UST) Release Site

This FYR was initiated in November 2018 and is based on activities conducted and data generated between January 2015 and January 2020 at these four sites. The triggering action for this FYR was the third FYR (U.S. Navy, 2015a), which was finalized in January 2015. Note, the third FYR (U.S. Navy, 2015a) and previous FYRs (U.S. Navy, 2004a and 2010) did not include a review of Tank 50. Washington State Department of Ecology (Ecology) issued a no further action (NFA) letter (Ecology, 1998) for Tank 50 identifying land use control (LUC) requirements to protect against exposure to residual contamination in soil and groundwater. As such, Tank 50 was included in the recently developed *Land Use Control Plan* (U.S. Navy, 2016a) and therefore, is included in this FYR to ensure the LUCs remain protective of human health and the environment.

MFD is not listed on the Comprehensive Environmental Response, Compensation, and Liability Action (CERCLA) National Priorities List. Although PCBs (i.e., at Site 302) are a hazardous substance under CERCLA, Site 302 was voluntarily investigated and recommended for cleanup activities to comply with the U.S. Navy Installation Restoration (IR) Program, which is consistent with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Sites 302, 303, and 304 and Tank 50 have been impacted by petroleum hydrocarbons (which are not hazardous substances under CERCLA) and are regulated under the Model Toxics Control Act (MTCA) with oversight from Ecology. Ecology issued NFA letters (Ecology, 1998, 2000, and 2001) for all four sites stating, "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." This determination was based primarily on the current and future land use at the sites (i.e., industrial/fuel farm). As such, LUC requirements were identified in the NFA letters to protect against exposure to residual contamination in soil and/or groundwater (Ecology, 1998, 2000, and 2001).

This FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the sites above levels that allow for unlimited use and unrestricted exposure (UU/UE). As a result, a statutory review is required in accordance with Washington Administrative Code (WAC) 173-340-420(3) for periodic reviews. The purpose of the FYR is to determine whether the remedies identified (i.e., LUCs) in the NFA letters for the sites remain protective of human health and the environment. The progress since the last FYR, data review, technical assessment, issues/recommendations, and ultimately, protectiveness determinations are documented in the FYR report.

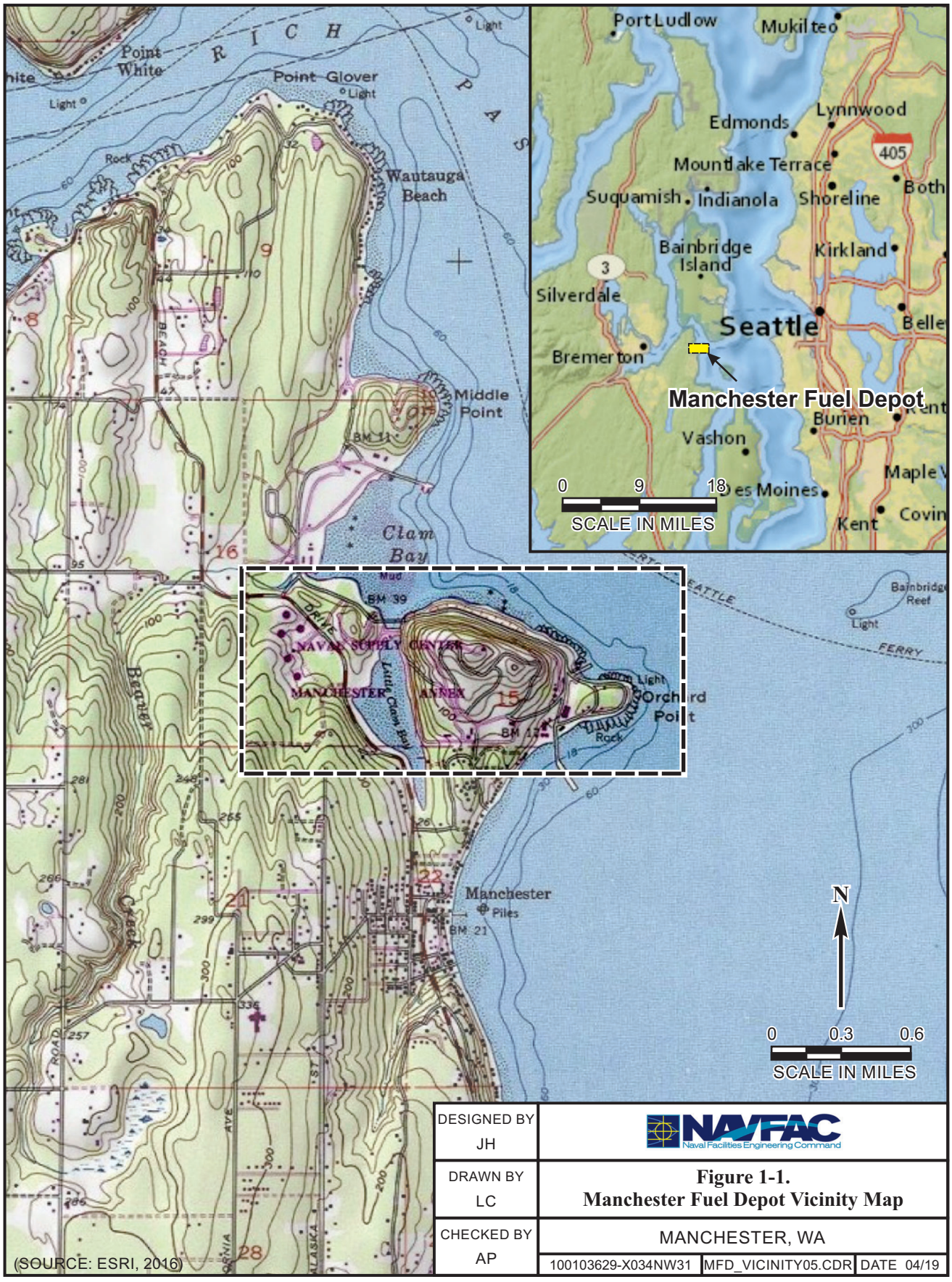
This FYR report was prepared as part of the FYR process using U.S. Navy and U.S. Environmental Protection Agency (U.S. EPA) guidance (U.S. Navy, 2004b, 2011, 2013, 2014; U.S. EPA, 2001, 2012, and 2016). This FYR report is organized in accordance with recommendations from U.S. EPA's 2016 recommended template (U.S. EPA, 2016) and has been streamlined to minimize information that has been presented in the previous three FYRs. The intent of this FYR report is to focus on the activities and issues over the last five years and recommendations and protectiveness for the next five years. As additional supporting information, the following appendices are also provided with this FYR:

- Appendix A – Well Rehabilitation and Decommissioning Maps and Recommendations
- Appendix B – Public Notifications
- Appendix C – FYR Interview Records
- Appendix D – Site Inspection Checklists
- Appendix E – Monitoring Well Inspection Checklists
- Appendix F – Responses to Stakeholder Comments on Draft Report

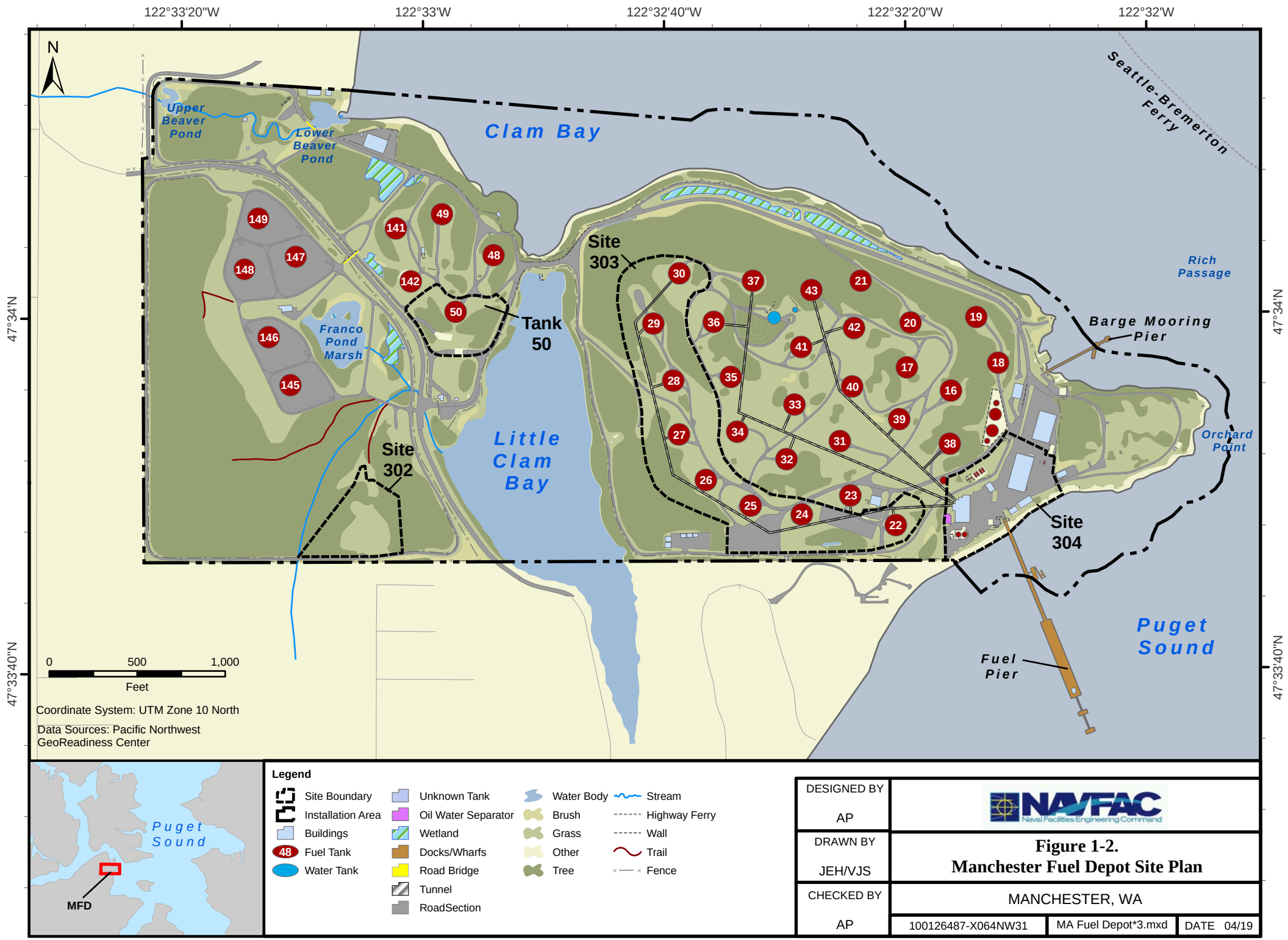
MFD is located less than 1 mile southwest of Bainbridge Island, approximately 3.5 miles northeast of the town of Port Orchard, and less than 1 mile north of the town of Manchester. The facility is situated on a small peninsula on the larger Kitsap Peninsula. This peninsula is located on the eastern edge of the larger Kitsap Peninsula and adjacent to Puget Sound to the east and Clam Bay to the north. MFD is divided into an eastern and western side of the facility by Little Clam Bay with these sides of the facility being connected by a 100-ft wide causeway. Figure 1-1 depicts the vicinity map for MFD.

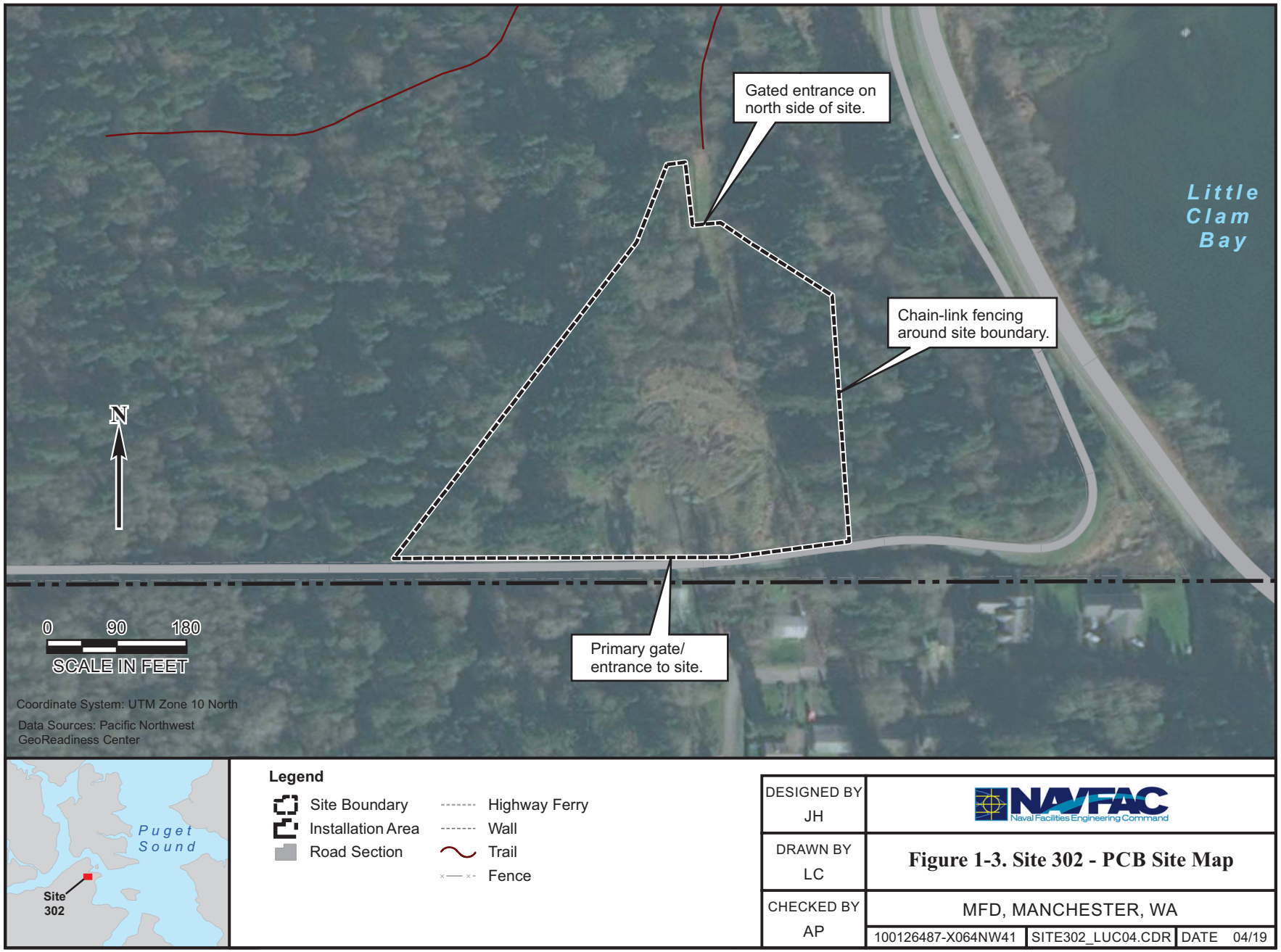
In the early 1940s (at the beginning of World War II), MFD was developed into a key fuel depot and remains a fuel depot for the Navy. The majority of the facility is currently used for fuel storage, including underground and aboveground petroleum storage tanks, associated pipelines, and a fuel pier. The remainder of the facility is dedicated to an industrial area with support and administrative buildings located adjacent to the fuel pier. Fuel products that have been or are currently stored at the fuel depot include Navy Special Fuel (No. 6 fuel oil [Bunker C]), marine diesel fuel, jet fuel, lubricant oil, and aviation gasoline.

As stated previously, several areas of the facility, specifically Sites 302, 303, and 304 and Tank 50, have been impacted by past releases of petroleum products to the environment which have required investigations and corrective actions. A site plan of MFD depicting the fuel storage, industrial area, and locations of these specific areas is shown in Figure 1-2. Site maps for Sites 302, 303, and 304 and Tank 50 are depicted in Figures 1-3, 1-4, 1-5, and 1-6, respectively. Figure 1-7 depicts the chronology of investigations, corrective actions, and documentation at these four sites. Table 1-1 summarizes the physical characteristics of these four sites, including history of contamination, physical characteristics, primary threat, land and resource use, and removal action performed.



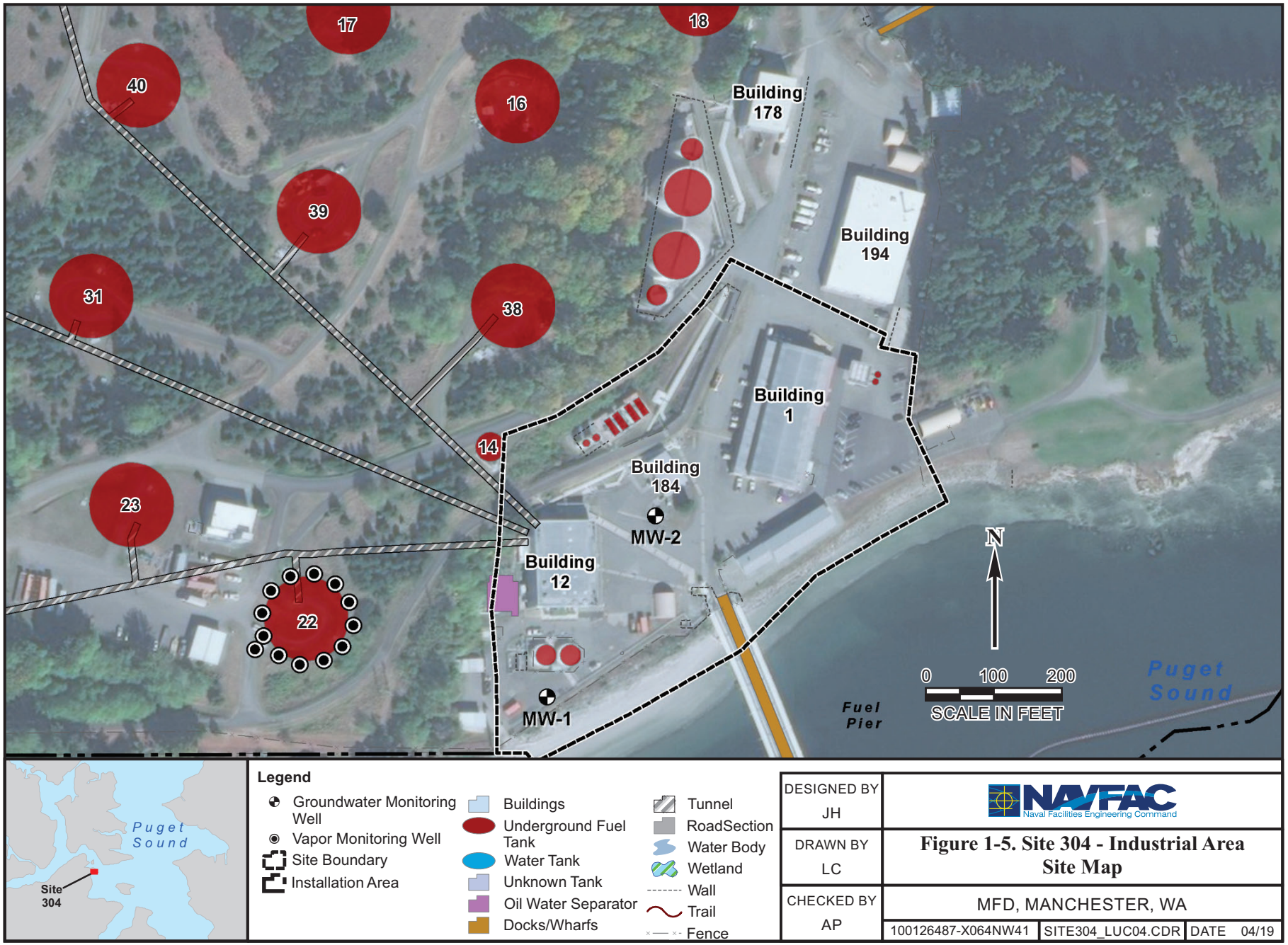
DESIGNED BY JH	NAVFAC Naval Facilities Engineering Command
DRAWN BY LC	**Figure 1-1. Manchester Fuel Depot Vicinity Map**
CHECKED BY AP	MANCHESTER, WA
100103629-X034NW31	MFD_VICINITY05.CDR DATE 04/19


122°33'20"W
122°33'W
122°32'40"W
122°32'20"W
122°32'W
47°34'N
47°33'40"N
N
Upper Beaver Pond
Lower Beaver Pond
Clam Bay
Seattle-Bremerton Ferry
Rich Passage
Barge Mooring Pier
Orchard Point
Franco Pond Marsh
Tank 50
Site 303
Site 302
Site 304
Little Clam Bay
Puget Sound
Fuel Pier
149
147
148
146
145
141
49
48
142
50
30
37
43
21
29
36
42
20
19
41
17
18
28
35
40
16
33
39
27
34
31
38
32
26
23
25
24
22
0
500
1,000
Feet
Coordinate System: UTM Zone 10 North
Data Sources: Pacific Northwest GeoReadiness Center
Puget Sound
MFD
Legend
Site Boundary
Installation Area
Buildings
48 Fuel Tank
Water Tank
Unknown Tank
Oil Water Separator
Wetland
Docks/Wharfs
Road Bridge
Tunnel
RoadSection
Water Body
Brush
Grass
Other
Tree
Stream
Highway Ferry
Wall
Trail
Fence
DESIGNED BY
AP
DRAWN BY
JEH/VJS
CHECKED BY
AP
NAVFAC
Naval Facilities Engineering Command
Figure 1-2.
Manchester Fuel Depot Site Plan
MANCHESTER, WA
100126487-X064NW31
MA Fuel Depot*3.mxd
DATE 04/19

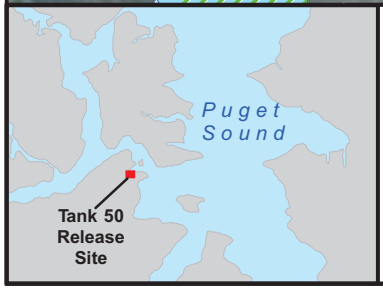


DESIGNED BY JH	NAVFAC Naval Facilities Engineering Command
DRAWN BY LC	**Figure 1-3. Site 302 - PCB Site Map**
CHECKED BY AP	MFD, MANCHESTER, WA
	100126487-X064NW41 | SITE302_LUC04.CDR | DATE 04/19

DESIGNED BY JH	NAVFAC Naval Facilities Engineering Command
DRAWN BY LC	**Figure 1-4. Site 303 - D-Tunnel Tanks Site Map**
CHECKED BY AP	MFD, MANCHESTER, WA
100126487-X064NW41	SITE303_LUC04.CDR DATE 05/19



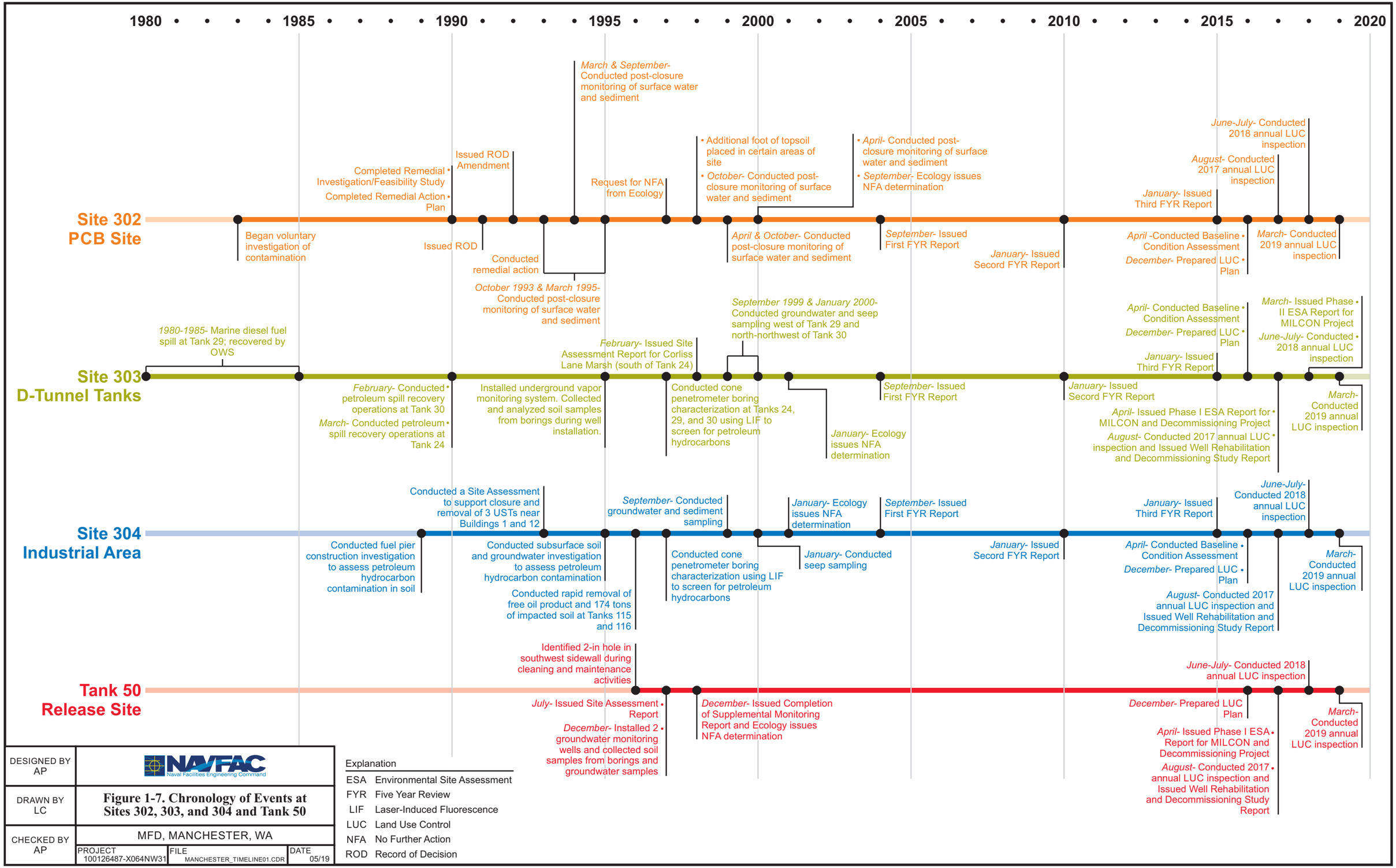
DESIGNED BY JH	NAVFAC Naval Facilities Engineering Command	
DRAWN BY LC	**Figure 1-5. Site 304 - Industrial Area Site Map**	
CHECKED BY AP	MFD, MANCHESTER, WA	
	100126487-X064NW41	SITE304_LUC04.CDR DATE 04/19



Legend

- Groundwater Monitoring Well
- Site Boundary
- Buildings
- Fuel Tank
- Road Section
- Water Body
- Wetland
- Wall
- Fence

DESIGNED BY JH	NAVFAC Naval Facilities Engineering Command		
DRAWN BY LC	**Figure 1-6. Tank 50 Release Site Map**		
CHECKED BY AP	MFD, MANCHESTER, WA		
	100126487-X064NW41	TANK50_LUC04.CDR	DATE 04/19



DESIGNED BY AP	NAVFAC Naval Facilities Engineering Command		
DRAWN BY LC	**Figure 1-7. Chronology of Events at Sites 302, 303, and 304 and Tank 50**		
CHECKED BY AP	MFD, MANCHESTER, WA		
	PROJECT 100126487-X064NW31	FILE MANCHESTER_TIMELINE01.CDR	DATE 05/19

Explanation

ESA	Environmental Site Assessment
FYR	Five Year Review
LIF	Laser-Induced Fluorescence
LUC	Land Use Control
NFA	No Further Action
ROD	Record of Decision

Table 1-1. Background Information Summary for Sites 302, 303, and 304 and Tank 50

Site	History of Contamination	Physical Characteristics	Primary Threat	Land and Resource Use	Removal Actions Performed
Site 302 – PCB Site (see Figure 1-3)	• From approximately 1955 through 1976, used as a dumping area for ship bilge waste, transformer oil, and other petroleum waste from local naval facilities. No estimate of the volume of waste disposed of at the site is available. • In 1983, the U.S. Navy Voluntary Sampling Program indicated that elevated chemical concentrations existed at the site. • The U.S. Navy continued to voluntarily investigate the site and recommend cleanup activities to comply with the U.S. Navy IR Program, which is consistent with CERCLA, as amended by SARA.	• 1.4-acre undeveloped area in southwest portion of MFD, west of Little Clam Bay. • Situated on north trending ridge, ranging in elevation from approximately 90 to 125 ft above mean sea level (amsl). • Bordered with chain-linked fencing with gates on southern (i.e., the main entrance on Alder Loop Road) and northern boundaries. • Montecito Road, an unpaved road, which once bisected the site running north-south, is no longer visible.	• Per the Record of Decision (ROD; U.S. Navy, 1991), PCBs in soil and their migration off-site to impact surface water and sediment. • Per the NFA letter (Ecology, 2000), residual PCB- and petroleum hydrocarbon-contaminated soil.	• Industrial land use. • Periphery covered with heavy vegetation (i.e., grasses, shrubbery, and trees). • Central portion is open, but covered with large, older stockpiles of soil and debris.	• In 1993, approximately 3,000 cubic yards (yd^3) of PCB- and petroleum hydrocarbon-impacted soil were excavated for off-site incineration per the ROD and ROD Amendment (U.S. Navy, 1991 and 1992). • Excavated areas received minimum 1 ft of granular fill, followed by capping with 4 inches of topsoil over the entire site. • In 1998, certain areas received an additional minimum 1 ft of soil cover.
Site 303 – D-Tunnel Tanks (see Figure 1-4)	• From 1980 through 1985, marine diesel fuel spill at Tank 29; however, all fuel reportedly recovered by oil-water separator. • In February 1990, diesel fuel spill of approximately 38,000 to 40,000 gallons at Tank 30; however, most fuel captured by backfill drainage system and directed to oil-water separator 8. • In March 1990, marine diesel fuel spill of approximately 10,000 gallons at Tank 24.	• Located on the east side of Little Clam Bay; along west, southwest, south portion of the peninsula, where it slopes steeply towards Little Clam Bay. • Consists of eight concrete USTs (each with a capacity of 0.84 to 2.1 Mgal) used to store marine diesel fuel. • Covered with approximately 4 to 6 ft of soil with the base of the tanks extending from 30 to 32 ft below ground surface (bgs). • USTs are located adjacent to the D-tunnel line, extending from Tank 30 to Building 12 in the Industrial Area. • USTs are surrounded by a backfill drainage system extending 6 to 8 ft outside the exterior wall and any groundwater collected is directed towards an oil-water separator.	• Per the NFA letter (Ecology, 2001), residual petroleum hydrocarbon-contaminated soil.	• Industrial land use/fuel farm. • Area directly above USTs is open; only vents, vaults, and mechanicals. • Periphery is vegetated with grasses, shrubbery, and trees.	• At Tank 30, fuel was recovered from the north dike and collection sumps and sorbent pads were used to recover fuel from the beach areas to the north.
Site 304 – Industrial Area (see Figure 1-5)	• In 1989, soil samples were collected as part of a construction project at the fuel pier to assess the potential for contamination in the area. Fuel was encountered in one sample collected at the water table. • In 1993, a site assessment was conducted to support closure and removal of three USTs located near Buildings 1 and 12. Soil sampling indicated diesel concentrations above cleanup levels. • In 1996, an expedited removal action was conducted to support construction of a secondary containment boom around oily waste Tanks 115 and 116. A subsurface investigation indicated TPH concentrations in soil and groundwater above cleanup levels.	• Located on east side of Little Clam Bay, in the eastern portion of MFD. • Central transfer point for most of the fuel products stored at MFD. • Groundwater ranges from 4 to 9 ft bgs, only marginally tidally influenced, and flows southeast towards Puget Sound.	• Per the NFA letter (Ecology, 2001), residual petroleum hydrocarbon-contaminated soil.	• Industrial land use/fuel farm. • Flat, mostly paved, and comprised of maintenance, administration, fuel pumping, and water treatment buildings.	• At Buildings 1 and 12, oily water was pumped out of the UST excavation and 120 yd^3 of petroleum hydrocarbon-impacted soil were excavated. • At Tanks 115 and 116, free oil product and 174 tons of visibly, petroleum hydrocarbon-impacted soil were removed.

Table 1-1 (continued). Background Information Summary for Sites 302, 303, and 304 and Tank 50

Site	History of Contamination	Physical Characteristics	Primary Threat	Land and Resource Use	Removal Actions Performed
Tank 50 – UST Release Site (see Figure 1-6)	• In 1996, discovered a 2-inch diameter hole in the steel wall on the southwest side of tank, 12 ft from the bottom, during cleaning and maintenance activities. A steel patch was welded into the wall of the tank to repair the hole.	• Located on the west side of Little Clam Bay. • Southernmost tank in a set of four USTs built on the top of a small knoll. • Steel cylinder tank approximately 100 ft diameter and 22 ft tall with a capacity of 1.1 Mgal. • Field constructed and covered with approximately 4 ft of earthen fill.	• Per the NFA letter (Ecology, 1998), petroleum hydrocarbons in soil and groundwater.	• Industrial land use/fuel farm. • Central portion is open; only piping and housing for tank mechanicals. • Periphery slopes steeply to the southeast, south, and southwest and is heavily vegetated with shrubbery and trees. • Building 185, a fueling station, is located along the southern boundary.	• None

2.0 RESPONSE ACTION SUMMARY

This section summarizes the environmental actions conducted at Sites 302, 303, and 304 and Tank 50 at MFD. Table 2-1 presents the reasonably anticipated land use, contaminants of concern (COCs) requiring action, impacted media, cleanup levels, remedial action objectives (RAOs), remedy components, remedy construction complete, and site closeout strategy for each site. As stated previously, Figure 1-7 depicts the chronology of investigations, corrective actions, and documentation for each site, which is also discussed in the subsections below.

2.1 Site 302 – PCB Site

PCBs were detected in the majority of surface soil samples at Site 302 at concentrations ranging from 0.1 to 1,500 parts per million (ppm). PCB concentrations greater than 1 ppm were confined primarily to the immediate disposal area. PCB concentrations greater than 5 ppm were confined primarily to the top 1 to 2 feet of soil. In addition to PCBs, other compounds were detected at elevated concentrations, including polynuclear chlorinated dibenzodioxins (dioxins), chlorinated dibenzofurans (furans), polynuclear aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs). The concentrations of these other compounds were located in the areas with the highest PCB concentrations. PCBs were also detected in surface water and sediment samples downgradient of the site. Notably, PCBs were not detected in fish tissue or shellfish collected from Little Clam Bay.

As stated in the ROD (U.S. Navy, 1991), the major components of the selected remedy to address the principal threats posed by PCB-contaminated soils at Site 302 included:

- Excavation of soil with PCB concentrations greater than 10 ppm;
- Treatment of excavated soil using solvent extraction;
- Off-site incineration of oil/PCBs extracted in the treatment process;
- Off-site incineration or chemical-waste landfilling of treated soil with residual PCB concentrations greater than 2 ppm;
- Placement of treated soil on the site;
- Installation of a soil cover over all soils containing PCB concentrations greater than 1 ppm;
- Construction of diversion trenching to prevent draining onto the site;
- Land use restrictions against residential use of the site; and
- Post construction testing of soil, sediments, and surface water.

In 1992, a ROD Amendment (U.S. Navy, 1992) was needed due to difficulties in locating contractors with experience in conducting treatment of PCB soils using solvent extraction and the higher than expected costs associated with this treatment method. The treatment method of soils with PCB concentrations greater than 10 ppm was changed to off-site incineration instead of solvent extraction.

In 1993, the selected remedy detailed in the ROD and ROD Amendment (U.S. Navy, 1991 and 1992) was implemented at Site 302. During these activities, approximately 3,000 yd^3 of PCB- and petroleum hydrocarbon-contaminated soil were removed for off-site incineration; excavated areas then received a

minimum of 1 foot of granular fill material followed by capping with 4 inches of topsoil over the entire site; and then certain areas received an additional foot of topsoil in 1998.

Following the remedial action, two years of semiannual surface water and sediment sampling were conducted (i.e., in October 1993, March 1994, September 1994, and March 1995). Samples were collected at six locations adjacent to Site 302 along freshwater drainage pathways. Samples in the first year were analyzed for PCBs. Samples in the second year were analyzed for PCBs and petroleum hydrocarbons. PCBs and petroleum hydrocarbons were not detected in the surface water samples, except in a seep that was only observed during one of the four rounds. PCBs were detected in sediment samples located along the shore of Little Clam Bay with most concentrations significantly lower than the cleanup level and Marine Sediment Quality Standards (SQS). One PCB sediment concentration [12.9 milligrams per kilogram (mg/kg)] slightly exceeded the SQS of 12 mg/kg (Hart Crowser, 2000a).

In 1997, the U.S. Navy requested an NFA determination from Ecology. Ecology requested further monitoring be completed at the seep location and along the western shoreline of Little Clam Bay. Beginning in October 1998, two additional years of semiannual surface water and sediment sampling were completed at three locations (i.e., one surface water location and two sediment locations), per Ecology's request. Sediment samples were analyzed for PCBs and surface water samples were analyzed for PCBs and petroleum hydrocarbons. PCBs and petroleum hydrocarbons were not detected in any surface water samples. PCBs were detected in sediment samples, but at concentrations significantly less than the ROD cleanup level of 10 mg/kg and SQS of 12 mg/kg (Hart Crowser, 2000a).

Based on the results of the post-remedial action monitoring and anticipated future industrial use of the MFD, Ecology issued an NFA letter in 2000 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." LUC requirements were identified in the NFA letter to guard against exposure to residual PCB-and petroleum hydrocarbon-contaminated soil (Ecology, 2000). Table 2-2 details the LUCs for Site 302 as presented in the *Land Use Control Plan* (U.S. Navy, 2016a).

2.2 Site 303 – D-Tunnel Tanks

In February 1990, an approximately 38,000 to 40,000-gallon diesel fuel spill occurred at Tank 30. Most of the spill was apparently contained by the footing drainage system under the tank and directed to an oil-water separator where it was recovered. Diesel fuel that was not contained by the drainage system flowed down the steep slope north of Tank 30. Some of this fuel flowed into the North Dike and was recovered. The remaining portion of the fuel infiltrated into the ground, where some of it discharged through seeps along the steep slopes and beaches north of Tank 30. Collection sumps and sorbent pads were used to collect fuel from the beach areas. Product and/or sheens were observed in monitoring wells and test pits installed along the beach to the north and test pits along Pine Road to the west.

In March 1990, an approximately 10,000-gallon diesel fuel spill occurred at Tank 24. Most of the spill was reported to have been recovered on base. Approximately 100 to 200 gallons leaked off base into the marsh area adjacent to Corliss Lane. Based on a review of data collected in 1990, 1991, 1995, and 1997, it was found that: 1) residual concentrations of petroleum hydrocarbons in soil near Tank 24 do not present a source of dissolved petroleum hydrocarbons in groundwater migrating towards the marsh area; 2) most recent data indicate residual petroleum hydrocarbon contamination in the marsh area does not pose a significant risk to human health and the environment; and 3) PAHs were detected in a surface water sample collected in the marsh area at concentrations which may pose unacceptable risk (Hart Crowser, 1998a).

In 1995, an underground vapor monitoring system was installed within the porous backfill drainage area surrounding each of the D-Tunnel tanks. Soil samples collected during installation of the soil vapor monitoring wells indicated that petroleum hydrocarbon-contaminated soil was present in the immediate vicinity (i.e., within the backfill drainage area) of all eight D-Tunnel tanks. In 1997, cone penetrometer borings were installed adjacent to Tanks 24, 29, and 30 in an attempt to characterize the extent of petroleum hydrocarbon contamination in the soil using laser induced fluorescence (LIF). The results of the investigation were generally inconclusive.

In September 1999 and January 2000, a groundwater and seep sampling investigation was conducted to determine if releases from Site 303 were adversely impacting the marine environment adjacent to MFD. In total, groundwater samples were collected from five monitoring wells and seep samples were collected from two locations west of Tank 29 and north-northwest of Tank 30. Based on the groundwater and seep sampling results, this investigation concluded that petroleum hydrocarbons are not being discharged into the marine environment at concentrations that pose an unacceptable risk and that no remedial actions are necessary to address residual petroleum hydrocarbon contamination (Hart Crowser, 2000b).

Based on the lack of impacts to the marine environment and the anticipated future industrial land use of MFD, Ecology issued an NFA letter in 2001 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." LUC requirements are identified in the NFA letter to guard against exposure to residual petroleum-contaminated soil (Ecology, 2001). Table 2-2 details the LUCs for Site 303 as presented in the *Land Use Control Plan* (U.S. Navy, 2016a).

2.3 Site 304 – Industrial Area

In 1989, a soil investigation was conducted as part of a construction project at the fuel pier. Of the thee soil samples collected, one soil sample collected at the water table (i.e., approximately 7 ft bgs) contained elevated petroleum hydrocarbon concentrations of 10,000 ppm.

In 1993, a site assessment was performed to support the closure and removal of three USTs located near Building 1 (i.e., UST P-3) and Building 12 (i.e., USTs T-4 and T-5). At UST P-3, soil sampling results for gasoline, VOCs, and lead were below MTCA Method A cleanup levels. At USTs T-4 and T-5, diesel concentrations were detected above MTCA Method A cleanup levels (i.e., at 475 to 5,800 ppm). As a result, approximately 120 yd^3 of contaminated soil was excavated from the area until levels of total petroleum hydrocarbon (TPH) from the sidewalls of the excavation were below MTCA Method A cleanup levels (Severson Construction, 1993a and 1993b).

In 1995, a subsurface soil and groundwater investigation was performed to assess petroleum hydrocarbon contamination at Site 304. In total, 50 soil samples were submitted for laboratory analysis from 23 different locations. TPH concentrations were detected above the MTCA Method A cleanup levels in 12 of the 50 soil samples. The vertical extent of petroleum hydrocarbon contamination in soil was generally limited to the top 8 ft bgs; however, contamination was observed to approximately 12 ft bgs at locations closer to Puget Sound. TPH concentrations were detected above the MTCA Method A cleanup level in groundwater near the base of the fuel pier, which is most likely associated with the numerous fuel lines that emerge from the pier and carried fuel to upland areas. Through this investigation, it was determined that petroleum hydrocarbon contamination in soil and groundwater at Site 304 has minimal potential for migration since there is no current source and significant contamination does not exist in groundwater (URS Consultants, Inc., 1995).

In 1996, an expedited removal action was performed to support construction of a secondary containment boom around oily waste Tanks 115 and 116. Free product oil and approximately 174 tons of visibly contaminated soil were removed from the area. No confirmation soil sampling was conducted following the removal action.

In 1997, a site characterization investigation was conducted using cone penetrometer borings. Soils were screened for the presence of petroleum hydrocarbons using LIF. Evidence of petroleum hydrocarbon contamination (including diesel, jet petroleum #5 [JP-5], and heavy oil) was found in many borings throughout Site 304.

In 1999 and 2000, a groundwater, seep, and sediment sampling investigation was conducted to determine if releases from Site 304 were adversely impacting the marine environment adjacent to MFD. Groundwater samples were collected from four monitoring wells and one seep at Site 304. Sediment samples were collected from 11 of 12 locations offshore of Site 304. Based on the groundwater, seep, and sediment sampling results, this investigation concluded that petroleum hydrocarbons are not being discharged into the marine environment at concentrations that pose an unacceptable risk and that no remedial actions are necessary to address residual petroleum hydrocarbon contamination (Hart Crowser, 2000b).

Based on the lack of impacts to the marine environment and the anticipated future industrial land use of MFD, Ecology issued an NFA letter in 2001 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." LUC requirements are identified in the NFA letter to guard against exposure to residual petroleum-contaminated soil (Ecology, 2001). Table 2-2 details the LUCs for Site 304 as presented in the *Land Use Control Plan* (U.S. Navy, 2016a).

2.4 Tank 50 – Release Site

In late 1996, the U.S. Navy hired a contractor to clean and line fuel storage tanks. Following cleaning and preparation for application of epoxy-based liner compound, the contractor identified an approximately 2-inch-diameter hole in the steel wall on the southwest side of Tank 50. The contractor reported that the hole was located approximately 12 feet above the bottom of the UST. Tank 50 was used to store JP-8 at the time. A steel patch was welded into the wall of Tank 50 to repair the hole. The steel around the hole in the tank wall reportedly was not rusted, suggesting that the hole may have been an artifact of the construction of the tank or work performed on the tank after construction. Cleaning and lining were then completed, and the tank was restored to service.

A soil sample collected from a depth of 6 inches below the damaged area during repair of the tank hole contained a TPH concentration of 1,000 mg/kg and a total combined benzene, toluene, ethylbenzene, and xylenes (BTEX) concentration of 60 mg/kg, both over the MTCA Method A cleanup levels.

Based on these results, a site assessment was conducted in 1997 to determine the nature and extent of petroleum contamination in soil near the tank and whether groundwater had been impacted by petroleum hydrocarbons released from this tank (Hart Crowser, 1997). Results of the site assessment indicated that TPH, identified as JP-8, was present at concentrations exceeding the MTCA Method A cleanup level at the time in soil adjacent to the hole found in the tank; approximately 75 feet downgradient of the hole found in the tank; and along the eastern perimeter of the tank at depths of roughly 16 to 32 feet bgs. Based on sample results and the nature of the TPH product, BTEX, PAHs and lead were determined not to be associated with the release. Although TPH was also detected above MTCA Method A cleanup level

in groundwater, only one boring could be advanced to groundwater and the sample collected was unfiltered.

Based on the uncertainties with regard to the presence of groundwater contamination, an additional well installation and sampling investigation was performed at Tank 50 (Hart Crowser, 1998b). The findings of this investigation concluded that:

- While TPH concentrations in several soil samples exceeded the MTCA Method A cleanup level of 200 mg/kg, there is little potential for ingestion of petroleum hydrocarbons from this site because the higher concentrations were observed at depth (generally more than 10 feet below ground surface), and the site has restricted access with few people visiting on a regular basis.
- Off-site migration of petroleum hydrocarbons at concentrations above the MTCA Method A cleanup level is unlikely and the closest drinking water wells are located more than a 1/4 mile northwest of the site, across a groundwater divide, and are screened at considerably greater depth than shallow groundwater encountered near Tank 50.
- The source of the petroleum release (i.e., the hole in the tank) has been repaired.

Based on a meeting with Ecology conducted in May 1998, the following additional actions were performed to support an NFA determination for the site by Ecology (Hart Crowser, 1998c):

- Installed 1-foot-high by 2-foot-wide aluminum warning signs at two locations near Tank 50 reading "PRIOR TO DIGGING IN THIS AREA CONTACT FACILITIES ENGINEER OR ENVIRONMENTAL DEPARTMENT."
- MFD modified their facility map with notation that reads "Area of Oil Contamination" indicating the area of concern to prevent contractors and base personnel working in the area from disturbing potential petroleum-contaminated soil without obtaining proper authorization and reviewing health and safety procedures with the facility environmental personnel.
- Collected one additional groundwater sample from monitoring well MW-2 in October 1998. TPH was not detected above the MTCA Method A cleanup level.

Based on the results of these investigations and the LUCs implemented at the site, Ecology issued a NFA letter in 1998 stating “Based upon the information in the reports listed above and institutional controls placed at the facility, Ecology has determined that, at this time, the release of total petroleum hydrocarbons into the soil and groundwater near Tank 50 no longer appears to pose a threat to human health or the environment.” The LUC requirements referred to in the NFA letter are to guard against exposure to residual petroleum-contaminated soil and groundwater (Ecology, 1998). Table 2-2 details the LUCs for Tank 50 as presented in the *Land Use Control Plan* (U.S. Navy, 2016a).

Table 2-1. Summary of Remedial Actions at Sites 302, 303, and 304 and Tank 50

Site	Reasonably Anticipated Land Use	COC Requiring Action[(a)]	Media[(a)]	Cleanup Levels	RAOs	Remedy Component	Remedy Construction Complete	Site Closeout Strategy
Site 302 – PCB Site	Industrial, U.S. Navy installation	PCBs, petroleum hydrocarbons	Soil	Soil: • Per remedial action (U.S. Navy, 1991 and 1992), 1 mg/kg for total PCBs. Sediment: • Ecology Sediment Quality Standard of 12 mg/kg for total PCBs (normalized for total organic carbon). Surface water: • Clean Water Act Marine Chronic Criteria of 0.03 µg/L for total PCBs. • Calculated Freshwater Chronic Criteria of 0.014 µg/L for total PCBs.	Per the ROD and ROD Amendment (U.S. Navy, 1991 and 1992): • To prevent current and future exposure to contaminated soil. • To prevent contamination from entering surface waters.	Per the ROD and ROD Amendment (U.S. Navy, 1991 and 1992) and completed in 1993: • Excavation of soil with PCB concentrations greater than 10 ppm; • Treatment of excavated soil using off-site incineration; • Off-site incineration of oil/PCBs extracted in the treatment process; • Off-site incineration or chemical-waste landfilling of treated soil with residual PCB concentrations greater than 2 ppm; • Placement of treated soil on the site; • Installation of a soil cover over all soils containing PCB concentrations greater than 1 ppm; • Construction of diversion trenching to prevent draining onto the site; • Land use restrictions against residential use of the site; and • Post construction testing of soil, sediments, and surface water. LUCs	Yes	Ongoing LUC maintenance
Site 303 – D-Tunnel Tanks	Industrial/fuel farm, U.S. Navy installation	Petroleum hydrocarbons	Soil	See Tables 5-3 through 5-5.	1999 to 2000 investigation concluded that no remedial actions were necessary to address residual petroleum hydrocarbon contamination (Hart Crowser, 2000b); therefore, there were no RAOs. However, the NFA Letter (Ecology, 2001) states that institutional controls are needed to prevent exposure to residual soil contaminants.	LUCs	Yes	Ongoing LUC maintenance
Site 304 – Industrial Area	Industrial/fuel farm, U.S. Navy installation	Petroleum hydrocarbons	Soil	See Tables 5-6 and 5-7.	1999 to 2000 investigation concluded that no remedial actions were necessary to address residual petroleum hydrocarbon contamination (Hart Crowser, 2000b); therefore, there were no RAOs. However, the NFA Letter (Ecology, 2001) states that institutional controls are needed to prevent exposure to residual soil contaminants.	LUCs	Yes	Ongoing LUC maintenance
Tank 50 – UST Release Site	Industrial/fuel farm, U.S. Navy installation	Petroleum hydrocarbons	Soil, groundwater	See Tables 5-8 and 5-9.	No remedial actions were conducted; therefore, there were no RAOs.	LUCs	Yes	Ongoing LUC maintenance

(a) COC requiring action and media information is based on NFA letters (Ecology, 1998, 2000, and 2001).

Table 2-2. Land Use Controls for Sites 302, 303, and 304 and Tank 50

Site	Land Use Controls
Site 302 – PCB Site	• *Ensure that site signage is readable and adequate.* • Ensure that land use remains for industrial purposes. • Ensure that there has been no unauthorized soil excavation or disturbance. • Ensure that there has been no unauthorized placement of excess soil from another location. • Ensure integrity of the soil cover vegetation, so that any excavation or improper disposal is apparent. • Ensure that any soil excavated from the site is properly characterized and disposed offsite and that on-site workers are protected during such activities. • Ensure that site fencing is intact and that gates are secured and locked.
Site 303 – D-Tunnel Tanks	• *Ensure that land use remains for industrial purposes. Coordinate with Ecology prior to change in property ownership or land use concerning the need for remedial actions.* • *Ensure that warnings are posted for workers to guard against exposure to residual petroleum contaminated soil.* • *Identify remaining areas of concern on facility maps and specify in facility excavation permit instruction.* • Ensure no production wells are installed and groundwater is not used except for monitoring and/or remediation. • Protect existing vapor monitoring wells until formally abandoned. • Ensure that there has been no unauthorized soil excavation or disturbance. • Confine authorized reusable material* to approved staging area. • Ensure that any soil excavated from the site is properly characterized and disposed offsite and that on-site workers are protected during such activities. *Those materials for which on-site placement has been coordinated with the Ecology Cleanup Project Manager and that have been characterized in collaboration with the Ecology Cleanup Project Manager.
Site 304 – Industrial Area	• *Ensure that land use remains for industrial purposes. Coordinate with Ecology prior to change in property ownership or land use concerning the need for remedial actions.* • *Ensure that warnings are posted for workers to guard against exposure to residual petroleum contaminated soil.* • *Identify remaining areas of concern on facility maps and specify in facility excavation permit instruction.*

Table 2-2 (continued). Land Use Controls for Sites 302, 303, and 304 and Tank 50

Site	Land Use Controls
	• Ensure no production wells are installed and groundwater is not used except for monitoring and/or remediation. • Protect existing monitoring wells until formally abandoned. • Ensure that there has been no unauthorized soil excavation or disturbance. • Ensure that any soil excavated from the site is properly characterized and disposed offsite and that on-site workers are protected during such activities.
Tank 50 – UST Release Site	• *Ensure that warnings are posted for workers to guard against exposure to residual petroleum contaminated soil.* • *Identify remaining areas of concern on facility maps and specify in facility excavation permit instruction.* • Ensure that land use remains for industrial purposes. Coordinate with Ecology prior to change in property ownership or land use concerning the need for remedial actions. • Ensure no production wells are installed and groundwater is not used except for monitoring and/or remediation. • Protect existing monitoring wells until formally abandoned. • Ensure that there has been no unauthorized soil excavation or disturbance. • Ensure that any soil excavated from the site is properly characterized and disposed offsite and that on-site workers are protected during such activities.

Note: LUCs that are italicized are required LUCs from the NFA letters (Ecology, 1998, 2000, and 2001).

3.0 PROGRESS SINCE LAST FIVE-YEAR REVIEW

Per U.S. EPA FYR Guidance (U.S. EPA, 2016), Table 3-1 details the protectiveness statement and determination from the *Third Five-Year Review for Sites 302, 303, and 304* (U.S. Navy, 2015a). As stated previously, Tank 50 was not included in the third FYR (U.S. Navy, 2015a) or previous FYRs (U.S. Navy, 2004a and 2010); therefore, there is no protectiveness determination and statement for Tank 50 presented in Table 3-1. Ecology issued an NFA letter (Ecology, 1998) for Tank 50 identifying LUC requirements to protect against exposure to residual contamination in soil and groundwater. As such, Tank 50 was included in the recently developed *Land Use Control Plan* (U.S. Navy, 2016a) and therefore, is included in this FYR to ensure the LUCs remain protective of human health and the environment.

Table 3-1. Protectiveness Statement(s) from the Third Five-Year Review

Site	Protectiveness Determination	Protectiveness Statements(s)
302	Protective	Site 302 at MFD was issued an NFA determination by Ecology in 2000 because it was determined that NFA was required to protect human health and the environment based primarily on the current and future land use at the site. There has been no new evidence that would change this. The remedy at this site remains protective of human health and environment.
303	Protective	Site 303 at MFD was issued an NFA determination by Ecology in 2001 because it was determined that NFA was required to protect human health and the environment based primarily on the current and future land use at the site. There has been no new evidence that would change this. The remedy at this site remains protective of human health and environment.
304	Protective	Site 304 at MFD was issued an NFA determination by Ecology in 2001 because it was determined that NFA was required to protect human health and the environment based primarily on the current and future land use at the site. There has been no new evidence that would change this. The remedy at this site remains protective of human health and environment.
Sitewide	Protective	Sites 302, 303, and 304 at MFD were issued NFA determinations by Ecology in 2000 and 2001 because it was determined that NFA was required to protect human health and the environment based primarily on the current and future land use at the site. There has been no new evidence that would change this. The remedies at all three sites remain protective of human health and environment.

3.1 Status of Recommendations

In total, nine recommendations were presented in the *Third Five-Year Review for Sites 302, 303, and 304* (U.S. Navy, 2015a) to optimize implementation of the LUC components (i.e., remedies) at these sites. Table 3-2 lists these recommendations as well as provides the current status of the recommendations. Since Tank 50 was not included in the *Third Five-Year Review for Sites 302, 303, and 304* (U.S. Navy, 2015a), there were no specific recommendations for the site.

Table 3-2. Status of Recommendations from the Third Five-Year Review

Item No.	Issue	Recommendation	Current Status	Current Implementation Status Description	Reference or Completion Data (if applicable)
Sites 302, 303, and 304					
1	NA	The U.S. Navy shall consult with Ecology concerning land use changes that could affect the protectiveness of the remedies at Sites 302, 303, and 304.	Completed/ Ongoing	The *Land Use Control Plan* (U.S. Navy, 2016a) documents and formalizes that a change in property ownership or land use would result in consultation with Ecology concerning the need for remedial action. The remedies implemented at Sites 302, 303, and 304 (and Tank 50) are LUCs, including institutional and engineering controls. The land use at these sites and across MFD will remain for industrial purposes (i.e., fuel farm) for the foreseeable future.	U.S. Navy, 2016a
2	NA	The continued implementation of land use restrictions at Site 302, 303, and 304 should be evaluated at the time of the next FYR.	Completed	The continued implementation of LUCs at Sites 302, 303, and 304 (and Tank 50) have been evaluated as part of this FYR effort and are presented in Section 5.0, Technical Assessment.	January 2020
3	LUCs for Sites 302, 303, and 304 are not formalized.	The U.S. Navy should implement LUCs for Sites 302, 303, and 304 through formal written instructions or standard operating procedures.	Completed	LUCs for Sites 302, 303, and 304 (and Tank 50) were implemented through formal written instruction via completion of the *Land Use Control Plan* (U.S. Navy, 2016a).	U.S. Navy, 2016a
4	There is no formal excavation permit process in place at MFD to prevent unauthorized excavations at Sites 302, 303, and 304.	The U.S. Navy should implement a formal written excavation permitting process for Sites 302, 303, and 304.	Completed	A formal written excavation permitting process, including excavation permit, for MFD is detailed in the *Contractor Environmental and Safety Guide* (U.S. Navy, 2015b) and has been implemented per interviews with MFD personnel, as presented in Section 4.0.	U.S. Navy, 2015b

Table 3-2 (continued). Status of Recommendations from the Third Five-Year Review

Item No.	Issue	Recommendation	Current Status	Current Implementation Status Description	Reference or Completion Data (if applicable)
Site 302					
5	Fill excavated from Beaver Creek was recently placed on the western part of the site and excess soil from two other facility projects has been placed on the site.	The U.S. Navy shall discontinue the practice of placing excess soil from various projects at Site 302.	Completed	The U.S. Navy has discontinued the practice of placing excess soil from various projects at Site 302. A formal waste management practice for MFD is detailed in the *Contractor Environmental and Safety Guide* (U.S. Navy, 2015b) and has been implemented per interviews with MFD personnel, as presented in Section 4.1.3.	U.S. Navy, 2015b
6	The excess soil placed at Site 302 has not been tested for PCBs.	The excess soil placed at Site 302 should be tested for PCBs and other potential contaminants based on generator knowledge. Soil that contains contaminants exceeding MTCA Method A levels shall be removed and disposed of off-site at a disposal facility that is licensed and permitted to accept the material.	Address in Next FYR	Per discussions with Navy personnel, there are plans in-place to test the excess soil placed at Site 302 in 2020.	NA
7	Areas where additional fill was placed and the area just inside the Alder Loop Road gate are not vegetated.	Site 302 should be revegetated in the areas where additional fill was placed and in the area just inside the Alder Loop Road gate. Grading of Site 302 prior to revegetation is recommended so that future site inspections can confirm that no additional soil has been placed at the site. A follow-up inspection should be performed during the following growing season to ensure that vegetation has taken hold.	Address in Next FYR	Once the excess soil is tested and properly disposed of, Site 302 will be graded and revegetated so that future site inspections can confirm that no additional soil has been placed at the site.	NA
8	Two sections of the Site 302 fence have been	Repair/replace the two damaged sections of Site 302 fence.	Address in Next FYR	The U.S. Navy is developing plans (i.e., contracting and funding) to repair/replace	NA

Table 3-2 (continued). Status of Recommendations from the Third Five-Year Review

Item No.	Issue	Recommendation	Current Status	Current Implementation Status Description	Reference or Completion Data (if applicable)
	damaged by fallen trees.			the two damaged sections of fencing along the northwest boundary of Site 302.	
Site 304					
9	There are no warning signs present to indicate that soil contamination is present and that unauthorized excavations were prohibited.	Warning signs should be placed at Site 304 to warn of the presence of contaminated soil.	Completed	As documented in the *2018 Land Use Control Inspection Technical Memorandum* (U.S. Navy, 2018), a warning/LUC sign is placed at the northern corner of Building 178, north of the LUC boundary and primary entry to Site 304.	U.S. Navy, 2018

NA – not applicable

3.2 Additional Actions Taken

In addition to implementing the recommendations from the *Third Five-Year Review for Sites 302, 303, and 304* (U.S. Navy, 2015a; see Table 3-2), additional actions have been taken for Sites 302, 303, and 304 and Tank 50 at MFD. These additional actions are described in the following subsections.

2016 Conditions Assessment at Sites 302, 303, and 304. The *Current Conditions at Sites 302, 303, and 304* (U.S. Navy, 2016b) documents the conditions at these three sites observed during site inspections conducted on April 12, 13, and 14, 2016; identifies any LUC deficiencies that may need corrective actions; and provides recommendations to ensure all LUCs are effective. Since the LUCs were formalized in 2016 in the *Land Use Control Plan* (U.S. Navy, 2016a), these 2016 findings/observations are used as a baseline to compare findings from subsequent annual LUC inspections at MFD. The findings/observations from the 2016 baseline conditions assessment are discussed in Section 4.3 along with the subsequent annual LUC inspections.

2016 Recommendations for the Contractor Environmental and Safety Guide. The *Contractor Environmental and Safety Guide* (U.S. Navy, 2015b) is intended to help contractors working at MFD comply with environmental laws and regulations as well as U.S. Navy and facility environmental policies. To enhance the *Contractor Environmental and Safety Guide* (U.S. Navy, 2015b), the guide was reviewed, and several recommendations were identified, developed, and presented in the *Recommendations for the Contractor Environmental and Safety Guide* (U.S. Navy, 2016c). These recommendations fell into one of three categories:

1) recommendations to ensure that the guide is applicable and available to all personnel;
2) recommendations to add specific information regarding any residual contamination in soil and/or groundwater and LUC requirements at Sites 302, 303, and 304; and
3) recommendations for utilizing the *Safety & Health Requirements Manual* (Consolidated EM 385-1-1; United States Army Corps of Engineers, 2014) to implement additional formalized processes (U.S. Navy, 2016c).

2016-2017 Phase I Environmental Site Assessment. From 2016 through 2017, a Phase I environmental site assessment (ESA) was conducted in accordance with American Society for Testing and Materials (ASTM) E 1527-13 in support of planned upcoming projects at MFD. The purpose of the Phase I ESA was to identify recognized environmental conditions (RECs), specifically within the project areas of interest (U.S. Navy, 2017a). RECs are the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: 1) due to any release to the environment; 2) under conditions indicative of a release to the environment; or 3) under conditions that pose a material threat of a future release to the environment (ASTM, 2016). Based on the findings of the records review, site reconnaissance, and interviews, it was determined that there are RECs associated with several USTs at MFD, including Tanks 22 and 24 through 30 (i.e., Site 303 D-Tunnel Tanks) and Tank 50 (see Figures 1-4 and 1-6; U.S. Navy, 2017a).

Although these areas/sites are not being sold or transferred, and the land use will remain for industrial purposes (i.e., fuel farm), recommendations were provided for the individual areas/sites based on the identified RECs and upcoming activities. Ultimately, it was recommended to conduct a Phase II ESA to determine/characterize the nature and extent of potential contamination prior to initiating the planned

MILCON Project. It was recommended that a subsurface investigation utilizing a high-resolution site characterization technology, specifically laser-induced fluorescence (LIF) to obtain real-time data, be implemented surrounding several USTs, including Tanks 24 and 26 at Site 303. For all areas/sites, it was recommended that prior to tank decommissioning a site assessment of each tank be performed in accordance with WAC 173-360-390, *Site Assessment at Closure or Change-in- Service*, to meet the state requirements for tank closure (U.S. Navy, 2017a).

2016-2017 Well Rehabilitation and Decommissioning Study. As stated previously, several areas of MFD have been impacted by past releases of petroleum products to the environment which have required investigations and corrective actions, including installation of monitoring wells. From 2016 through 2017, a well rehabilitation and decommissioning study was conducted for all groundwater and vapor monitoring wells at MFD. The purpose of this well rehabilitation and decommissioning study was to: 1) conduct a records review, identifying and inventorying all groundwater and vapor monitoring wells that have been installed at MFD; 2) conduct a site reconnaissance, describing the observations and findings from the well inspection activities; and 3) provide recommendations for well rehabilitation or decommissioning due to upcoming activities at MFD and based on regulations in WAC 173-160 (U.S. Navy, 2017b).

Based on the records review, documents found in Navy Installation Restoration Information Solution (NIRIS) indicate that there is a total of 122 monitoring wells, including 18 groundwater and 104 vapor monitoring wells at MFD. Inquiries conducted using Ecology's searchable database or made to Kitsap County Environmental Health did not provide any pertinent information regarding monitoring wells at MFD. Of the 122 monitoring wells, a total of 74 monitoring wells, including seven groundwater and 67 vapor monitoring wells, were found during the site reconnaissance activities conducted in December 2016. Appendix A presents a map of all documented monitoring wells at MFD and a map of those monitoring wells found at MFD during the site reconnaissance. During the field effort, 96% of the monitoring wells found were in good condition. The most salient finding was product or sheen detected in various vapor monitoring wells surrounding Tanks 22, 26, and 29. Upon further analysis, MFD determined that the product was weathered fuel; therefore, not the result of a current or ongoing release (U.S. Navy, 2017b).

In total, four groundwater monitoring wells, specifically MW-3 north of Tank 30 (associated with Site 303); MW-1 and MW-2 at Site 304; and MW-1 at Tank 50, were recommended to remain in place because of their generally good condition and proximity to surface water bodies (i.e., Clam Bay, Puget Sound, and Little Clam Bay, respectively). Per the LUC requirements for Site 303, Site 304, and Tank 50 (see Table 2-2), these groundwater monitoring wells will be protected and maintained until deemed unnecessary for potential future monitoring and formally abandoned. All vapor monitoring wells were recommended to be decommissioned because upcoming activities at MFD will destroy or partially destroy these wells. It was recommended that depth to water (DTW) and depth to product (DTP), if present, measurements are collected from each well again prior to decommissioning. Appendix A presents a table of all monitoring wells at MFD along with respective recommendations and rationales (U.S. Navy, 2017b).

2017-2018 Phase II Environmental Site Assessment. From 2017 through 2018, a Phase II ESA was conducted surrounding eight different USTs to further evaluate select RECs identified during the Phase I ESA (U.S. Navy, 2017a); to obtain sufficient information to guide MILCON Project design; and to assess potential risks to human health and the environment during execution of the MILCON Project. Of these eight USTs, only Tanks 24 and 26 are located within the boundary of Site 303 (i.e., all other USTs are

located outside the boundaries of Sites 302, 303, and 304, and Tank 50). With regards to Tanks 24 and 26, the objectives of the Phase II ESA included:

1) investigating if wide-spread petroleum hydrocarbon contamination is present at Tank 24;
2) confirming the presence of previously identified petroleum hydrocarbon contamination at Tank 26; and
3) further delineating the presence of petroleum hydrocarbon contamination based on results from the initial phase of investigation.

Overall, the results of the Phase II ESA did not indicate wide-spread petroleum hydrocarbon contamination at Tank 24. Additionally, the results indicated that there may have been very localized petroleum hydrocarbon contamination on the south side of Tank 26. Based on these results, it was found that no additional investigation is warranted/needed before execution of the MILCON Project (CH2M, 2018). The results of the Phase II ESA at Tanks 24 and 26 are further discussed in Section 4.2, Data Review.

Preliminary Assessment for Per- and Polyfluoroalkyl Substances. The U.S. Navy recognizes per-and polyfluoroalkyl substances (PFAS) as chemicals of emerging concern. As such, the U.S. Navy is in the process of completing a preliminary assessment (PA; and will begin a site investigation [SI]) at MFD, as part of the U.S. Navy-wide program to assess PFAS at its installations. The U.S. Navy plans to submit the Draft Final MFD PFAS PA Report to all stakeholders and then conduct an in-person meeting/presentation to discuss the findings and receive/address comments. At this time, there are no recommendations or analytical data for PFAS; therefore, it does not affect protectiveness. The results of the PFAS PA/SI will be addressed in the next FYR for MFD.

4.0 FIVE-YEAR REVIEW PROCESS

4.1 Community Notification, Involvement and Interviews

The U.S. Navy's public or community notification and involvement activities related to MFD are described in the following subsections.

4.1.1 History of Community Involvement

Community involvement activities have established communication between the citizens living near MFD (in Manchester and Port Orchard, Washington), other interested organizations and agencies, the U.S. Navy, U.S. EPA, Ecology, and/or Suquamish Tribe. Community involvement activities included the following:

- Technical Review Meeting
- Community Relations Plan (CRP)
- Factsheet
- Local newspaper release
- Public meeting

In support of the voluntary investigation and cleanup activities at Site 302, a technical review meeting was conducted on August 3, 1989 to present the results of sampling activities, a baseline risk assessment, and the remedial alternatives (U.S. Navy, 1989). This meeting was attended by several community members, including representatives from Watauga Beach Water System, Bremerton/Kitsap Health Department, and Manchester Water District. There is no documentation of other technical review meetings conducted after August 1989.

A CRP was developed in September 1989 describing how the U.S. Navy was planning to involve the community in the remedial activities at Site 302 (Hall & Associates, 1989). The purpose of the CRP was to facilitate two-way communication between the surrounding community and the U.S. Navy and to encourage community involvement and understanding of ongoing environmental remedial activities at Site 302. The document includes the site background information, remedial investigations at the site, key community concerns, community relations activities, and schedule.

A factsheet and local newspaper release were the primary methods of informing the public of activities at Site 302. The community members were given opportunities to ask questions or provide comments at the public meeting, by direct telephone calls to the U.S. Navy's contact person, or by submitting written comments or questions to the contact person. The public meeting was held on December 6, 1990 and discussed community comments and concerns on the proposed plan for cleanup of Site 302 (U.S. Navy, 1990).

4.1.2 Community Involvement during the Five-Year Review Period

In addition to the various community involvement efforts conducted in support of the voluntary investigation and cleanup activities at Site 302, there is a Manchester Citizen Advisory Committee that meets every month in Manchester, Washington. The Kitsap County Board of Commissioners Resolution established the Manchester Citizen Advisory Committee on April 13, 2009. The committee provides a discussion forum for community interests and issues. The committee enhances communication between

Manchester-area residents and Kitsap County government, and coordinates efforts of the many council and community residents currently working to improve the Manchester community. The meeting minutes are posted on the Kitsap County government website: https://www.kitsapgov.com/BOC_p/Pages/MCAC.aspx. As recently as August 7, 2018, the U.S. Navy has presented at these community meetings, specifically discussing the proposed fuel farm project at MFD and its potential effects in the area.

Public notices were published in three local newspapers informing the community of the U.S. Navy's intent to conduct the fourth FYR for MFD. A notification was published in the *Kitsap Sun* from December 21 through 23, 2018 and in the *Port Orchard Independent* and *North Kitsap Harold* on December 21 and 28, 2018 and January 4, 2019. The proofs of these public notices are provided as Appendix B. The notification provided information on why the FYR was being conducted; what sites were included in the FYR; when the FYR would be completed; how the public could receive additional information; and established a 30-day public review period for the public to provide questions or comments on the FYR process for MFD.

Similar to the notification of intent to conduct the FYR, a notice of completion for the FYR will be published in the *Kitsap Sun*, *Port Orchard Independent, and North Kitsap Herald*. The notification will include the protectiveness statement and website link to the completed FYR report.

4.1.3 Interviews during the Five-Year Review Period

As part of the FYR process, interviews were conducted with persons familiar with Sites 302, 303, and 304 and Tank 50 at MFD. Interview candidates were identified from a variety of organizations and groups, including MFD personnel, Ecology, Suquamish Tribe, and community members. A set of interview questions were developed and tailored to specific categories of interview candidates (i.e., either Navy/MFD personnel, regulatory agency, or community member). These interview questions and instructions were transmitted via email to regulatory agency personnel on January 24, 2019 and to a community member on March 9, 2019. MFD personnel were interviewed in-person on March 7, 2019. The complete interview questionnaires are provided as Appendix C. Highlights of MFD personnel, regulatory agency, and community member interviews are summarized below.

U.S. Navy/MFD Personnel. Three MFD personnel were interviewed as part of the fourth FYR for MFD. The names, organization, and role of the interviewees/respondents are listed below:

Name	Organization	Role
Doug Tailleur	MFD	Environmental Specialist
Michael Hardiman	MFD	Environmental Director
Glenn Schmitt	MFD	Regional Fuels Manager

All of the MFD respondents were in general agreement that the remedies were implemented as planned with the exception of Site 302. One MFD respondent noted that the dredge spoils were placed on top of the clean cap at Site 302 more than five years ago.

All of the MFD respondents indicated that the U.S. Navy continues to own the land and there are no ownership changes that may impact the effectiveness of the remedies at the site. Respondents also indicated that they are not aware of any activities which may alter the site conditions or land use, stating that the new fuel farm project (i.e., MILCON) is consistent with industrial land use.

MFD respondents indicated that the LUC inspections, conducted on an annual basis, have been sufficiently thorough and frequent to ensure protection of human health and the environment.

MFD respondents indicated that some corrective actions regarding issues identified in the *Third Five-Year Review for Sites 302, 303, and 304* (U.S. Navy, 2015a) were made, but the U.S. Navy has not addressed all of the issues at this time (e.g., soils placed at Site 302, which the sampling will now be conducted in 2020). The respondents indicated that major accomplishments included developing the *Land Use Control Plan* (U.S. Navy, 2016a), conducting annual LUC inspections, implementing a dig permit process (including annual environmental awareness training), posting signage at Site 303, and working to address soil placement issues at Site 302. MFD personnel inquired about decreasing or eliminating LUCs, specifically at Site 303, since no contamination was found during the Phase II Environmental Site Assessment investigation, conducted in support of the new fuel farm project.

All of the MFD respondents indicated that there were no community concerns regarding the remedies at Sites 302, 303, and 304 and Tank 50. An MFD respondent noted that the U.S. Navy has sent flyers to the community and conducted a number of community meetings/open house (with Manchester Community Group) regarding the new fuel farm project. The U.S. Navy has not received any comments from the community on the environmental issues at MFD. The community was more concerned with visuals, noise, and truck traffic related to the new fuel farm project. More details on specific comments and responses are provided in Appendix C.

Stakeholders. One regulatory agency personnel and one stakeholder were interviewed as part of the fourth FYR for MFD. The names, organization, and role of the interviewees/respondents are listed below:

Name	Organization	Role
Mahbub Alam	Ecology	Project Manager
Denice Taylor	Suquamish Tribe	Environmental Scientist

The Ecology respondent indicated that he was very familiar with the remedy implementation at Sites 302, 303, and 304 and Tank 50. The respondent felt that not all institutional controls that are stipulated in the *Land Use Control Plan* (U.S. Navy, 2016a) are being maintained or followed through on (however, did not specify which institutional controls). In addition, he indicated that there is no formal long-term monitoring program to verify whether contaminants that remained on site are impacting the surrounding environment.

The Ecology respondent indicated that the annual LUC inspections seem to be sufficiently thorough and frequent with the LUC inspection reports providing field notes, photographs, figures, and recommendations. However, he did indicate that the U.S. Navy has not followed through on all recommendations from these LUC inspections. Additionally, he noted that not all recommendations from the third FYR were completed. He indicated that it seems the sites have been used for further dumps of excess soil, equipment, and storage without justification.

The Ecology respondent noted that the U.S. Navy is supposed to consult with Ecology prior to any planned land use changes. He stated that the U.S. Navy plans to decommission the USTs in place and replace with aboveground storage tanks (i.e., the MILCON Project) and, to date, Ecology was not consulted on any planned land use changes or any environmental assessment work the U.S. Navy has performed.

The Ecology respondent was not aware of any complaints or violations at MFD or any community concerns. The respondent believes that a long-term monitoring program should be implemented at these sites to confirm/verify the effectiveness of the remedies and to protect the human health and environment; the signage at the sites is not adequate; and that the U.S. Navy should implement a formal process to follow through on recommendations. More details on specific comments and responses are provided in Appendix C.

The Suquamish Tribe respondent indicated that she was familiar with the site-specific documents, including the third FYR, Phase II ESA report, and the most recent LUC inspection report. The respondent expressed concern over some issues related to stockpiled soils that have not yet been managed. She noted that the Phase II ESA report recommended preparation of a soil management plan ahead of the proposed tank project and additional soil characterization in other areas of MFD. Based on the respondent's review of the 2018 LUC inspection report, she indicated that the annual LUC inspections appear to be frequent enough and to encompass an appropriate scope. However, the respondent felt that there was not an effective process in place to track and follow through on recommendations. Based on the review of site-specific reports, the respondent stated that she expects the remedies to remain protective of human health and environment, in accordance with NFA letters (Ecology, 1998, 2000, and 2001). The respondent stated that she is aware of the U.S. Navy's PA/SI regarding the potential for PFAS contamination at MFD.

The Suquamish Tribe respondent also is not aware of any community complaints, violations, or incidents related to MFD that have required a response by Suquamish Fisheries Department. She requested to be informed of any proposed changes in site operations or conditions that may impact the remedies or the protectiveness determinations, including proposed testing, investigations, and evaluations. More details on specific comments and responses are provided in Appendix C.

Community Members. One community member, who was the Deputy Director at MFD from August 1985 through January 2014, was interviewed as part of the fourth FYR for MFD. He indicated that the remedy operations were adequate for Sites 302, 303, and 304 and Tank 50 and that the remedies during his tenure at MFD consisted primarily of drilling wells and soil sampling to determine the extent of contamination and monitoring of the sites for any migration of contamination. However, he was not aware of the remedy operations after his retirement in January 2014.

The respondent indicated that he is an active member of the Manchester Community Advisory Committee and was not aware of any community concerns. He noted that the local community recognizes MFD as an outstanding steward of the environment. He noted that the community is aware of the many awards that MFD has received, including the award (on three occasions) for having the best environmental operations in the entire U.S. Navy.

More details on specific comments and responses are provided in Appendix C.

4.2 Data Review

The following section discusses the results of any data collection efforts, including environmental monitoring or investigations, to ensure the protectiveness of the remedies (i.e., LUCs) at Sites 302, 303, and 304 and Tank 50.

4.2.1 Site 302

No environmental data were collected from Site 302 during this FYR period; therefore, there is no data review. As stated in Section 3.0, there are plans in place to test the excess soil placed at Site 302 in 2020. These data will be presented and discussed in the next FYR.

4.2.2 Site 303

As part of the Phase II ESA, a total of 30 LIF borings were completed around eight different USTs at MFD. Of these eight USTs, only Tanks 24 and 26 are located within the boundary of Site 303 (i.e., all other USTs are located outside the boundaries of Sites 302, 303, and 304, and Tank 50). Figure 4-1 illustrates the locations of the LIF borings at each of the eight different USTs. A total of four LIF borings were completed from the surrounding area of Tank 24 and eight LIF borings were completed from the surrounding area of Tank 26. Overall, the LIF responses were very low, indicating a lack of light non-aqueous phase liquids (LNAPLs) encountered in the subsurface. The maximum LIF response among all borings advanced (i.e., at all eight USTs) was 7.3% Reference Emitter (RE). LIF data are reported as relative response, where the fluorescence of LNAPL produced by the formation is compared to the fluorescence of a calibration standard, expressed in units of percent relative to the calibration standard (percent reference emitter [%RE]). The calibration standard is a stock hydrocarbon mixture, which can have differing fluorescence properties than the LNAPL being investigated and thus, responses of greater than 100% RE are often observed. In this case, a RE value of 7.3% is considered low.

Tanks 24 and 26. Several LIF borings advanced at Tanks 24 and 26 exhibited slightly elevated peaks relative to background fluorescence; therefore, direct-push confirmation soil sampling was conducted. The sampling intervals coincide with LIF boring locations and depths with the slightly elevated response peaks. The soil samples were analyzed for Northwest Total Petroleum Hydrocarbon-hydrocarbon identification (HCID) and selected PAHs, including naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. Figure 4-1 illustrates the locations of the confirmation soil sampling at Tanks 24 and 26 (as well as at Tanks 23 and 34). All HCID results were below laboratory method detection limits, with the exception of two samples, both at Tank 26:

- MFD-UST26-SBS01 at 22 to 23 feet bgs
- MFD-UST26-SBS01 at 25 to 26 feet bgs

One sample, MFD-UST26-SBS01 at 25 to 26 feet bgs, slightly exceeded the MTCA Method A Cleanup Level for TPH-Gx of 100 mg/kg (i.e., at 105 mg/kg). Therefore, this sample was analyzed for volatile petroleum hydrocarbons (VPH). The VPH data and other analytical data from this sample were used to calculate a site-specific MTCA Method B Cleanup Level for total TPH. The calculated total TPH value of 648 mg/kg was below the calculated MTCA Method B Cleanup Level of 1,989 mg/kg for unrestricted land use. In addition, the detected PAH concentrations (including estimated results) were summed and compared to the MTCA Method A Cleanup Level of 5,000 µg/kg for total naphthalenes (including 1- and 2-methylnaphthalene). None of the confirmation soil samples at Tank 26 exceeded the cleanup level. Figure 4-2 presents the results from the three confirmation soil samples collected at Tank 26 (CH2M, 2018).

MFD-UST35-LIF02
MFD-UST35-LIF03
MFD-UST35-SON01
MFD-UST35-LIF01
35
28
17
40
Tunnel B (JP-5)

Tank 34:
Located outside of Site 303. Slightly elevated %RE; therefore, collected confirmation soil samples at 15-16 and 16-17 ft bgs. Non-detect for TPHs.

33
MFD-UST33-LIF01
MFD-UST33-LIF03
MFD-UST33-LIF02
MFD-UST33-SON01
39
MFD-UST34-LIF01
34
MFD-UST34-LIF02
MFD-UST34-SB01
27
MFD-UST34-SON01
MFD-UST34-LIF03
MFD-UST31-LIF03
31
MFD-UST31-LIF01
MFD-UST32-LIF02
MFD-UST32-LIF01
MFD-UST32-SON01
MFD-UST31-LIF02
MFD-UST31-SON01
32
MFD-UST32-LIF03
MFD-UST26-LIF02
MFD-UST26-LIF03
MFD-UST26-LIF01
MFD-UST26-LIF04
MFD-UST26-SON03
MFD-UST26-LIF08
MFD-UST26-SB03
26
MFD-UST26-SON02
MFD-UST26-LIF05
MFD-UST26-SB02
MFD-UST26-LIF06

Tank 23:
Located outside of Site 303. Slightly elevated %RE; therefore, collected confirmation soil samples at 14-15 and 17-18 ft bgs. Non-detect for TPHs.

Tank 24 (at SB02):
Slightly elevated %RE; therefore, collected confirmation soil samples at 2-3 and 4.5-5.5 ft bgs. Non-detect for TPHs.

Tank 26:
Additional assessment/ borings due to confirmed presence of previously identified petroleum hydrocarbon contamination. Slightly elevated %RE at 3 LIF locations; therefore, collected confirmation soil samples. Detections of TPHs, SVOCs, and VPHs (see Figure 4-2).

MFD-UST23-LIF03
MFD-UST23-LIF01
MFD-UST23-SB01
23
Tunnel C (JP-5)
MFD-UST23-LIF02
MFD-UST23-SON01
MFD-UST26-SON01
MFD-UST26-LIF07
MFD-UST26-SB01
25
24
MFD-UST24-LIF01
MFD-UST24-SB01
22
Tunnel D (F-76)
MFD-UST24-LIF03
MFD-UST24-SB02
MFD-UST24-SON01
MFD-UST24-LIF02
MFD-UST24-LIF02A

Tank 24 (at SB01):
Slightly elevated %RE; therefore, collected confirmation soil sample at 8-9 ft bgs. Non-detect for TPHs.

Note: Site features including locations of USTs and tunnels are approximate and have not been field verified.

Legend

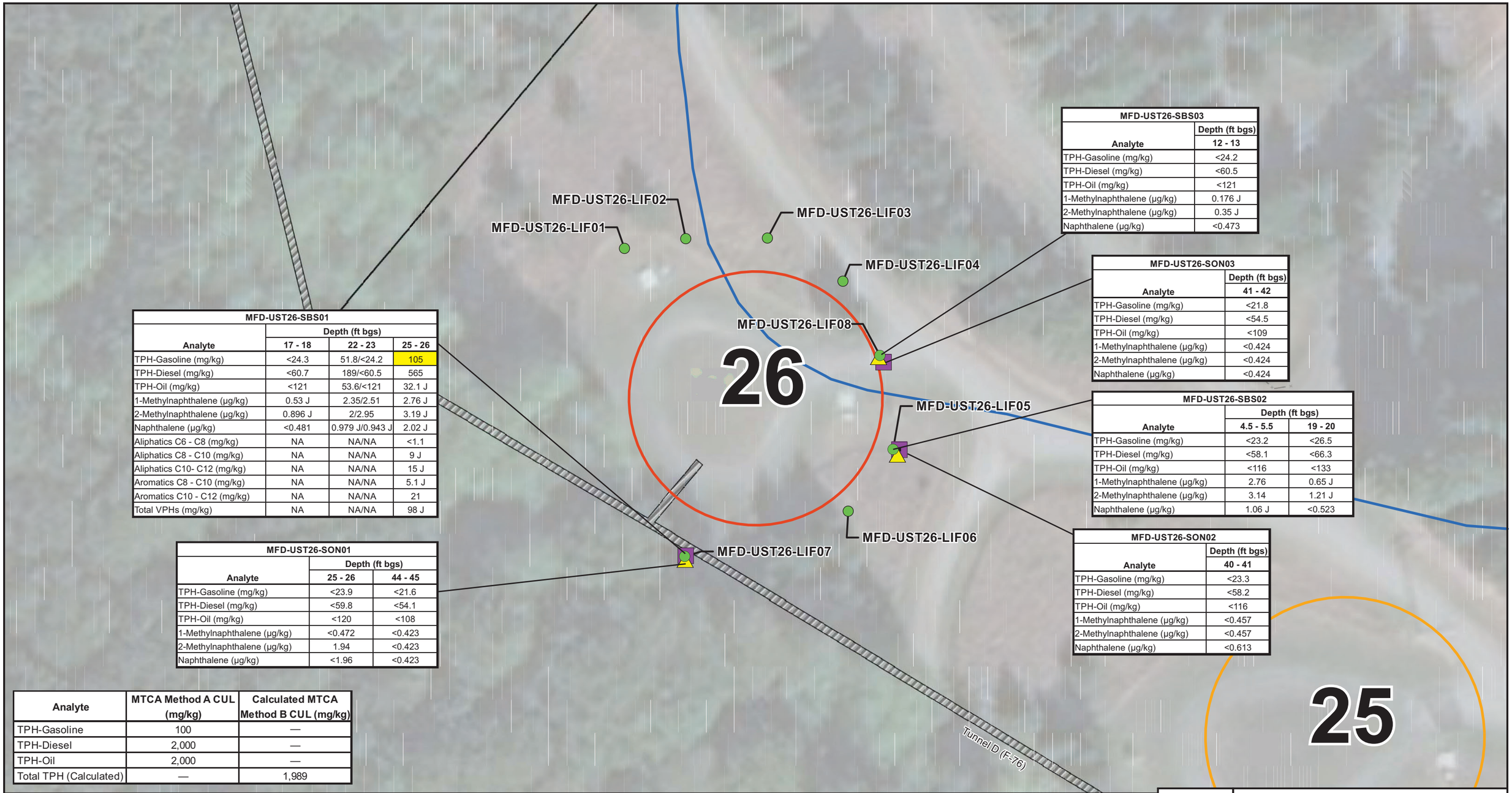
- Tank Proposed for Investigation
- Tank Not Proposed for Investigation
- MILCON Project Area
- Buildings
- Tunnel
- Fence
- Approximate Location of 18" Fuel Oil By-Pass Lines
- LIF Boring (Minimum of 3 Surrounding each Tank)
- Direct Push Boring (Only Collected if Elevated %RE from LIF Boring)
- Sonic Boring (Minimum of 1 at Each Tank to Characterize Conditions below Base of Tank
- Site 303 LUC Boundary

N

0 75 150 300 Feet

1 inch = 125 feet

DESIGNED BY AP	NAVFAC Naval Facilities Engineering Command
DRAWN BY LC	**Figure 4-1. LIF, Direct Push, and Sonic Boring Locations during Phase II Environmental Site Assessment**
CHECKED BY AP	MFD, MANCHESTER, WA
PROJECT 100126487-X064NW31	FILE MANCHESTER_SB_TXT.CDR DATE 05/19



MFD-UST26-SBS01			
	Depth (ft bgs)		
Analyte	17 - 18	22 - 23	25 - 26
TPH-Gasoline (mg/kg)	<24.3	51.8/<24.2	105
TPH-Diesel (mg/kg)	<60.7	189/<60.5	565
TPH-Oil (mg/kg)	<121	53.6/<121	32.1 J
1-Methylnaphthalene (µg/kg)	0.53 J	2.35/2.51	2.76 J
2-Methylnaphthalene (µg/kg)	0.896 J	2/2.95	3.19 J
Naphthalene (µg/kg)	<0.481	0.979 J/0.943 J	2.02 J
Aliphatics C6 - C8 (mg/kg)	NA	NA/NA	<1.1
Aliphatics C8 - C10 (mg/kg)	NA	NA/NA	9 J
Aliphatics C10- C12 (mg/kg)	NA	NA/NA	15 J
Aromatics C8 - C10 (mg/kg)	NA	NA/NA	5.1 J
Aromatics C10 - C12 (mg/kg)	NA	NA/NA	21
Total VPHs (mg/kg)	NA	NA/NA	98 J

MFD-UST26-SON01		
	Depth (ft bgs)	
Analyte	25 - 26	44 - 45
TPH-Gasoline (mg/kg)	<23.9	<21.6
TPH-Diesel (mg/kg)	<59.8	<54.1
TPH-Oil (mg/kg)	<120	<108
1-Methylnaphthalene (µg/kg)	<0.472	<0.423
2-Methylnaphthalene (µg/kg)	1.94	<0.423
Naphthalene (µg/kg)	<1.96	<0.423

MFD-UST26-SBS03	
	Depth (ft bgs)
Analyte	12 - 13
TPH-Gasoline (mg/kg)	<24.2
TPH-Diesel (mg/kg)	<60.5
TPH-Oil (mg/kg)	<121
1-Methylnaphthalene (µg/kg)	0.176 J
2-Methylnaphthalene (µg/kg)	0.35 J
Naphthalene (µg/kg)	<0.473

MFD-UST26-SON03	
	Depth (ft bgs)
Analyte	41 - 42
TPH-Gasoline (mg/kg)	<21.8
TPH-Diesel (mg/kg)	<54.5
TPH-Oil (mg/kg)	<109
1-Methylnaphthalene (µg/kg)	<0.424
2-Methylnaphthalene (µg/kg)	<0.424
Naphthalene (µg/kg)	<0.424

MFD-UST26-SBS02		
	Depth (ft bgs)	
Analyte	4.5 - 5.5	19 - 20
TPH-Gasoline (mg/kg)	<23.2	<26.5
TPH-Diesel (mg/kg)	<58.1	<66.3
TPH-Oil (mg/kg)	<116	<133
1-Methylnaphthalene (µg/kg)	2.76	0.65 J
2-Methylnaphthalene (µg/kg)	3.14	1.21 J
Naphthalene (µg/kg)	1.06 J	<0.523

MFD-UST26-SON02	
	Depth (ft bgs)
Analyte	40 - 41
TPH-Gasoline (mg/kg)	<23.3
TPH-Diesel (mg/kg)	<58.2
TPH-Oil (mg/kg)	<116
1-Methylnaphthalene (µg/kg)	<0.457
2-Methylnaphthalene (µg/kg)	<0.457
Naphthalene (µg/kg)	<0.613

Analyte	MTCA Method A CUL (mg/kg)	Calculated MTCA Method B CUL (mg/kg)
TPH-Gasoline	100	—
TPH-Diesel	2,000	—
TPH-Oil	2,000	—
Total TPH (Calculated)	—	1,989

Legend

- Tank Proposed for Investigation
- Tank Not Proposed for Investigation
- MILCON Project Area
- Tunnel
- Fence
- Approximate Location of 18" Fuel Oil By-Pass Lines
- LIF Boring
- Direct Push Boring
- Sonic Boring

VPH - Volatile Petroleum Hydrocarbon
ft bgs - Feet below Ground Surface
mg/kg - Milligrams per Kilogram
µg/kg - Micrograms per Kilogram
NA - Not Analyzed
#/# - Duplicate Samples
J - Estimated concentration

Notes:
1. Site features including locations of USTs and tunnels are approximate and have not been field verified.
2. Highlighted value indicates above cleanup level.

N
0 20 40 80 Feet
1 inch = 40 feet

DESIGNED BY AP
DRAWN BY LC
CHECKED BY AP

NAVFAC Naval Facilities Engineering Command

Figure 4-2. Tank 26 Analytical Results from Phase II Environmental Site Assessment

MFD, MANCHESTER, WA

PROJECT 100126487-X064NW31 | FILE MANCHESTER_TANK26.CDR | DATE 05/19

After the direct-push phases were completed, sonic drilling was completed to increase the confidence in the results from the LIF and confirmation soil sampling phases and evaluate whether releases may have occurred from the base of each tank. A total of one sonic boring was completed at Tank 24 and three sonic borings were completed at Tank 26. Figure 4-1 illustrates the locations of the sonic borings. All HCID results were below laboratory method detection limits. MFD-UST26-SON01 was advanced adjacent to MFD-UST26-SBS01 (the only direct push boring with TPH concentrations exceeding MTCA Method A Cleanup Levels). HCID results were below laboratory detection limits, indicating that the impacts at MFD-UST26-SBS01 are most likely very localized. Total naphthalene results at Tank 26 were well below the MTCA Method A Cleanup Level of 5,000 µg/kg. Figure 4-2 presents the results from the three sonic drilling borings completed at Tank 26 (CH2M, 2018).

Overall, the results of the Phase II ESA did not indicate wide-spread petroleum hydrocarbon contamination at Tank 24. Additionally, the results indicated that there may have been very localized petroleum hydrocarbon contamination on the south side of Tank 26. Based on these results, it was found that no additional investigation is warranted/needed before execution of the MILCON Project (CH2M, 2018).

4.2.3 Site 304

No environmental data were collected from Site 304 during this FYR period; therefore, there is no data review.

4.2.4 Tank 50

No environmental data were collected from Tank 50 during this FYR period; therefore, there is no data review.

4.3 Results of Site Inspections

The inspections of Sites 302, 303, and 304 and Tank 50 at MFD for the FYR were conducted concurrently with the 2019 LUC inspections. LUC inspections have been conducted on an annual basis during this FYR period (i.e., a 2016 baseline event and then in 2017, 2018, and 2019). Sites 302, 303, and 304 were included in the LUC inspections from 2016 through 2019, while Tank 50 was only included in the LUC inspections from 2017 through 2019 (i.e., not included in the 2016 baseline event).

LUC inspections were conducted in accordance with the *Land Use Control Plan for Sites 302, 303, 304 and Tank 50, Naval Base Kitsap Manchester, Manchester, Washington* (U.S. Navy, 2016a) and included a field inspection, determination of the current land use, document review (e.g., administrative and institutional controls in place), and condition assessment of engineering controls such as fencing, gates, signage, monitoring wells, and soil covers. The LUC inspections provide a means to verify that the required LUCs ensure protection of human health and the environment and assist in identifying recommendations for corrective/additional action(s) to ensure that the LUCs continue to be effective at MFD. Specific LUC requirements for Sites 302, 303, and 304 and Tank 50 were summarized in Table 2-2.

The results of the annual LUC inspections are documented with checklists, field notes, and/or photographs in the following annual LUC inspection technical memorandum, which are submitted to Ecology for their reference/awareness:

- 2016 baseline condition assessment documented in the *Current Conditions at Sites 302, 303, and 304, Naval Base Kitsap Manchester, Manchester, Washington* (U.S. Navy, 2016b) conducted on April 12, 13, and 14, 2016;
- 2017 annual LUC inspections documented in the *2017 Land Use Control Inspection Technical Memorandum, Fleet Logistics Center Puget Sound, Manchester Fuel Depot, Manchester, Washington* (U.S. Navy, 2017c) conducted on August 29 and 30, 2017;
- 2018 annual LUC inspections documented in the *2018 Land Use Control Inspection Technical Memorandum, Fleet Logistics Center Puget Sound, Manchester Fuel Depot, Manchester, Washington* (U.S. Navy, 2018) conducted on June 19 and 20, 2018 and July 10, 2018; and
- 2019 annual LUC and FYR site inspections documented in the *2019 Land Use Control Inspection Technical Memorandum, Fleet Logistics Center Puget Sound, Manchester Fuel Depot, Manchester, Washington* (U.S. Navy, 2019) conducted on March 5 and 6, 2019.

Based on the annual LUC inspections, there was no change in land use or ownership at any site and, most importantly, there were no observations or findings which required notification to Ecology or threatened the protection of human health and the environment during this FYR period. The LUCs in place at Sites 302, 303, 304 and Tank 50 of MFD remain effective in the protection of human health and the environment. Table 4-1 presents a summary of findings and recommendations from the LUC inspections conducted from 2016 through 2019.

During the 2019 LUC inspections (or FYR site inspections), the LUC inspection checklists were used to guide the inspections at each site and, ultimately, assess the protectiveness of the remedies (i.e., LUCs) at Sites 302, 303, and 304 and Tank 50 of MFD. A summary of findings regarding specific LUCs at each site from the 2019 LUC inspections is provided below:

- **Site 302:** Land use remains for industrial purposes; no unauthorized soil excavation or disturbance and no new unauthorized placement of excess soil from another location.
- **Site 303:** Land use remains for industrial purposes. Warnings are posted for workers; the LUC boundary (i.e., remaining area of concern) is identified on facility maps and specified in facility permit instructions; no production wells were installed, and groundwater was not used; and there has been no unauthorized soil excavation or disturbance.
- **Site 304:** Land use remains for industrial purposes. The LUC boundary (i.e., remaining area of concern) is identified on facility maps and specified in facility permit instructions; no production wells were installed, and groundwater was not used; monitoring wells have been protected; and there has been no unauthorized soil excavation or disturbance.
- **Tank 50:** Land use remains for industrial purposes. The LUC boundary (i.e., remaining area of concern) is identified on facility maps and specified in facility permit instructions; no production wells were installed, and groundwater was not used; monitoring wells have been protected; and there has been no unauthorized soil excavation or disturbance.

The completed 2019 LUC inspection checklists and monitoring well inspection checklists are provided as Appendices D and E, respectively.

Table 4-1. Summary of Site Inspection Findings and Recommendations to Optimize LUC Implementation (2016 through 2019)

2016	2017	2018	2019	Findings	Recommendations	Comment
				Site 302 – PCB Site		
✓	✓	✓	✓	There is no LUC signage along the boundary of the site, including the primary gate/entrance on the south side of the site.	No action necessary at this time.	There is a total of six (6) "Restricted Area/Keep Out" signs along the southern boundary of the site.
✓	✓	✓	✓	The central portion of the site is covered with large, older stockpiles of soil and debris.	Properly characterize the excess soil placed in the central portion of the site. If the soil meets Model Toxic Control Act (MTCA) Method A levels, then use to regrade site and develop vegetative cover—with concurrence from Ecology. If the soil exceeds MTCA Method A levels, then properly transport and dispose of soil offsite, place clean topsoil cap, and develop vegetative cover as recommended in the *Third Five-Year Review* (U.S. Navy, 2015a).	Based on discussions with the NAVFAC Northwest and MFD personnel, there are plans in place to properly characterize the excess soil in 2020.
✓	✓	✓	✓	The gated entrance on the north side of the site has no lock or LUC signage.	Secure gate with lock and place LUC signage.	The entrance is in a relatively remote location of MFD, where personnel would not typically access the site from this location.
✓	–	–	✓	Approximately 60 linear feet of chain-link fencing has collapsed on the northwest side of the site, likely due to incursion of vegetation.	Repair chain-linked fencing.	In 2017 and 2018, the northern region of the site was so heavily vegetated that the complete perimeter of the fence-line could not be inspected. The vertical posts remain in good condition, but the chain-linked fencing requires replacement. The northwest side is in a relatively remote location of MFD, and vegetative overgrowth serve as natural barricades for any persons accessing the site from this location.
				Site 303 – D-Tunnel Tanks		
✓	–	–	–	There is no LUC signage warning of contaminated soil and groundwater at Tanks D-24, D-25, D-27, or D-28.	Add signage at the primary vehicle or pedestrian access point to each UST (i.e., at Tanks D-22, D-24, D-25, D-26, D-27, D-28, D-29, and D-30) warning of contaminated soil and groundwater and prohibiting unauthorized dumping and/or soil excavation.	Completed; signs were installed at Site 303, according to the 2016 recommendations.
✓	–	–	–	In 2016, numerous vapor monitoring wells could not be located, including: Tank D-22, MW-3; Tank D-25, all wells except MW-2 and MW-13; Tank D-26, MW-13; Tank D-27, all except for one unknown well; Tank D-28, all monitoring wells; Tank D-29, MW-1, MW-3, MW-4, MW-6, MW-8, MW-9, and MW-11; and Tank D-30, MW-1 and MW-4.	Locate all monitoring wells and assess for condition and integrity; mark with survey stakes, if feasible.	Completed; a well rehabilitation and decommissioning study, including a records review and site reconnaissance, was conducted from 2016 through 2017 (U.S. Navy, 2017b).
–	✓	✓	✓	An unmarked stockpile of soil covered by black poly sheeting in the northwest corner of the construction laydown area southwest of Tank 24.	Confirm soil stockpile is authorized reusable material and is located in an approved staging area.	This soil stockpile appears to be part of the general stockpiled materials for activities at MFD.
✓	✓	✓	✓	Old stockpile of soil on a tarp surrounded by absorbent wattles in the laydown area north of Tank 29.	Properly characterize, transport, and dispose of (off site) the soil stockpile.	MFD personnel have discussed actions for this stockpile.
–	✓	✓	✓	Monitoring wells MW-1 south of Tank 24 and MW-3 north of Tank 30 need casing to be lowered to fit cap under lid and minor maintenance/repairs.	Lower casing and perform needed minor maintenance/repairs on monitoring wells MW-1 and MW-3.	Monitoring well MW-1 south of Tank 24 is located along the southern boundary of the facility adjacent to a residential area. Therefore, the location of this well may provide useful information during future monitoring, if needed, and will be added to the monitoring network. Monitoring well MW-3 north of Tank 30 is already part of the monitoring network (U.S. Navy, 2017b). Plans are in place to perform maintenance/repairs at both wells.

Table 4-1 (continued). Summary of Findings and Recommendations from Site Inspections from 2016 through 2019

2016	2017	2018	2019	Findings	Recommendations	Comment
				Site 304 – Industrial Area		
✓	–	–	–	Groundwater monitoring wells MW-1 and MW-2 were found; however, MW-3 and MW-5 are presumed to be buried under landscaping rocks and MW-4 is presumed to be buried under a newly installed trench based on field observations.	Locate all monitoring wells and assess for condition and integrity.	Completed; a well rehabilitation and decommissioning study, including a records review and site reconnaissance, was conducted from 2016 through 2017 (U.S. Navy, 2017b).
✓	✓	–	–	There is no LUC signage warning of potential exposure to contaminated soil and groundwater.	Considering there is relatively more activity within the area compared to other sites, signage should be installed at all vehicle and pedestrian access points to Site 304. The signs should warn of contaminated soil and groundwater and prohibit unauthorized soil excavation.	Completed; LUC signage was installed at the main entrance to Site 304 between the 2017 and 2018 LUC inspections.
–	–	✓	✓	The LUC signage for Site 304 is located at the northern corner of Building 178, outside and north of the LUC boundary.	Move the LUC signage to the corner of Cedar Avenue and Olympic Drive E to be consistent with the actual LUC boundary.	This is the primary entry/access point to the site; therefore, moving the LUC signage to this location would accurately inform staff, contractors, and visitors of the area with LUC restrictions.
–	✓	✓	✓	Monitoring wells MW-1 and MW-2 do not have identification and the expansion caps are broken. In addition, one monument ear is broken on MW-1.	Perform needed minor maintenance/repairs on monitoring wells MW-1 and MW-2.	Per the *Well Rehabilitation and Decommissioning Study* (U.S. Navy, 2017b), these two (2) monitoring wells are to remain in the monitoring network. Plans are in place to perform maintenance/repairs at both wells.
–	✓	–	–	There is construction of a trench box for a fuel line (i.e., excavation activities).	Post approval permit from MFD Environmental for construction of trench box at job site.	The trench box was completed after the 2017 inspections and not observed during the 2018 and 2019 inspections.
				Tank 50 – Release Site		
×	✓	✓	✓	There is no LUC signage at the primary entry way to Tank 50.	Add LUC signage on the northern access road to Tank 50 (i.e., the primary entry way to the site).	LUC signage at this location is noted in the *Well Installation and Sampling and Analysis Tank No. 50 Fuel Hydrocarbon Leak Assessment, Manchester Fleet and Industrial Supply Center, Manchester, Washington* (Hart Crowser, 1998).
×	✓	✓	✓	Monitoring well MW-1 has no exterior well identification and no lock on lid.	Perform needed minor maintenance/repairs on monitoring well MW-1.	Per the *Well Rehabilitation and Decommissioning Study* (U.S. Navy, 2017b), this monitoring well is to remain in the monitoring network. Plans are in place to perform maintenance/repairs at this well.

5.0 TECHNICAL ASSESSMENT

In accordance with the *Comprehensive Five-Year Review Guidance* (U.S. EPA, 2001), the technical assessment for Sites 302, 303, and 304 and Tank 50 at MFD answer the following three questions:

- Question A: Is the remedy functioning as intended by the decision documents?
- Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?
- Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Table 5-1 summarizes the responses to Questions A, B, and C based on the technical assessment discussion provided in the following subsections for Sites 302, 303, and 304 and Tank 50.

Table 5-1. Technical Assessment Summary for Sites 302, 303, and 304 and Tank 50 at MFD

Site	**Question A:** Is the remedy functioning as intended by the decision documents?	**Question B:** Are the exposure assumptions, cleanup levels, and RAOs used at the time of the remedy still valid?	**Question C:** Has any other information come to light that could call into question the protectiveness of the remedy?
Site 302	Yes	No	No
Site 303	Yes	Yes	No
Site 304	Yes	Yes	No
Tank 50	Yes	Yes	No

5.1 Answers to Questions A, B, and C for Site 302

Per the ROD and ROD Amendment (U.S. Navy, 1991 and 1992), approximately 3,000 yd^3 of PCB- and petroleum hydrocarbon-impacted soil were excavated for off-site incineration. Excavated areas received a minimum of 1 ft of granular fill, followed by capping with 4 inches of topsoil over the entire site. Based on post-closure monitoring results and an additional minimum of 1 ft of soil cover in certain areas, Ecology issued an NFA letter for Site 302, contingent upon land use remaining for industrial purposes and identifying LUC requirements to prevent exposure to residual soil contamination (Ecology, 2000).

As noted in the *Third Five-Year Review for Sites 302, 303, and 304* (U.S. Navy, 2015a) and annual LUC inspections (see Section 4.3), excess soil has been placed in the central portion of the site. Plans are in place to properly characterize the excess soil in 2020 and, ultimately, dispose of it and regrade/revegetate the area. The excess soil is not impacting the effectiveness of the underlying soil cover and is within a separately fenced and gated area of MFD, limiting any exposures. The LUC requirements for Site 302 remain effective in the protection of human health and the environment; therefore, the remedy (i.e., LUCs) is functioning as intended and the answer to Question A is "yes."

For Site 302, the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy are not valid; therefore, the answer to Question B is "no." The soil cleanup level and RAOs were based on a federal and state applicable or relevant and appropriate requirement (ARAR) whereby residual PCB contamination of less than 10 mg/kg can be left in place as long as the contaminated soil is capped

to prevent or minimize human exposure, infiltration of water, and erosion and deed restrictions are implemented to maintain cap and control site use (40 C.F.R. 761.61 and WAC 173-340-745). This ARAR has not changed since the ROD and ROD Amendment (U.S. Navy, 1991 and 1992) were signed and are in effect today; thus, this portion of the remedy remains valid. Although not included in the ROD and ROD Amendment (U.S. Navy, 1991 and 1992), changes to sediment cleanup standards and water quality criteria used to compare against post-closure monitoring results have changed since the Final Post-Closure Monitoring Report (Hart Crowser, Inc., 2000a). Thus, conclusions of the Final Post-Closure Monitoring Report (Hart Crowser, Inc., 2000a) may be in question. Further discussions regarding the continued validity of cleanup levels, exposure assumptions, and RAOs used at the time of the remedy are provided in Sections 5.5.1 and 5.5.2.

For Site 302, no other information has come to light that could call into question the protectiveness of the remedy (i.e., LUCs) during this FYR period; therefore, the answer to Question C is "no" (see Section 5.6). The U.S. Navy recognizes PFAS as chemicals of emerging concern and is in the process of completing a PA (and will begin a SI) at MFD. At this time, there are no recommendations or analytical data to assess; therefore, PFAS does not affect protectiveness. Also, Site 302 is not located along the shoreline of MFD; therefore, there are no shoreline remedies (e.g., shoreline armoring) and climate change does not call into question the protectiveness of the remedy (i.e., LUCs).

5.2 Answers to Questions A, B, and C for Site 303

Ecology issued an NFA letter for Site 303, identifying LUC requirements to guard against exposure to residual petroleum hydrocarbon-contaminated soil (Ecology, 2001). Based on the annual LUC inspections, there was no change in land use or ownership and, most importantly, there were no observations or findings which required notification to Ecology or threatened the protection of human health and the environment during this FYR period. The LUC requirements for Site 303 remain effective in the protection of human health and the environment, preventing exposures; therefore, the remedy (i.e., LUCs) is functioning as intended and the answer to Question A is "yes."

For Site 303, the exposure assumptions, toxicity data, and cleanup levels used at the time of the remedy are still valid; therefore, the answer to Question B is "yes." A discussion of the changes in toxicity data and cleanup levels is provided in Section 5.5.

For Site 303, no other information has come to light that could call into question the protectiveness of the remedy (i.e., LUCs) during this FYR period; therefore, the answer to Question C is "no" (see Section 5.6). The U.S. Navy recognizes PFAS as chemicals of emerging concern and is in the process of completing a PA (and will begin a SI) at MFD. At this time, there are no recommendations or analytical data to assess; therefore, PFAS does not affect protectiveness. Also, Site 303 is not located along the shoreline of MFD; therefore, there are no shoreline remedies (e.g., shoreline armoring) and climate change does not call into question the protectiveness of the remedy (i.e., LUCs).

5.3 Answers to Questions A, B, and C for Site 304

Ecology issued an NFA letter for Site 304, identifying LUC requirements to guard against exposure to residual petroleum hydrocarbon-contaminated soil (Ecology, 2001). Based on the annual LUC inspections, there was no change in land use or ownership and, most importantly, there were no observations or findings which required notification to Ecology or threatened the protection of human health and the environment during this FYR period. The LUC requirements for Site 304 remain effective

in the protection of human health and the environment, preventing exposures; therefore, the remedy (i.e., LUCs) is functioning as intended and the answer to Question A is "yes."

For Site 304, the exposure assumptions, toxicity data, and cleanup levels used at the time of the remedy are still valid; therefore, the answer to Question B is "yes." A discussion of the changes in toxicity data and cleanup levels is provided in Section 5.5.

For Site 304, no other information has come to light that could call into question the protectiveness of the remedy (i.e., LUCs) during this FYR period; therefore, the answer to Question C is "no" (see Section 5.6). The U.S. Navy recognizes PFAS as chemicals of emerging concern and is in the process of completing a PA (and will begin a SI) at MFD. At this time, there are no recommendations or analytical data to assess; therefore, PFAS does not affect protectiveness. Also, there are no shoreline remedies (e.g., shoreline armoring) implemented at Site 304; therefore, climate change does not call into question the protectiveness of the remedy (i.e., LUCs).

5.4 Answers to Questions A, B, and C for Tank 50

Ecology issued an NFA letter for Tank 50, identifying LUC requirements to guard against exposure to residual petroleum hydrocarbon-contaminated soil and groundwater (Ecology, 1998). Based on the annual LUC inspections, there was no change in land use or ownership and, most importantly, there were no observations or findings which required notification to Ecology or threatened the protection of human health and the environment during this FYR period. The LUC requirements for Tank 50 remain effective in the protection of human health and the environment, preventing exposures; therefore, the remedy (i.e., LUCs) is functioning as intended and the answer to Question A is "yes."

For Tank 50, the exposure assumptions, toxicity data, and cleanup levels used at the time of the remedy are still valid such that the remedy remain protective; therefore, the answer to Question B is "yes." A discussion of the changes in toxicity data and cleanup levels is provided in Section 5.5.

For Tank 50, no other information has come to light that could call into question the protectiveness of the remedy (i.e., LUCs) during this FYR period; therefore, the answer to Question C is "no" (see Section 5.6). The U.S. Navy recognizes PFAS as chemicals of emerging concern and is in the process of completing a PA (and will begin a SI) at MFD. At this time, there are no recommendations or analytical data to assess; therefore, PFAS does not affect protectiveness. Also, Tank 50 is not located along the shoreline of MFD; therefore, there are no shoreline remedies (e.g., shoreline armoring) and climate change does not call into question the protectiveness of the remedy (i.e., LUCs).

5.5 Continued Validity of Cleanup Levels, Exposure Assumptions, and Remedial Action Objectives Used at the Time of the Remedy

This section reviews any changes to cleanup levels, exposure assumptions, and RAOs used at the time of remedy implementation to evaluate the protectiveness of the remedy. Based on the evaluations conducted as part of this FYR, identified changes that have occurred since the remedy implementation, as discussed below, do not affect the protectiveness of the remedies at Sites 302, 303, and 304 and Tank 50 of MFD.

5.5.1 Changes in Cleanup Levels

FYR guidance (U.S. EPA, 2001) indicates that the question of interest in developing the FYR is not whether a cleanup level has changed in the intervening period, but whether the change calls into question the protectiveness of the remedy. If the change in the cleanup level would be more stringent, the next stage is to evaluate and compare the old and new cleanup levels and their associated risk. This comparison is done to assess whether the currently calculated risk associated with the cleanup level identified in the decision document is still within U.S. EPA's acceptable excess cancer risk range of 10^{-4} to 10^{-6}, or below a hazard index of 1 for noncancer effects. If the old cleanup level is not considered protective, a new cleanup level may need to be adopted after the FYR. For this FYR, all cleanup levels identified in the decision documents for Sites 302, 303, and 304 and Tank 50 were reviewed for changes that could affect the assessment of whether the remedy is protective. Cleanup levels selected as part of the remedy at each of the four sites were obtained from federal and state regulations. These regulations, as listed below, were reviewed for changes that could affect the protectiveness of the cleanup actions:

- U.S. EPA National Primary Drinking Water Regulations Maximum Contaminant Levels
- U.S. EPA National Recommended Water Quality Criteria per Section 304(a)(1) of the Clean Water Act
- Washington State MTCA Cleanup Regulations (Chapter 173-340 WAC)
- Washington State Marine Surface Water Quality Standards for Protection of Aquatic Life and Human Health (Chapter 173-201A WAC)
- Washington State Sediment Management Standards (Chapter 173-204 WAC)
- Sediment Cleanup User's Manual II (SCUM II), Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards, Chapter 173-204 WAC (Ecology, 2017)
- Puget Sound Apparent Effects Thresholds (AETs) have been released by Ecology as interim guidelines for sediment quality evaluation. When adopted, these AETs will become ARARs.
- Aquatic life criteria promulgated under the Clean Water Act to protect marine organisms from chronic exposures to wastewater discharges
- The EPA's PCB Spill Cleanup Policy while not applicable to the PCB Site, may be appropriate. The EPA has stated 10 ppm as a cleanup goal for PCBs in soil, and 1 ppm for materials with considerable water contact, such as stream sediments.
- 40 CFR 761.61 PCB Remediation Waste [63 FR 35448, June 29, 1998, as amended at 64 FR 33761, June 24, 1999; 72 FR 57239, Oct. 9, 2007; 74 FR 30232, June 25, 2009]

Changes found that would call into question the protectiveness of the cleanup levels or cleanup actions are presented below for each site. The result of changes to the regulations is, in some instances, the lowering of a cleanup level. In these instances, the revised standard must be evaluated to determine whether there is a negative effect on the protectiveness of the remedy. In other instances, the cleanup level remains unchanged or has been raised. In these instances, no further discussion is provided because the protectiveness of the remedy is not affected. Tables are provided that compare standards selected as cleanup levels to current standards. In addition, review of cleanup levels for those COCs remaining in soil and/or groundwater where LUCs are used to prevent exposure is also provided to evaluate the protectiveness of the remedy.

Site 302. As described in the ROD and ROD Amendment (U.S. Navy, 1991 and 1992), the selected remedy for Site 302 involved excavation of soil with PCB concentrations greater than 10 mg/kg and installation of a cover over residual soils with PCB concentrations greater than 1 mg/kg.

In addition, to assess and document the effectiveness of the selected remedy in preventing off-site contamination from surface water run-off, post-closure soil, sediment, and surface water monitoring was conducted in October 1993, March 1994, September 1994, March 1995, October 1998, April 1999, October 1999, and April 2000 (Hart Crowser, 2000a). Soil and surface water samples were primarily collected along the surface water run-off flow path and the perennial creek located around Site 302 and sediment and surface water samples were collected along the western shoreline of Little Clam Bay, where a portion of the surface water run-off from Site 302 may enter into Little Clam Bay.

Soil analytical results were compared to the ROD cleanup criteria, sediment results to the marine SQS, and surface water results to aquatic life ambient water quality criteria. The results of the comparisons and impact to remedy protectiveness are summarized in the following subsections. COCs for the environmental media and associated standards selected as cleanup levels as well as current standards for comparison are provided in Table 5-2.

Soil. As stated previously, the remedial action included excavation of soil with PCB concentrations greater than 10 mg/kg and installation of a cover over residual soils with PCB concentrations greater than 1 mg/kg; therefore, the cleanup criteria for Site 302 was essentially 1 mg/kg. Thus, potential for exposure to PCBs in soil was only associated with those areas containing 1 mg/kg or less of total PCBs. Treatment of soils containing total PCB concentrations greater than 10 mg/kg is based on the specification for PCB levels in 40 CFR 761. The containment cover over on-site soils having total PCB concentrations greater than 1 mg/kg is based on U.S. EPA-recommended cleanup criteria for PCB spills in 40 CFR 761.125. As shown in Table 5-2, soil cleanup levels for PCBs have not changed since the ROD and ROD Amendment (U.S. Navy, 1991 and 1992). The current soil cleanup level for bulk PCB remediation waste in high occupancy areas is ≤1 mg/kg without further conditions. High occupancy areas where bulk PCB remediation waste remains at concentrations >1 mg/kg and ≤10 mg/kg are covered, meeting the requirements of paragraphs (a)(7) and (a)(8) of 40 CFR 761.61.

Surface soil samples were collected during post-closure monitoring events at one location (i.e., SED-4, the only location without an accompanying surface water sampling location), which was located immediately north of Site 302. PCB concentrations detected in soil at SED-4 during post-closure monitoring events ranged from 0.022 to 19.0 mg/kg (see Table 5-2). The total PCB concentration in soil at SED-4 exceeded the cleanup criteria of 1 mg/kg at 19.0 mg/kg in September 1994. However, the total PCB concentration was 0.9 mg/kg during the next sampling event in March 1995 (Hart Crowser, 2000a), indicating that the remedy was effective in lowering residual total PCB concentrations in soil to below the cleanup criteria. As reported in the Final Post-Closure Monitoring Report (Hart Crowser, Inc., 2000a), after the remedy was completed, PCB concentrations decreased in soil and sediment or remained noticeably unchanged in surface water over time (i.e., non-detect). Therefore, the selected remedy for Site 302 has been effective in preventing off-site contamination from surface water run-off.

Sediment. Ecology's SQS for PCBs is 12 mg/kg (normalized for total organic carbon [TOC]), which has not changed since post-closure monitoring results were evaluated in 2000 (see Table 5-2). The marine SQS (WAC 173-204-320) listed in Table I of the 2013 Sediment Management Standards (SMS) is 12 mg/kg normalized to TOC and is based on no adverse effects to the benthic community. Sediment samples were collected from two locations (i.e., SED-6 and SED-7) along the western shoreline of Little Clam Bay during post-closure monitoring. PCBs detected in sediments between 1993 and 2000 have

been below the marine SQS of 12 mg/kg, with one exception from location SED-6 (i.e., at 12.9 mg/kg) collected shortly after remedy completion in March 1994. PCBs detected at location SED-6 were below the marine SQS of 12 mg/kg during subsequent sampling events in September 1994, March 1995, October 1998, April 1999, October 1999, and April 2000. PCBs detected at location SED-7 were below the marine SQS of 12 mg/kg during all four sampling events conducted at this location (Hart Crowser, 2000a). As Ecology's SQS for PCBs has not changed over time and this level corresponds to a sediment PCB concentration that will result in no adverse effects, the remedy remains protective of the benthic community. However, in accordance with the 2013 update to the SMS in WAC 173-204, protection of human health and higher trophic organisms must be considered when establishing sediment cleanup standards for bioaccumulative COCs such as PCBs. As such, the benthic marine SQS used for post-closure monitoring may not be protective of humans or higher trophic organisms where consumption of fish/shellfish is associated with the greatest risk.

The current SMS include provisions for establishing risk-based sediment concentrations for bioaccumulative COCs (e.g., PCBs) that account for protection of human health and higher trophic organisms. Once bioaccumulative risk-based concentrations are developed, these concentrations are compared to the benthic criteria to identify the lowest risk-based concentrations in sediment (Ecology, 2019). Often, risk-based concentrations for bioaccumulative chemicals that are typically found at cleanup sites are below or near natural and regional background levels or practical quantitation limits (PQLs), regardless of the specific exposure assumptions used (Ecology, 2019). Given current site conditions (i.e., effectiveness of the remedy based on post-closure monitoring results, land use remains industrial, and implementation of LUCs to prevent exposures) and the NFA letter issued by Ecology (2000), it is assumed that the remedy remains protective. However, additional sediment sampling along the western shoreline of Little Clam Bay and comparison to appropriate cleanup criteria in accordance with the SMS rule would confirm protectiveness of human health and higher trophic organisms.

Surface Water. Water quality criteria for aquatic life exposure to total PCBs have not changed since post-closure monitoring results were evaluated in 2000 (see Table 5-2). During post-closure monitoring (i.e., 1993 through 2000), PCBs and petroleum hydrocarbons were not detected at any surface water sampling locations, with the exception of surface water sampling location SW-7. Surface water sampling location SW-7 was a seep observed in April 1994 and PCBs were detected at a concentration of 0.076 µg/L, which is above the Clean Water Act ambient water quality criteria of 0.03 µg/L for marine chronic and 0.014 µg/L for freshwater chronic. During subsequent surface water sampling events, water was not observed at this seep location (therefore, not discharging to surface water and not resulting in potential exposure) and no further sampling was possible. PCBs were not detected in a surface water sample collected downstream of SW-7 (i.e., at SW-3). All five samples collected from the one surface water sampling location along the western shoreline of Little Clam Bay (i.e., at SW-6) were non-detect for PCBs from 1993 to 1995, when post-closure monitoring was discontinued at this location (Hart Crowser, 2000a).

Although not evaluated in the ROD or ROD Amendment (U.S. Navy, 1991 and 1992), surface water criteria protective of human health are provided in Table 5-2. In 2016, U.S. EPA promulgated new state ambient water quality criteria protective of human consumption, derived in WAC 173-201A-240. The state PCB human health criterion for consumption of organisms was calculated to be 0.00017 µg/L using a chemical- specific risk level of 4×10^{-5}. Because that calculation resulted in a higher (less protective) concentration than the current federal 40 C.F.R. 131.45 criterion, the federal 40 C.F.R. 131.45 criterion concentration of 0.000007 µg/L takes precedence over the state surface water criterion. U.S. EPA is currently in the process of proposing to amend the federal regulations to withdraw certain human

Table 5-2. Soil, Sediment, and Surface Water Cleanup Criteria for Site 302

Soil/Sediment (mg/kg) Analyte	ROD Soil Cleanup Level[a]	2000 Marine SQS[b]	Current Soil PCB Level[c]	Current Marine SQS[d]	Historical Data[e] 1993 - 2000	
					Minimum Concentration	Maximum Concentration
Total PCBs in Soil[i]	10/1.0	–	10/1.0	–	0.016	19.0
Total PCBs in Sediment (OC)[j]	–	12	–	12	1.0	12.9

Surface Water (ug/L) Analyte	2000 EPA Water Quality Criteria[f]		Current EPA Water Quality Criteria[g]		Current Washington State Aquatic Life Criteria[h]		Current Washington State Human Health Criteria[h]	Human Health 40 CFR 131.45[h]	Human Health Fresh Water CWA §304[h]	Historical Data Detection Limit Range[e] 1993 - 2000	
	Marine Chronic	Freshwater Chronic	Marine Chronic	Freshwater Chronic	Marine Chronic	Freshwater Chronic	Marine/ Freshwater Chronic	Marine/ Freshwater Chronic	Marine/ Freshwater Chronic	Minimum	Maximum
Total PCBs[i]	0.03	0.014	0.03	0.014	0.03	0.014	0.00017	0.000007	0.000064	0.02 U	0.05 U

(a) Record of Decision (ROD) for PCB Site Fuel Department Naval Supply Center Puget Sound (U.S. Navy, 1991).
(b) Sediment Management Standards: Chapter 173-204 WAC as recorded in 2000 for the Final Post-Closure Monitoring Report (Hart Crowser, 2000a).
(c) Sol PCB cleanup levels as documented in 40 CFR 761.61 PCB Remediation Waste [63 FR 35448, June 29, 1998, as amended at 64 FR 33761, June 24, 1999; 72 FR 57239, Oct. 9, 2007; 74 FR 30232, June 25, 2009] and the Model Toxics Control Act Regulation and Statute, MTCA Cleanup Regulation Chapter 173-340 WAC, Table 740-1, Compiled by Washington State Department of Ecology Toxics Cleanup Program Publication No. 94-06; Revised 2013.
(d) Chapter 173-204 WAC Sediment Management Standards, Last Update: 2/25/13.
(e) Final Post-Closure Monitoring Report (Hart Crowser, 2000a).
(f) U.S. EPA National Recommended Water Quality Criteria per Section 304(a)(1) of the Clean Water Act as provided in the Final Post-Closure Monitoring Report (Hart Crowser, 2000).
(g) U.S. EPA National Recommended Water Quality Criteria per Section 304(a)(1) of the Clean Water Act as obtained from the Aquatic Life Criteria Table at https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table on May 15, 2019.
(h) Table 240 in WAC 173-201A-240; effective 9/1/16
(i) Total PCBs is the sum of all congener or all isomer or homolog or Aroclor analyses.
(j) OC, organic carbon, expressed on a total organic carbon basis as described in WAC 173-204-320.

health criteria applicable to waters in Washington State. If this amendment is approved, the state PCB surface water criterion of 0.00017 µg/L becomes the governing criterion for PCBs (i.e., ARAR).

The post-closure monitoring results support the conclusion that the remedy was effective in preventing a continuing off-site source of contamination to Little Clam Bay (i.e., analytical detection limits remained the same, but no detections reported over time). However, the historical detection limits associated with the post-closure surface water samples are not sufficient to ascertain if concentrations present in the environment are protective of aquatic life (i.e., 0.03 µg/L marine chronic and 0.014 µg/L freshwater chronic), nor are the historical detection limits sufficient to compare against the water quality criterion protective of human health (i.e., 0.000007 µg/L).

Based on a lines of evidence approach, the remedy at Site 302 remains protective of human health and the environment because: 1) PCB source soil has been removed or capped and seven years of post-remedy monitoring results support that off-site contamination from surface water run-off has been effectively diminished from pre-remedy conditions; 2) land use has not changed since the RODs (U.S. Navy, 1991 and 1992), nor is it expected to change; and 3) LUCs are maintained to prevent and control exposure to PCBs at Site 302.

Given the changes that have occurred to analytical methods for achieving lower PQLs since the final post-closure monitoring event and because the historical detection limits were above both historical and current ambient water quality criteria for aquatic and human health protection, additional surface water sampling would confirm PCB surface water run-off from Site 302 to Little Clam Bay has been eliminated.

Site 303. Diesel fuel spills occurred at Tank 30 in February 1990 and Tank 24 in March 1990. Most of the product from the spills was contained or recovered as a result of the existing drainage systems around the tanks and the addition of extra collection sumps and absorbent pads. Although most of the product from the spills was contained or recovered, monitoring samples were collected following cleanup activities to ensure that petroleum hydrocarbons were not migrating from the site to the marine environment, as required by the Ecology MTCA Cleanup Regulation, Chapter 173-340 WAC. Analytical results of samples collected from soil, groundwater, seeps, and sediment and surface water in the marsh area adjacent to Corliss Lane, south of Tank 24, indicated the presence of at least one of the following constituents, TPH-D, TPH-O, benzene, xylenes, and/or PAHs. Concentrations detected were evaluated using Ecology's Interim TPH Policy (Ecology, 1997) and compared to criteria provided in Chapters 173-340 WAC, 173-201A WAC, and 173-204. Ecology issued an NFA for Site 303 in 2001 (Ecology, 2001), stating that although petroleum hydrocarbon contamination continues to exist in upland soils, the monitoring of Site 303 demonstrates that there is a lack of impact to marine sediments and marine surface water that would warrant sediment or groundwater remedial actions. Chemicals detected in the environmental media and associated standards used for comparison are summarized in Tables 5-3 through 5-5. Discussions regarding comparisons of current cleanup standards to those used to determine NFA and protectiveness determinations are provided in the following subsections.

Tank 24 Soil and Sediment. Three soil samples (S-1, S-5, and S-10) from three depths were collected from one sample location (SB-1) from the Tank 24 area. TPH-D was the only constituent detected in soil (see Table 5-3). The sample from the shallow soil depth (2.5 to 4ft bgs) had the maximum concentration of TPH-D at 60 mg/kg. The other two samples collected from 12.5 to 14 ft bgs and 25 to 26.5 ft bgs were non-detect. Analyses performed on soil samples S-5 and S-10 also included total aliphatic and total aromatic results so that exposure to TPH concentrations in soil could be evaluated for the direct contact exposure pathway using MTCA Method B industrial equation (Chapter 173-340-745[3]) following risk

assessment procedures presented in Ecology's Interim TPH Policy (Ecology, 1997). Based on the risk calculations, petroleum hydrocarbons present in Tank 24 area soils did not pose a significant risk to human health via the direct contact pathway. The potential for petroleum hydrocarbon-containing soils present in soil near Tank 24 to impact shallow groundwater quality via dissolution also was evaluated during initial monitoring investigations using the Raoult's law screen procedure described in the Interim Policy (Ecology, 1997). The predicted groundwater concentrations from soil samples S-5 and S-10 did not exceed the MTCA Method A cleanup level of 1 mg/L for TPH. These results indicated that residual petroleum hydrocarbon in soil did not pose a significant risk for impacting groundwater quality via dissolution.

Remediation of petroleum hydrocarbon-contaminated sites is addressed under the MTCA Chapter 70.105D, and its implementing regulations, Chapter 173-340 WAC and detailed in the *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology, 2016). Current MTCA regulations for assessing and remediating petroleum hydrocarbon contaminated sites differ from the methods provided in Ecology's Interim TPH Policy (Ecology, 1997) and, therefore, a direct comparison of old and current cleanup levels cannot be made. However, for purposes of this technical assessment, current MTCA regulations are compared to historical data to assess protectiveness (see Table 5-3).

For direct contact to soil, the current MTCA Method A soil cleanup level for TPH-D is 2,000 mg/kg under unrestricted land use, which is much greater than the historical maximum TPH-D concentration detected in soil (i.e., at SB-1, 60 mg/kg). As the historical maximum TPH-D concentration is significantly less than the current MTCA Method A soil cleanup level of 2,000 mg/kg, the remedy (i.e., LUCs) remains protective even under the more conservative unrestricted land use scenario.

For potential soil to groundwater migration, the MTCA Method A groundwater cleanup level of 1 mg/L (drinking water standard) was used during the historical investigations to compare to the predicted soil to groundwater TPH-D concentrations. The current MTCA Method A cleanup level for TPH-D (drinking water standard) is 0.50 mg/L. Based on a comparison of the current MTCA Method A cleanup level to the predicted soil to groundwater concentrations presented in the Draft Site Assessment Report (Hart Crowser, 1998a), none of the predicted groundwater concentrations exceed the current MTCA Method A cleanup level (drinking water standard). Thus, the remedy (i.e., LUCs) remains protective based on fate and transport modeling even though the current MTCA Method A value is lower than the value listed in the Draft Site Assessment Report (Hart Crowser, 1998a). An empirical assessment for TPH-D in groundwater, based on measured TPH concentrations in groundwater is discussed below.

Although Site 303 is a fuel storage facility and land use is restricted for industrial purposes, the grassy area may be home to terrestrial wildlife. Therefore, protection of wildlife, including plants, which was not included in the historical data evaluation, has been provided in this FYR to address MTCA regulations in WAC 173-340-900. For soil, historical TPH-D concentrations present within 6 feet of the ground surface are less than the MTCA unrestricted land use terrestrial ecological soil concentration of 460 mg/kg; thus, the remedy (i.e., LUCs) remains protective.

Table 5-3. Soil and Sediment Data Summary and Comparison to Cleanup Levels for Tank 24 at Site 303

Analyte	Current MTCA TPH value[a]	Draft Derived Freshwater Sediment Quality Values[b]	SMS Freshwater Sediments[c]		Historical Data [d]	
			SCO	CSL	Minimum Concentration	Maximum Concentration
Soil (Tank 24)						
TPH-D (mg/kg)	2,000	NA	NA	NA	20 U	60
TPH-O (mg/kg)	2,000	NA	NA	NA	50 U	50 U
Marsh Sediment						
TPH-D (mg/kg)	–	–	340	510	26	4200
TPH-O (mg/kg)	–	–	3,600	4,400	150	1300
Benzene (mg/kg)	–	–	–	–	0.45 U	1.5 U
Toluene (mg/kg)	–	–	–	–	0.45 U	1.5 U
Ethylbenzene (mg/kg)	–	–	–	–	0.45 U	1.5 U
Xylenes (mg/kg)	–	–	–	–	0.9 U	3.1 U
Naphthalene (mg/kg)	–	37	–	–	0.03 U	0.1 U
Acenaphthylene (mg/kg)	–	1.9	–	–	0.026 U	0.091 U
Acenaphthene (mg/kg)	–	3.5	–	–	0.023 U	0.077 U
Fluorene (mg/kg)	–	3.6	–	–	0.018 U	0.061 U
Phenanthrene (mg/kg)	–	5.7	–	–	0.016 U	0.055 U
Anthracene (mg/kg)	–	2.1	–	–	0.019 U	0.063 U
Total Low Molecular Weight PAHs (mg/kg)	–	27	–	–	0.07U	0.22 U
Fluoranthene (mg/kg)	–	11	–	–	0.013 U	0.05 U
Pyrene (mg/kg)	–	9.6	–	–	0.014 U	0.048 U
Benzo(a)Anthracene (mg/kg)	–	5	–	–	0.011 U	0.036 U
Chrysene (mg/kg)	–	7.4	–	–	0.014 U	0.048 U
Total Benzofluoranthenes (mg/kg)	–	11	–	–	0.019 U	0.065 U
Benzo(a)Pyrene (mg/kg)	–	7	–	–	0.01 U	0.035 U
Indeno(1,2,3-Cd)Pyrene (mg/kg)	–	0.73	–	–	0.018 U	0.061 U
Dibenzo(a,h)Anthracene (mg/kg)	–	0.23	–	–	0.014 U	0.049 U
Benzo(g,h,i)Perylene (mg/kg)	–	1.2	–	–	0.016 U	0.054 U
Total High Molecular Weight PAHs (mg/kg)	–	36	–	–	0.07 U	0.22 U
TPH (mg/kg)	–	60	–	–	0.13 U	0.45 U
Total PAHs (mg/kg)	–	–	17	30	–	–

"—" not available; CSL – cleanup screening level; NA – not applicable; SCO – sediment cleanup objective; U – non-detect

(a) A single TPH MTCA criterion was not provided in the site investigation report. The value shown here is the current MTCA Method A value in Chapter 173-340.

(b) As obtained from Draft Site Assessment Report, Corliss Lane Marsh (Hart Crowser, 1998a).

(c) Chapter 173-204 WAC Sediment Management Standards, Last Update: 2/25/13

(d) Historical data obtained from Draft Site Assessment Report, Corliss Lane Marsh (Hart Crowser, 1998a) and Groundwater and Sediment Characterization Report Sites 303 and 304 FISC Fuel Department (Hart Crowser, 2000b).

Table 5-4. Groundwater Summary Data and Comparison to Cleanup Criteria for Tank 24 at Site 303

Analyte	MTCA Method A[a]	Current MTCA Method A[b]	Historical Data [a]	
			Minimum Concentration	Maximum Concentration
Groundwater (MW-1 south of Tank 24)				
TPH-D (mg/L)	1.0	0.50	0.76	0.76
TPH-O (mg/L)	1.0	0.50	0.75 U	0.75 U
Benzene (ug/L)	5.0	5.0	1.2	1.2
Toluene (ug/L)	NL	1,000	1 U	1 U
Ethylbenzene (ug/L)	NL	700	1 U	1 U
Xylenes (ug/L)	NL	1,000	1 U	1 U
Naphthalene (ug/L)	NL	160 [c]	6.02 J	6.02 J
2-Methylnaphthalene (ug/L)	NL	160 [c]	0.86	0.86
Acenaphthylene (ug/L)	NL	–	0.05 U	0.05 U
Acenaphthene (ug/L)	NL	–	0.05	0.05
Fluorene (ug/L)	NL	–	0.08	0.08
Phenanthrene (ug/L)	NL	–	0.05 U	0.05 U
Anthracene (ug/L)	NL	–	0.05 U	0.05 U
Fluoranthene (ug/L)	NL	–	0.05 U	0.05 U
Pyrene (ug/L)	NL	–	0.05 U	0.05 U
Benzo(a)Anthracene (ug/L)	NL	–	0.05 U	0.05 U
Chrysene (ug/L)	NL	–	0.05 U	0.05 U
Total Benzofluoranthenes (ug/L)	NL	–	0.05 U	0.05 U
Benzo(a)Pyrene (ug/L)	NL	0.1[d]	0.05 U	0.05 U
Indeno(1,2,3-Cd)Pyrene (ug/L)	NL	–	0.05 U	0.05 U
Dibenzo(a,h)Anthracene (ug/L)	NL	–	0.05 U	0.05 U
Benzo(g,h,i)Perylene (ug/L)	NL	–	0.05 U	0.05 U
Temporary Well Point Samples (Tank 24)				
TPH-D (mg/L)	1.0	0.50	0.43	13
TPH-O (mg/L)	1.0	0.50	0.75 U	1.19
Benzene (ug/L)	5.0	5.0	1 U	1 U
Toluene (ug/L)	NL	1,000	1 U	1 U
Ethylbenzene (ug/L)	NL	700	1 U	5.7
Xylenes (ug/L)	NL	1,000	1 U	1.8

NL – not listed; TPH – total petroleum hydrocarbon; D – diesel, O – oil; U – not detected

(a) As obtained from Draft Site Assessment Report, Corliss Lane Marsh (Hart Crowser, 1998a).

(b) MTCA Method A levels as reported in the Cleanup Levels and Risk Calculation Master Table dated August 2015. Cleanup Levels and Risk Calculations cleanup levels for hazardous waste sites comply with the MTCA Cleanup Regulation, chapter 173-340 WAC as provided in Ecology, 2013.

(c) Cleanup level based on a total value for naphthalene, 1-methyl naphthalene and 2-methyl naphthalene (Table 720-1 in WAC 173-340-900).

(d) If other carcinogenic PAHs are suspected of being present at the site, test for them and use this value as the total concentration that all carcinogenic PAHs must meet using the toxicity equivalency methodology in WAC 173-340-708(8), Table 708-2 (Ecology, 2013).

Table 5-5. Groundwater and Seep Summary Data and Comparison to Cleanup Criteria for Tank 30 at Site 303

Analyte	MTCA Surface Water Method B [(a)]	Current MTCA B Chapter 173-201A WAC (consumption of organism only)	Historical Data [(a)]	
			Minimum Concentration	Maximum Concentration
Groundwater (Tank 30, Clam Bay Area)				
Benzene (ug/L)	43	1.6	0.5 U	0.5 U
Ethylbenzene (ug/L)	6910	270	1 U	1 U
Toluene (ug/L)	48500	410	1 U	1 U
Xylenes (ug/L)	16000	NA	1 U	1 U
TPH-G (mg/L)	1.0	NA	0.25 U	0.25 U
TPH-PHC as Gasoline (mg/L)	1.0	NA	0.25 U	0.25 U
TPH-D (mg/L)	10	NA	0.25 U	0.25 U
TPH-PHC as Diesel (mg/L)	10	NA	1.48	7.54
TPH-Heavy Fuel Oil (mg/L)	10	NA	0.5 U	0.5 U
TPH-Jet Fuel as Jet A (mg/L)	10	NA	0.25 U	0.25 U
TPH-Kerosene (mg/L)	10	NA	0.25 U	0.25 U
TPH-Lube Oil (mg/L)	10	NA	0.5 U	0.5 U
TPH-Mineral Spirits (mg/L)	10	NA	0.25 U	0.25 U
Seep (Tank 30, Clam Bay Area)				
Benzene (ug/L)	43	1.6	0.5 U	0.5 U
Ethylbenzene (ug/L)	6910	270	1 U	1 U
Toluene (ug/L)	48500	410	1 U	1 U
Xylenes (ug/L)	16000	NA	1 U	1 U
TPH-G (mg/L)	1	NA	0.25 U	0.25 U
TPH-PHC as Gasoline (mg/L)	1	NA	0.25 U	0.25 U
TPH-D (mg/L)	10	NA	0.25 U	0.25 U
TPH-PHC as Diesel (mg/L)	10	NA	0.3 J	0.764
TPH-Heavy Fuel Oil (mg/L)	10	NA	0.5 U	0.5 U
TPH-Jet Fuel as Jet A (mg/L)	10	NA	0.25 U	0.25 U
TPH-Kerosene (mg/L)	10	NA	0.25 U	0.25 U
TPH-Lube Oil (mg/L)	10	NA	0.5 U	0.5 U
TPH-Mineral Spirits (mg/L)	10	NA	0.25 U	0.25 U

NA – not available; TPH – total petroleum hydrocarbon; D – diesel, G – gasoline; U – non-detect

(a) Analytical data and MTCA Surface Water Method B criteria as presented in Groundwater and Sediment Characterization Report Sites 303 and 304 FISC Fuel Department (Hart Crowser, 2000b)

As shown in Table 5-3, TPH-D was the only constituent detected in sediment samples collected from the marshy lowland area located approximately 75 feet south of the southern property line of MFD, on the east side of Corliss Lane. The marsh area consists of a small pond and a swamp spread out along an approximately 100-foot-wide by 200-foot-long area. Potential ecological risks from residual petroleum hydrocarbon contamination in the marsh area are difficult to evaluate because TPH standards were not available at the time of the investigation. As there were no state or federal risk-based standards for TPH in sediment, an indicator approach was used to assess potential ecological risks. In an indicator approach, the toxicity of the entire range of chemical constituents is evaluated based on the toxicity of one or more constituent chemicals. In this case, the PAH testing results were used to evaluate the potential toxicity of residual petroleum hydrocarbons. Historical PAH results were compared to freshwater sediment quality values presented in Ecology (1997; shown in Table 5-3). No PAHs were detected and the detection limits

for PAHs were generally at least an order of magnitude below the sediment quality values. The sediment quality values were never adopted into the Sediment Management Standards (SMS), so these values were only used for comparison purposes during the historical data evaluation. Current SMS do include standards for TPH and total PAH (see Table 5-3). The maximum historical TPH-D sediment concentration of 4,200 mg/kg exceeds the current TPH-D SMS cleanup screening level of 510 mg/kg. However, PAHs were non-detect; therefore, the current Total PAH SMS cleanup screening level of 30 mg/kg was not exceeded. Therefore, LUCs continue to be appropriate and remain protective of human health and the environment.

Tank 24 Groundwater. MTCA Method A cleanup level of 1 mg/L for TPH was used in the historical investigation data evaluation to assess groundwater contamination near Tank 24 (see Table 5-4). At that time, the maximum TPH-D concentrations of 0.76 mg/L was less than the MTCA Method A cleanup level. The current MTCA Method A cleanup goal has been lowered to 0.50 mg/L and now includes the stipulation that the groundwater cleanup level for any carcinogenic components of the petroleum (such as benzene and PAHs) and any noncarcinogenic components (such as ethylbenzene, toluene, xylenes and naphthalenes), if present at the site, must also be met. As shown in Table 5-4, the historical maximum (and only) TPH-D concentration of 0.76 mg/L exceeds the current MTCA Method A cleanup level of 0.50 mg/L. Benzene and 2-methylnaphthalene also were detected, but concentrations are less than the current MTCA Method A cleanup levels (see Table 5-4). MTCA Method A cleanup levels have not been established for the other two noncarcinogenic PAHs detected in the groundwater sample from monitoring well MW-1. Since LUCs at Site 303 prohibit installation of drinking water wells and use of the groundwater (except for monitoring and/or remediation), its implementation remains protective of human health and the environment.

Tank 30 Groundwater and Seep. Because site groundwater discharges into the adjacent marine surface water body and is not likely a current or potential source of drinking water, historical groundwater and seep data collected during the Tank 30 investigation were compared to MTCA Method B surface water criteria (including Washington State surface water quality standards – Chapter 173-201A WAC) because shallow groundwater beneath the site is fairly saline and would not likely be used as a domestic water supply due to its close proximity to a marine surface water body. Surface water criteria for TPH during the historical investigation were obtained from Ecology's Water Quality Policy Number 9 "Guidelines for Oil and Grease Discharges." Table 5-5 contains a summary of the historical maximum concentrations detected and comparison criteria.

There are no current MTCA surface water numeric cleanup levels in groundwater for TPH and the *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology, 2016) states:

> *"No numeric standards exist for petroleum products. 40 C.F.R. Part 110 prohibits discharges of oil that are harmful to the public health, welfare or the environment and defines harmful discharges to include discharges that "…Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines." WAC 173-201A-260(2)(b) states: "Aesthetic values must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste..."*

Since historical groundwater and seep samples were non-detect for BTEX and TPH and detection limits were below historical and current MTCA Method B values (see Table 5-5), the remedy (i.e., LUCs) remains protective. The LUCs prohibit installation of drinking water wells and use of the groundwater

(except for monitoring and/or remediation); thus, it remains protective of human health and the environment.

Site 304. A groundwater and sediment investigation was conducted in 1999 and 2000 to determine if releases of residual levels of petroleum hydrocarbons in soil were adversely impacting the adjacent marine environment. Because site groundwater discharges into the adjacent marine surface water body and is not likely a current or potential source of drinking water, groundwater quality data are compared to Method B surface water criteria (including Washington State surface water quality standards – Chapter 173-201A WAC). Sediment quality results were compared to the Ecology SMS (Chapter 173-204 WAC). The sediment quality data were compared to the marine SQS and Cleanup Screening Level (CSL) criteria. Chemicals detected in the environmental media and associated standards used for comparison are summarized in Tables 5-6 and 5-7. Discussions regarding comparisons of current cleanup standards to those used to determine NFA and protectiveness determinations are provided in the following subsections.

Table 5-6. Groundwater and Seep Summary Data and Comparison to Cleanup Criteria for Site 304

Analyte	Historical MTCA Surface Water Method B [(a)]	Current WAC 173-201A-240 Human Health Criteria for Consumption of Water and Organisms	Historical Data[(a)]	
			Minimum Concentration	Maximum Concentration
Groundwater				
Benzene (ug/L)	43	1.6	0.5 U	0.5 U
Ethylbenzene (ug/L)	6910	270	1 U	1 U
Toluene (ug/L)	48500	410	1 U	1 U
Xylenes (ug/L)	16000	NA	1 U	1 U
TPH-G (mg/L)	1.0 [(b)]	NA	0.25 U	0.25 U
TPH-PHC as Gasoline (mg/L)	1.0 [(b)]	NA	0.25 U	0.91
TPH-D (mg/L)	10 [(b)]	NA	0.25 U	0.25 U
TPH-PHC as Diesel (mg/L)	10 [(b)]	NA	0.5 U	1.9
TPH-Heavy Fuel Oil (mg/L)	10 [(b)]	NA	0.25 U	0.25 U
TPH-Jet Fuel as Jet A (mg/L)	10 [(b)]	NA	0.25 U	0.25 U
TPH-Kerosene (mg/L)	10 [(b)]	NA	0.25 U	0.25 U
TPH-Lube Oil (mg/L)	10 [(b)]	NA	0.5 U	0.5 U
TPH-Mineral Spirits (mg/L)	10 [(b)]	NA	0.25 U	0.25 U
Seep				
Benzene (ug/L)	43	1.6	0.5 U	0.5 U
Ethylbenzene (ug/L)	6910	270	1 U	1 U
Toluene (ug/L)	48500	410	1 U	1 U
Xylenes (ug/L)	16000	NA	1 U	1 U
TPH-G (mg/L)	1.0 [(b)]	NA	0.25 U	0.25 U
TPH-D (mg/L)	10 [(b)]	NA	0.26	0.26

TPH – total petroleum hydrocarbon; D – diesel; G – gasoline
U – not detected
NA – not available
(a) Analytical data and MTCA Surface Water Method B criteria as presented in the Groundwater and Sediment Characterization Report Sites 303 and 304 FISC Fuel Department (Hart Crowser, 2000b).
(b) Surface water criteria for petroleum hydrocarbons are based on Ecology's Water Quality Policy Number 9 "Guidelines for Oil and Grease Discharges" as presented in the Groundwater and Sediment Characterization Report Sites 303 and 304 FISC Fuel Department (Hart Crowser, 2000b).

Table 5-7. Summary of Sediment Data and Cleanup Levels for Site 304

Analyte	Ecology SQS Criteria [a, b]	Ecology CSL Criteria [a, b]	Historical Data[a]	
			Minimum Concentration	Maximum Concentration
Arsenic (mg/kg)	57	93	1.6	21.1
Cadmium (mg/kg)	5.1	6.7	0.03	0.42
Chromium (mg/kg)	260	270	7.3	27.8
Copper (mg/kg)	390	390	7.63	124
Lead (mg/kg)	450	530	5.32	63.6
Nickel (mg/kg)	–	–	6.9	28
Zinc (mg/kg)	410	960	21.5	165
Acenaphthene (mg/kg)	16	57	0.25 J	7.47
Acenaphthylene (mg/kg)	66	66	0.15 J	2.64
Anthracene (mg/kg)	220	1200	0.96 J	109.20
Fluorene (mg/kg)	23	79	0.30 J	17.24
Naphthalene (mg/kg)	99	170	0.10 J	2.99
Phenanthrene (mg/kg)	100	480	2.00 J	212.64
Total Low Molecular Weight PAHs (mg/kg)	370	780	3.4	352.2
Benzo(a)anthracene (mg/kg)	110	270	2.48	396.55
Benzo(a)pyrene (mg/kg)	99	210	1.98	264.37
Benzo(b)fluoranthene (mg/kg)	–	–	2.00 J	241.38
Benzo(k)fluoranthene (mg/kg)	–	–	1.68	195.40
Total Benzofluoranthenes (mg/kg)	230	450	3.76	436.78
Benzo(g,h,i)perylene (mg/kg)	31	78	0.99 J	109.20
Chrysene (mg/kg)	110	460	3.22	396.55
Dibenz(a,h)anthracene (mg/kg)	12	33	0.25 J	37.36
Fluoranthene (mg/kg)	160	1200	5.94	747.13
Indeno(1,2,3-cd)pyrene (mg/kg)	34	88	1.19	149.43
Pyrene (mg/kg)	1000	1400	4.90	747.13
Total Heavy Molecular Weight PAHs (mg/kg)	960	5300	28.5	3721.3
Dibenzofuran (mg/kg)	15	58	0.15 J	4.83
2,4-Dimethylphenol (ug/kg)	29	29	6 U	6 U
2-Methylphenol (ug/kg)	63	63	6 U	7
4-Methylphenol (ug/kg)	670	670	23	3400
Pentachlorophenol (ug/kg)	360	690	61 U	61 U
Phenol (ug/kg)	420	1200	22	1100
Benzene (mg/kg)	NA	NA	0.50 U	5.56 U
Ethylbenzene (mg/kg)	NA	NA	0.50 U	5.56 U
Toluene (mg/kg)	NA	NA	0.50 U	5.56 U
m,p-Xylenes (mg/kg)	NA	NA	0.50 U	5.56 U
o-Xylene (mg/kg)	NA	NA	0.50 U	5.56 U
Aroclor 1016 (mg/kg)	NA	NA	0.50 U	11.11 U
Aroclor 1221 (mg/kg)	NA	NA	0.50 U	22.22 U
Aroclor 1232 (mg/kg)	NA	NA	0.50 U	11.11 U
Aroclor 1242 (mg/kg)	NA	NA	0.50 U	11.11 U
Aroclor 1248 (mg/kg)	NA	NA	0.50 U	11.11 U
Aroclor 1254 (mg/kg)	NA	NA	0.50 U	11.11 U
Aroclor 1260 (mg/kg)	NA	NA	0.98	5.56 J
Total PCBs (mg/kg)	12	65		

J – estimated; U – not detected; NA – not available

(a) Analytical data and sediment cleanup criteria as presented in Groundwater and Sediment Characterization Report Sites 303 and 304 FISC Fuel Department (Hart Crowser, 2000b).

(b) Current sediment cleanup criteria as provided in Table III Chapter 173-204 WAC have not changed since the data were evaluated in 2000.

Groundwater and Seep. Groundwater and seep samples were analyzed for BTEX and various TPH fractions during historical investigations. TPH-D was the only constituent detected, as shown in Table 5-6. TPH-D concentrations detected were compared to Ecology's Water Quality Policy Number 9 "Guidelines for Oil and Grease Discharges." There are no current MTCA surface water numeric cleanup levels in groundwater for TPH and the *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology, 2016) states:

> *"No numeric standards exist for petroleum products. 40 C.F.R. Part 110 prohibits discharges of oil that are harmful to the public health, welfare or the environment and defines harmful discharges to include discharges that "…Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines." WAC 173-201A-260(2)(b) states: "Aesthetic values must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste..."*

For comparison purposes, the current groundwater MTCA Method A cleanup level is used to compare against the historical TPH-D concentrations. The historical TPH-D concentrations detected in groundwater are lower than the current MTCA Method A cleanup level of 0.50 mg/L, which is lower than the MTCA surface water Method B criterion used in the historical data evaluation (see Table 5-6). Therefore, the remedy (i.e., LUCs) remains protective.

Sediment. Results of the historical data evaluation indicated that, in general, sediment constituent concentrations were less than the SQS criteria (see Table 5-7). Exceedances of SQS criteria were limited to two samples: high molecular weight PAHs in sample HC-SED-07 and phenols in sample HC-SED-02. The sediment quality criteria have not changed since the NFA letter (Ecology, 2001); therefore, there are no new exceedances of SQS criteria and the remedy (i.e., LUCs) remains protective.

Tank 50. During the 1997 and 1998 site investigations, concentrations of petroleum hydrocarbon-related chemicals detected in soil and groundwater were compared to Ecology's MTCA Method A cleanup levels as provided in WAC 173-340-740 (Ecology, 1996). Tables 5-8 and 5-9 compare current soil and groundwater cleanup levels, respectively, with the 1996 values documented in the 1997 and 1998 site reports (Hart Crowser, 1997, 1998b, and 1998c). Comparisons of 1996 and current MTCA Method A cleanup levels identified some differences, but these differences do not affect the protectiveness of the remedy as long as LUCs restricting land use and groundwater use are maintained, as discussed below.

Soil. As shown in Table 5-8, the current MTCA Method A level for lead is the only soil cleanup level that has not changed since 1996. Soil cleanup levels for BTEX have all decreased, whereas the soil cleanup level for TPH-diesel has increased since 1996. Naphthalene did not have a cleanup level for soil in 1996, but now has a cleanup level. The current procedure for comparing TPH-gasoline in soil to the soil criterion now depends on whether benzene also is present in soil. The carcinogenic polycyclic aromatic hydrocarbons (cPAH) soil criterion is an order of magnitude less than the 1996 level, but the current approach now incorporates the toxicity equivalency methodology if other cPAHs are present.

Table 5-8. Soil Cleanup Levels for Tank 50

Analyte	MTCA Method A Soil Cleanup Level Value (mg/kg)		Historical Data (mg/kg)[c]		Method B for Direct Contact (mg/kg)[d]
	1996 Level[a]	Current Level[b]	Maximum Concentration Detected	Soil Depth, ft bgs (Sample Location)	
Lead	250	250	9.2	20 - 23.5 (HC-3)	250
TPH-Gasoline	100	30/100[e]	1600	26 – 32 (HC-2)	NA
TPH-Diesel	200	2,000	1100	16 – 20 (HC-3)	NA
Benzene	0.5	0.03	0.056	26 – 32 (HC-2)	18.2
Ethylbenzene	20	6	0.63	26 – 32 (HC-2)	8,000
Toluene	40	7	0.12	26 – 32 (HC-2)	6,400
Xylenes	20	9	2.0	26 – 32 (HC-2)	16,000
Naphthalene	NA	5[f]	3.2	26 – 32 (HC-2)	1,600
Acenaphthene	NA	NA	0.42 J	26 – 32 (HC-2)	4,800
Fluorene	NA	NA	0.38 J	26 – 32 (HC-2)	3,200
Phenanthrene	NA	NA	1.0	26 – 32 (HC-2)	NA
Anthracene	NA	NA	0.26 J	26 – 32 (HC-2)	24,000
Fluoranthene	NA	NA	0.36 J	26 – 32 (HC-2)	3,200
Pyrene	NA	NA	0.59 J	26 – 32 (HC-2)	2,400
Benzo(a)Anthracene	See cPAH	See cPAH	0.15 J	26 – 32 (HC-2)	1.37
Chrysene	See cPAH	See cPAH	0.14 J	26 – 32 (HC-2)	137
Benzo(a)Pyrene	See cPAH	0.1[g]	0.099 J	26 – 32 (HC-2)	0.137
Indeno(1,2,3-cd)Pyrene	See cPAH	See cPAH	0.044 J	26 – 32 (HC-2)	1.37
Total cPAH [b]	1[h]	0.1[g]	0.4 / 0.1[h, g]	26 – 32 (HC-2)	NA
TPH-Kerosene/Jet A	200[i]	2,000[j]	990	10 – 11.5 (MW-2)	NA

(a) MTCA Method A levels as reported in Ecology, 1996. Method A levels based on protection of groundwater pathway (i.e., soil leaching to groundwater) unless otherwise indicated.
(b) MTCA Method A levels as reported in the Cleanup Levels and Risk Calculation Master Table dated August 2015. Cleanup Levels and Risk Calculation cleanup levels for hazardous waste sites comply with the MTCA Cleanup Regulation, chapter 173-340 WAC as provided in Ecology, 2013. Method A levels based on protection of groundwater pathway for drinking water use (i.e., soil leaching to groundwater) unless otherwise indicated.
(c) Historical data obtained from Hart Crowser, 1997 and 1998b.
(d) MTCA Method B values as reported in the Cleanup Levels and Risk Calculation Master Table dated August 2015. Cleanup Levels and Risk Calculation cleanup levels for hazardous waste sites comply with the MTCA Cleanup Regulation, chapter 173-340 WAC as provided in Ecology, 2013.
(e) The soil criterion is 100 mg/kg for gasoline mixtures without benzene and the total of ethylbenzene, toluene and xylene are less than 1% of the gasoline mixture. All other gasoline mixtures the criterion is 30 mg/kg.
(f) This is a total value for naphthalene, 1-methyl naphthalene and 2-methyl naphthalene.
(g) If other carcinogenic PAHs are suspected of being present at the site, test for them and use this value as the total concentration that all carcinogenic PAHs must meet using the toxicity equivalency methodology in WAC 173-340-708(8), Table 708-2 (Ecology, 2013).
(h) Sum of detected carcinogenic PAHs: benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, benzo(k)fluoranthene, benzo(a)anthracene, and benzo(b)fluoranthene.
(i) Total Petroleum Hydrocarbons (other). Cleanup level based on protection of ground water (Ecology, 1996).
(j) Included as a diesel range organic in Ecology, 2013.

Notes: cPAHs – carcinogenic polycyclic aromatic hydrocarbons; mg/kg – milligram per kilogram; NA – not available; J – estimated value; U – non-detect

Table 5-9. Groundwater Cleanup Levels for Tank 50

Analyte	MTCA Method A Groundwater Cleanup Level (µg/L)		Historical Data (µg/L)[c]	
	1996 Level[a]	Current Level[b]	Concentration Detected in Geoprobe HC-9	Maximum Concentration Detected in Monitoring Wells
Benzene	5	5	0.5 U	1 U
Ethylbenzene	30	700	0.92	1 U
Toluene	40	1,000	1.7	1 U
Xylene	20	1,000	1.8	1 U
TPH-Gasoline	1,000	800 / 1,000 [d]	810	NA
TPH-Diesel	1,000[e]	500[f]	1,600	260
TPH-JP-8/Kerosene	1,000[e]	500[f]	NA	340
Naphthalene	NA	160 [g]	NA	3.9
2-Methylnaphthalene	NA	160 [g]	NA	4.1
Phenanthrene	NA	NA	NA	0.074 J

(a) MTCA Method A levels as reported in Ecology, 1996. Method A levels based on protection of groundwater pathway (i.e., soil leaching to groundwater) unless otherwise indicated.
(b) MTCA Method A levels as reported in the Cleanup Levels and Risk Calculation Master Table dated August 2015. Cleanup Levels and Risk Calculation cleanup levels for hazardous waste sites comply with the MTCA Cleanup Regulation, chapter 173-340 WAC as provided in Ecology, 2013. Method A levels based on protection of groundwater pathway for drinking water use (i.e., soil leaching to groundwater) unless otherwise indicated.
(c) Historical data obtained from Hart Crowser, 1997 and 1998b.
(d) The cleanup level is 800 µg/L if benzene is also present; 1,000 µg/L if benzene not detected (Table 720-1 in WAC 173-340-900).
(e) Cleanup level based on prevention of adverse aesthetic characteristics for total petroleum hydrocarbons.
(f) Diesel range organics include diesel, kerosene, and #1 and #2 heating oil.
(g) Cleanup level based on a total value for naphthalene, 1-methyl naphthalene and 2-methyl naphthalene (Table 720-1 in WAC 173-340-900).

Notes: µg/L – microgram per liter; NA – not available; J – estimated value; U – non-detect

Maximum concentrations of TPH-G, TPH-D, and TPH-kerosene were the only chemicals detected in soil that exceeded the 1996 MTCA Method A cleanup levels. Comparison of the historical concentrations to current MTCA Method A cleanup levels indicate that maximum concentrations of TPH-G and benzene exceed the current MTCA Method A cleanup levels (see Table 5-8). Regardless if residual concentrations of contaminants exist in soil above the current MTCA cleanup levels, LUCs are in place to prevent exposure to soil. Therefore, the lowering of these MTCA cleanup levels does not affect the protectiveness of the remedy (i.e., LUCs), and the cleanup levels remain protective of human health.

Groundwater. As shown in Table 5-9, the MTCA Method A cleanup level for benzene is the only groundwater cleanup level that has not changed since 1996. Groundwater cleanup levels for toluene, ethylbenzene, and xylenes have all increased since 1996. The current procedure for comparing TPH-G to the groundwater criterion now depends on whether benzene also is present in groundwater. Naphthalene and 2-methylnaphthalene did not have cleanup levels in 1996, but now have cleanup levels.

Maximum concentrations of TPH-D was the only chemical detected in groundwater that exceeded the 1996 MTCA Method A cleanup level, which also exceeds the current MTCA Method A cleanup level. Groundwater concentrations of other chemicals do not exceed either their historical or current MTCA Method A cleanup levels (see Table 5-9). LUCs are in place to prevent exposure to groundwater. Therefore, the lowering of the MTCA Method A cleanup level for TPH-D does not affect the protectiveness of the remedy (i.e., LUC), and the cleanup levels remain protective of human health.

5.5.2 Review of Exposure Assumptions

Exposure assumptions were reviewed as part of the requirement to review cleanup levels to assess protectiveness of the remedy. There are potentially two areas where changes could have occurred since the signing of the ROD (U.S. Navy, 1991 and 1992) and NFA letters (Ecology, 1998, 2000, and 2001): 1) toxicity values for select chemicals, and 2) assumptions regarding human activity (i.e., exposure assumptions). Changes to toxicity and exposure parameter input values are captured in the comparison of historical and current cleanup levels. The following subsection describe how these changes to toxicity and exposure parameters potentially affect the protectiveness of the remedy.

Site 302. Through the FYR process, it was found that potential exposure pathways for human health through consumption of fish/shellfish may be complete based on potential tribal use of Little Clam Bay. In 2016, Ecology adopted revisions to the Water Quality Standards for Surface Waters of Washington State Chapter WAC 173-201A which used a fish consumption rate (FCR) of 175 grams per day (g/day) to develop the standards better depicting the consumption rate for a tribal exposure scenario. MTCA Cleanup Regulations (WAC 173-340-730) are still based on the lower consumption rate of 54 g/day.

FCR is a key parameter in estimating sediment-related human health risks that should be evaluated on a site-specific basis when developing the reasonable maximum exposure (RME) scenario. WAC 173-204-561(2)(b)(i) specifies that human health risks should be based on an RME scenario that reflects tribal consumption of fish and shellfish (Ecology, 2019). For purposes of sediment cleanup under the SMS rule, a site-specific FCR should be established in consultation with affected tribes (Ecology, 2019). Tribal populations enjoy treaty fishing rights and harvesting and consuming fish/shellfish plays a significant role in their cultures. PCBs, dioxins, mercury, and other persistent chemicals can accumulate in fish tissue and harm the health of people who consume fish. The fish ingestion rates summarized in the RODs (U.S. Navy, 1991 and 1992) ranged from 11 g/day to 195 g/day, much lower than the consumption rate of the Suquamish Tribe. The Suquamish Tribe conducted a fish ingestion study for tribal members (Suquamish, 2000). In consultation with the Tribe and stakeholders, the 95th percentile Suquamish adult shellfish consumption rate was determined to be 615.4 g/day (Suquamish, 2000; Ecology, 2013). Use of a higher site-specific consumption rate better reflects the Suquamish population potentially at risk if organisms are consumed. The shorelines of Little Clam Bay proximal to Site 302 are not currently used by tribal populations for fish/shellfish angling; however, the Tribe has treaty-reserved rights and expects to be able to exercise these rights in the future.

Given current site conditions (i.e., effectiveness of the remedy based on post-closure monitoring results, land use remains industrial, and implementation of LUCs to prevent exposures) and the NFA letter issued by Ecology (2000), it is assumed that the remedy remains protective. Additional sediment and surface water sampling at Site 302 and/or along the western shoreline of Little Clam Bay is expected to confirm protectiveness of human health.

Site 303, Site 304, and Tank 50. There have been no new exposure pathways identified for Site 303, Site 304, and Tank 50 during this FYR process, as land use continues as industrial/fuel farm (i.e., when the NFA letters [Ecology, 1998 and 2001] were issued) and LUCs are in place to restrict land use and prevent exposure to contaminants in soil and/or groundwater. Therefore, the remedies at Site 303, Site 304, and Tank 50 remain protective.

5.5.2.1 Review of Ecological Exposure Assumptions

Ecological health risk assessment assumptions were also reviewed as part of the requirement to assess protectiveness of the remedy. A summarized ecological evaluation is provided in Section 5.5.1, wherein historical TPH-D concentrations in soil (within the top 6 feet) were compared to ecological unrestricted land use soil concentration in Table 749-2 of WAC 173-340-900. The historical maximum TPH-D concentration in soil is less than the current MTCA ecological soil criterion and, therefore, the remedy (i.e., LUCs) remains protective.

As recognized in Section 5.5.1, protection of higher trophic organisms must be considered when establishing sediment cleanup standards for bioaccumulative COCs (e.g., PCBs) per the 2013 update to the SMS (WAC 173-204). The benthic marine SQS used for post-closure monitoring at Site 302 may not be protective of higher trophic organisms where consumption of fish/shellfish is associated with the greatest risk. The current SMS include provisions for establishing risk-based sediment concentrations for protection of higher trophic organisms, which are often less than or near natural and regional background levels or PQLs. Given current site conditions (i.e., effectiveness of the remedy based on post-closure monitoring results, land use remains industrial, and implementation of LUCs to prevent exposures) and the NFA letter issued by Ecology (2000), it is assumed that the remedy remains protective. However, additional sediment sampling along the western shoreline of Little Clam Bay and comparison to background levels would confirm this protectiveness determination for higher trophic organisms.

5.6 Any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy

5.6.1 Chemicals of Emerging Concern

The U.S. Navy recognizes PFAS as chemicals of emerging concern. These substances may be present in the soil and/or groundwater at U.S. Navy sites as a result of historical firefighting activities using aqueous film forming foam (AFFF). AFFF was used for plane crashes, equipment testing, and training, as well as in other operations such as plating shops and hangars where AFFF was used in the fire suppression system. As such, the U.S. Navy is in the process of completing a PA (and will begin a SI) at MFD, as part of the U.S. Navy-wide program to assess its installations for areas where AFFF releases occurred or are suspected to have occurred. The U.S. Navy plans to submit the Draft Final MFD PFAS PA Report to all stakeholders and then conduct an in-person meeting/presentation to discuss the findings and receive/address comments. At this time, there are no recommendations or analytical data for PFAS; therefore, it does not affect protectiveness. The results of the PFAS PA/SI will be addressed in the next FYR for MFD.

5.6.2 Climate Change

Climate change research indicates that any shoreline remedies (e.g., shoreline armoring) may be vulnerable to climate change impacts, including sea level rise and weather pattern changes, not apparent during remedy selection. These aspects of climate change increase the possibility of flooding/inundation of the shoreline areas and can increase the energy and, therefore, erosive force of storm events. There are no shoreline remedies implemented at Sites 302, 303, and 304 and Tank 50 of MFD; therefore, climate change does not call into question the protectiveness of the remedy (i.e., LUCs).

6.0 ISSUES AND RECOMMENDATIONS

6.1 Issues and Recommendations

Based on the technical assessment conducted as part of this FYR, there are no issues (and subsequent recommendations) that affect current or future protectiveness of the remedies in-place at Sites 302, 303, and 304 and Tank 50 at MFD (see Table 6-1).

Table 6-1. Issues and Recommendations for Sites 302, 303, and 304 and Tank 50 at MFD

Issues/Recommendations
Sites without Issues/Recommendations Identified in the Five-Year Review:
Sites 302, 303, and 304 and Tank 50 did not have any issues/recommendations during this FYR period.

6.2 Other Findings/Recommendations

This section presents other findings identified during this FYR process that may improve performance of the remedy, reduce costs, improve management of operation and maintenance, or accelerate site closeout, but do not affect current and/or future protectiveness of the remedy. Table 6-2 summarizes these other findings and subsequent recommendations.

Table 6-2. Findings and Recommendations Not Affecting Protectiveness

Other Findings/Recommendations				
Other Findings and Recommendations Identified in the Five-Year Review:				
Site: 302	**Finding Category:** Remedy Performance			
	Finding: The excess soil at Site 302 has not been tested for PCBs.			
	Recommendation: Test the excess soil for PCBs (and other potential contaminants based on generator knowledge) and then properly disposed of it (i.e., use a grading material or off site). Regrade and revegetate the areas with the excess soil, such that future site inspections can confirm that no additional soil has been placed at the site. Conduct a follow-up inspection during the following growing season to ensure that vegetation has taken hold.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	No	U.S. Navy	Ecology	January 2021
Site: 302	**Finding Category:** Remedy Performance			
	Finding: 1) In accordance with the 2013 update to the SMS in WAC 173-204, protection of human health and higher trophic organisms must be considered when establishing sediment cleanup standards for bioaccumulative COCs (e.g., PCBs). Only benthic communities were previously considered when establishing/reviewing sediment cleanup standards. 2) Historical PCB detection limits were above both historical and current Washington State and ambient water quality criteria for aquatic and human health. Therefore, the absence of PCBs above its cleanup standard in surface water has not been verified.			

Table 6-2 (continued). Findings and Recommendations Not Affecting Protectiveness

	Recommendation: Conduct a data gap investigation to: 1) determine if additional sampling (including sediment, surface water, and seep/groundwater discharge) along the western shoreline of Little Clam Bay is needed to establish concentrations/presence of PCBs; 2) if so, develop and conduct a monitoring program that would assess Site 302 as a potential residual source of PCBs impacting Little Clam Bay from surface water runoff and seep/groundwater discharge; and 3) if these additional data verify ARAR exceedances, re-evaluate impacts to human and ecological receptors (potentially including additional sampling) to assess protectiveness of the remedy. Conduct additional sampling ensuring the use of analytical methods able to achieve proper PQL and assess data by comparing to current Washington State and ambient water quality criteria and relevant sediment cleanup criteria.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	No	U.S. Navy	Ecology	January 2024
Site: 302	**Finding Category:** Operations and Maintenance			
	Finding: Two sections of fencing on the northwest boundary of Site 302 have been damaged by fallen trees and the gated entrance on the north side of Site 302 has no lock or LUC signage.			
	Recommendation: Determine the necessity of repairing the fence and adding a lock and LUC signage on the north entrance given its remote location and the fact that the site is already within the patrolled fence line of MFD.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	No	U.S. Navy	Ecology	January 2021
Site: 303 and Tank 50	**Finding Category:** Operations and Maintenance			
	Finding: There are vapor and groundwater monitoring wells located at Site 303 and Tank 50 that are inoperable, in poor condition, will be destroyed/damaged during the upcoming MILCON Project, and/or would not provide useful information, if needed.			
	Recommendation: Based on the results of the Well Rehabilitation and Decommissioning Study (U.S. Navy, 2017b), properly decommission select vapor and groundwater monitoring wells in accordance with WAC 173-160-460.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	No	U.S. Navy	Ecology	June 2020
Site: 303, 304, and Tank 50	**Finding Category:** Monitoring			
	Finding: Monitoring wells MW-1 south of Tank 24; MW-3 north of Tank 30; MW-1 and MW-2 at Site 304; and MW-1 at Tank 50 need minor maintenance/repairs to remain operable.			
	Recommendation: Perform minor maintenance/repairs on these five monitoring wells, which will be the monitoring network at MFD, if needed in the future.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	No	U.S. Navy	Ecology	June 2020

Table 6-2 (continued). Findings and Recommendations Not Affecting Protectiveness

Site: 303, 304, and Tank 50	**Finding Category:** Institutional Controls			
	Finding: During LUC inspections, it was found that: 1) an old stockpile of soil on a tarp surrounded by absorbent wattles is located in the laydown area north of Tank 29; 2) the LUC signage for Site 304 is located at the northern corner of Building 178, outside and north of the LUC boundary; and 3) there is no LUC signage at the primary entry way to Tank 50.			
	Recommendation: Properly characterize, transport, and dispose of (off site) the soil stockpile located north of Tank 29; move the LUC signage for Site 304 to the corner of Cedar Avenue and Olympic Drive E to be consistent with the actual LUC boundary; and add LUC signage on the northern access road to Tank 50 (i.e., the primary entry way to the site).			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	No	U.S. Navy	Ecology	January 2021

7.0 PROTECTIVENESS STATEMENT

This section presents the protectiveness determinations and statements as a result of this fourth FYR for Sites 302, 303, and 304 and Tank 50 at MFD. Table 7-1 lists the individual protectiveness determinations and statements for Sites 302, 303, and 304 and Tank 50. Table 7-2 provides the sitewide protectiveness determination or statement for this FYR for MFD.

Table 7-1. Protectiveness Statements for Sites 302, 303, and 304 and Tank 50

Protectiveness Statement(s)	
Site: Site 302	**Protectiveness Determination:** Protective
Protectiveness Statement: The remedy at Site 302 remains protective of human health and the environment because PCB source soil has been removed or capped; off-site contamination from surface water run-off has been effectively diminished from pre-remedy conditions; land use remains industrial; and LUCs are maintained to prevent exposure. In addition, Ecology issued an NFA letter in 2000 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment" which was based primarily on the current and future land use at the site (i.e., industrial). Additional sediment, surface water, seep/groundwater discharge sampling at Site 302 and/or along the western shoreline of Little Clam Bay are anticipated to confirm this protectiveness determination.	
Site: Site 303	**Protectiveness Determination:** Protective
Protectiveness Statement: Ecology issued an NFA letter in 2001 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." This determination was based primarily on the current and future land use at the site (i.e., industrial/fuel farm). LUC requirements are identified in the NFA letter to guard against exposure to residual petroleum hydrocarbon-contaminated soil (Ecology, 2001). The remedy (i.e., LUCs) at Site 303 is protective of human health and the environment, preventing exposures, as documented through the annual LUC inspections.	
Site: Site 304	**Protectiveness Determination:** Protective
Protectiveness Statement: Ecology issued an NFA letter in 2001 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment." This determination was based primarily on the current and future land use at the site (i.e., industrial/fuel farm). LUC requirements are identified in the NFA letter to guard against exposure to residual petroleum hydrocarbon-contaminated soil (Ecology, 2001). The remedy (i.e., LUCs) at Site 304 is protective of human health and the environment, preventing exposures, as documented through the annual LUC inspections.	
Site: Tank 50	**Protectiveness Determination:** Protective
Protectiveness Statement: Ecology issued a NFA letter in 1998 stating "Based upon the information in the reports listed above and institutional controls placed at the facility, Ecology has determined that, at this time, the release of total petroleum hydrocarbons into the soil and groundwater near Tank 50 no longer appears to pose a threat to human health or the environment." The LUC requirements are referred to in the NFA letter and are to guard against exposure to residual petroleum hydrocarbon-contaminated soil and groundwater (Ecology, 1998). The remedy (i.e., LUCs) at Tank 50 is protective of human health and the environment, preventing exposures, as documented through the annual LUC inspections.	

Table 7-2. Sitewide Protectiveness Statement for MFD

Sitewide Protectiveness Statement
Protectiveness Determination: Protective
Protectiveness Statement: Remedy construction is complete at Sites 302, 303, and 304 and Tank 50 of MFD. The selected remedy (i.e., LUCs) at Sites 302, 303, and 304 and Tank 50 is protective of human health and the environment, preventing exposures to residual contamination in soil and/or groundwater, as documented through the annual LUC inspections.

8.0 NEXT REVIEW

The next FYR report for Sites 302, 303, and 304 and Tank 50 at MFD is required five years from the completion date of this review, which will be in 2025.

9.0 REFERENCES

American Society for Testing and Materials (ASTM). 2016. *Designation: E1527-13, Standard Practice for Environmental Site Assessment: Phase I Environmental Site Assessment Process*. Downloaded on November 13.

CH2M. 2018. *Final Phase II Environmental Site Assessment Report In Support of MILCON P-856, Manchester Fuel Depot, Manchester, Washington*. March.

Hall & Associates. 1989. *Community Relations Plan*, Naval Supply Center Puget Sound, Fuel Department Manchester, Washington. September.

Hart Crowser. 1997. *Site Assessment Report, Tank No. 50 Fuel Hydrocarbon Leak Assessment, Manchester Fleet and Industrial Supply Center, Manchester, Washington*. Prepared for Department of the Navy Engineering Field Activity, Northwest. July 31.

Hart Crowser. 1998a. *Draft Site Assessment Report, Corliss Lane Marsh, Manchester Fleet and Industrial Supply Center*. February 3.

Hart Crowser. 1998b. *Well Installation and Sampling and Analysis, Tank No. 50 Fuel Hydrocarbon Leak Assessment, Manchester Fleet and Industrial Supply Center, Manchester, Washington*. Prepared for Department of the Navy Engineering Field Activity, Northwest Naval Facilities Engineering Comment. January 21.

Hart Crowser. 1998c. *Completion of Supplemental Monitoring, Placement of Warning Signs, and Description of Site Plan Modifications, Tank 50, Fleet and Industrial Supply Center, Manchester, Washington*. Prepared for Department of the Navy Engineering Field Activity, Northwest. December 8.

Hart Crowser. 2000a. *Final Post-Closure Monitoring Report, Site 302, FISC Fuel Department, Manchester, Washington*. August 24.

Hart Crowser. 2000b. *Groundwater and Sediment Characterization Report, Sites 303 and 304, FISC, Fuel Department, Manchester, Washington*. September 26.

Severson Construction. 1993a. Letters to ROICC/Bremerton – Site Assessment Report for Tanks T-4 and T-5. September 25.

Severson Construction. 1993b. Letters to ROICC/Bremerton – Site Assessment Report for Tank P-3. September 30.

The Suquamish Tribe. 2000. *Fish Consumption Survey of the Suquamish Indian Tribe of the Port Madison Indian Reservation, Puget Sound Region*. August.

United States Environmental Protection Agency (U.S. EPA). 2001. *Comprehensive Five-Year Review Guidance.* Office of Emergency and Remedial Response. EPA 540-R-01-007. OSWER No. 9355.7-03B-P. June 2001.

United States Environmental Protection Agency (U.S. EPA). 2012. Memo from James E. Woolford, Director Office of Superfund Remediation and Technology Innovation, re: Clarifying the Use of Protectiveness Determinations for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews. OSWER No. 9200.2-111. Office of Solid Waste and Emergency Response. September 2012.

United States Environmental Protection Agency (U.S. EPA). 2016. *Writing Five-Year Reviews at Superfund Sites*. https://www.epa.gov/superfund/writing-five-year-reviews-superfund-sites. Visited: August 16, 2018.

URS Consultants, Inc. 1995. *Final Subsurface Investigation Report, Fleet and Industrial Supply Center, Manchester, Washington*. September.

U.S. Navy. 1989. *Invitation to Technical Review Meeting*, Naval Supply Center Puget Sound, Fuel Department Manchester, Washington. July.

U.S. Navy. 1990. *Public Meeting Minutes and Agenda on Proposed Remedial Action Plan*, Naval Supply Center Puget Sound, Fuel Department Manchester, Washington. December July.

U.S. Navy. 1991. *Record of Decision for PCB Site, Fuel Department, Naval Supply Center Puget Sound, Manchester, Washington*. May.

U.S. Navy. 1992. *Amendment to Record of Decision for PCB Site, Fuel Department, Naval Supply Center Puget Sound, Manchester, Washington*. December.

U.S. Navy. 2004a. *First Five Year Review, Sites 302, 303, and 304, FISC Puget Sound Fuel Department, Manchester, Washington*. September.

U.S. Navy. 2004b. *Navy/Marine Corps Policy for Conducting Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Statutory Five-Year Reviews.* November 2001 (Revised May 2004).

U.S. Navy. 2010. *Second Five Year Review, Sites 302, 303, and 304, FISC Puget Sound Fuel Department, Manchester, Washington*. January.

U.S. Navy. 2011. *Navy/Marine Corps Policy for Conducting Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Five-Year Reviews*. May 2011.

U.S. Navy. 2013. *Toolkit for Preparing Five-Year Reviews*. NAVFAC. December.

U.S. Navy. 2014. *Five-year Review Procedures- Update to DoD Manual (DoDM) 4715.20, "Defense Environmental Restoration Program (DERP) Management Manual." March 9, 2012.* Memorandum from the Office of the Under Secretary of Defense dated June 2, 2014.

U.S. Navy. 2015a. *Final Third Five-Year Review for Sites 302, 303, and 304 Fleet Logistics Center Puget Sound (FLCPS) Naval Base Kitsap Manchester, Washington*. January 6.

U.S. Navy. 2015b. *Contractor Environmental and Safety Guide, Fleet Logistics Center Puget Sound*. January 15.

U.S. Navy. 2016a. *Land Use Control Plan for Sites 302, 303, 304 and Tank 50, Naval Base Kitsap Manchester, Manchester, Washington*. Prepared by Battelle. December 9.

U.S. Navy. 2016b. *Current Conditions at Sites 302, 303, and 304, Naval Base Kitsap Manchester, Manchester, Washington*. Prepared by Battelle. September 21.

U.S. Navy. 2016c. *Recommendations for the Contractor Environmental and Safety Guide, Naval Base Kitsap Manchester, Manchester, Washington*. Prepared by Battelle. September 21.

U.S. Navy. 2017a. *Phase I Environmental Site Assessment Report, Proposed MILCON and Decommissioning Project, Fleet Logistics Center Puget Sound, Manchester Fuel Depot, Manchester, Washington*. Prepared by Battelle. April 4.

U.S. Navy. 2017b. *Well Rehabilitation and Decommissioning Study, Fleet Logistics Center Puget Sound, Manchester Fuel Depot, Manchester, Washington*. Prepared by Battelle. August 10.

U.S. Navy. 2017c. *2017 Land Use Control Inspection Technical Memorandum, Fleet Logistics Center Puget Sound, Manchester Fuel Depot, Manchester, Washington*. Prepared by Battelle. October 9.

U.S. Navy. 2018. *2018 Land Use Control Inspection Technical Memorandum, Fleet Logistics Center Puget Sound, Manchester Fuel Depot, Manchester, Washington*. Prepared by Battelle. July 26.

U.S. Navy. 2019. *2019 Land Use Control Inspection Technical Memorandum, Fleet Logistics Center Puget Sound Manchester Fuel Depot Manchester, Washington*. Prepared by Battelle. May 14.

Washington State Department of Ecology (Ecology). 1997. Interim Interpretive and Policy Statement, Cleanup of Total Petroleum Hydrocarbons (TPH), Ecology Publication No. ECY-600, revised January 30, 1997.

Washington State Department of Ecology (Ecology). 1998. Ecology Determination at Tank 50 Site, FISC Manchester. December 3.

Washington State Department of Ecology (Ecology). 2000. No Further Action Determination at PCB Site Letter. September 25.

Washington State Department of Ecology (Ecology). 2001. No Further Action Determination at Fleet and Industrial Supply Center Site 303/304 Letter. January 17.

Washington Department of Ecology (Ecology). 2013. *Fish Consumption Rates. Technical Support Document. A Review of Data and Information about Fish Consumption in Washington*. Version 2.0. Final. January. Publication Number 12-09-058.

Washington State Department of Ecology (Ecology). 2016. *Guidance for Remediation of Petroleum Contaminated Sites*. Publication No. 10-09-057. June.

Washington State Department of Ecology (Ecology). 2019. *Sediment Cleanup User's Manual (SCUM), Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards,*

Chapter 173-204 WAC. Publication No. 12-09-057. Original publication March 2015, First Revision December 2017, Second Revision December 2019.

This page intentionally left blank.

APPENDIX A
Well Rehabilitation and Decommissioning Maps and Recommendations

This page intentionally left blank.


N
Explanation
Groundwater Monitoring Well
Vapor Monitoring Well
Buildings
Fuel Tank in Decommissioning Area Extent
Fuel Tank in MILCON Project Area Extent
Fuel Tank/Storage
Water Tank
Oil Water Separator
Docks/Wharfs
Tunnel
Road Section
Wall
Fence
Installation Boundary
Upper Beaver Pond
Lower Beaver Pond
Clam Bay
Rich Passage
Barge Mooring Pier
Orchard Point
Little Clam Bay
Franco Pond Marsh
Pumphouse, part of MILCON Project
Fuel Pier
Puget Sound
MW-1
MW-2
MW-3
MW-4
MW-5
OW-1
OW-2
100
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.
0
450
900
SCALE IN FEET
DESIGNED BY AP
DRAWN BY LC/VS
CHECKED BY AP
BATTELLE
Catalog of All Monitoring Wells at Manchester Fuel Depot
MANCHESTER, WA
PROJECT 100089524-015NW43
FILE MANCHESTER_PROPOSED02.CDR
DATE 07/17


N
Upper Beaver Pond
Lower Beaver Pond
Clam Bay
Rich Passage
Barge Mooring Pier
Orchard Point
Puget Sound
Fuel Pier
Little Clam Bay
Franco Pond Marsh
Pumphouse, part of MILCON Project
MW-1
MW-2
MW-3
OW-2
149
147
148
146
145
141
142
49
48
50
30
29
28
27
26
25
24
23
22
37
36
35
34
33
32
31
43
42
41
40
39
38
21
20
19
18
17
16
14
Explanation
Groundwater Monitoring Well
Vapor Monitoring Well for Investigation Prior to Tank Decommissioning Activities
Vapor Monitoring Well
Buildings
Fuel Tank in Decommissioning Project Area Extent
Fuel Tank in MILCON Project Area Extent
Fuel Tank/Storage
Water Tank
Oil Water Separator
Docks/Wharfs
Tunnel
Road Section
Wall
Fence
Installation Boundary
0
450
900
SCALE IN FEET
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community.
DESIGNED BY AP
DRAWN BY LC/VS
CHECKED BY AP
BATTELLE
Monitoring Wells Found and Surveyed at Manchester Fuel Depot
MANCHESTER, WA
PROJECT 100089524-015NW43
FILE MANCHESTER_MW03_SURVEYED02.CDR
DATE 07/17

Table 5. Recommendations and Rationale for Monitoring Wells

Location Description	Well ID	Sheen or Product Detected?	General Condition	Recommendation	Rationale
Outside of the Project Areas					
North of Tank D-30	MW-1	No	Moderate	Measure DTW and DTP; then decommission per WAC 173-160-460.	Only in moderate condition and within close proximity to MW-3.
	MW-3	No	Good	Keep wells in place and conduct any required maintenance.	Wells are in good condition and may provide useful information in the future.
Industrial Area	MW-1	No	Good		
	MW-2	No	Good		
Within the MILCON Project Area					
Tank D-26	MW-2	No	Good	Measure DTW and DTP; then decommission per WAC 173-160-460.	Wells will be destroyed during MILCON/decommissioning project activities.
	MW-3	No	Good		
	MW-4	No	Good		
	MW-13	No	Good		
	MW-5	No	Good		
	MW-6	No	Good		
	MW-7	No	Good		
	MW-8	No	Good		
	MW-9	Yes	Good		
	MW-10	No	Good		
	MW-11	No	Good		
	MW-12	No	Good		
Tank D-24	MW-1	No	Good		
	MW-2	No	Good		
	MW-13	No	Good		
	MW-3	No	Good		
	MW-4	No	Good		

Table 5. Recommendations and Rationale for Monitoring Wells (Continued)

Location Description	Well ID	Sheen or Product Detected?	General Condition	Recommendation	Rationale
Tank D-24 (cont.)	MW-5	No	Good	Measure DTW and DTP; then decommission per WAC 173-160-460.	Wells will be destroyed during MILCON/decommissioning project activities.
	MW-6	No	Good		
	MW-7	No	Good		
	MW-8	No	Good		
	MW-9	No	Good		
	MW-10	No	Good		
	MW-11	No	Good		
	MW-12	No	Good		
Within the Decommissioning Project Area					
Tank D-30	MW-6	No	Good	Measure DTW and DTP; then decommission per WAC 173-160-460.	Wells will be destroyed during decommissioning project activities.
	MW-7	No	Good		
	MW-8	No	Good		
	MW-9	No	Good		
	MW-10	No	Good		
	MW-11	No	Good		
	MW-12	No	NR		
	MW-13	No	Good		
	MW-1	No	Good		
	MW-2	No	Good		
	MW-3	No	Good		
	MW-4	No	Good		
	MW-5	No	Good		
Tank D-29	MW-7	Yes	Good		
	MW-8	No	Good		

Table 5. Recommendations and Rationale for Monitoring Wells (Continued)

Location Description	Well ID	Sheen or Product Detected?	General Condition	Recommendation	Rationale
Tank D-29 (cont.)	MW-9	No	Good	Measure DTW and DTP; then decommission per WAC 173-160-460.	Wells will be destroyed during decommissioning project activities.
	MW-10	No	Good		
	MW-11	No	Good		
	MW-12	No	Good		
	MW-1	No	Good		
	MW-2	No	Good		
	MW-3	No	Good		
	MW-13	No	Good		
	MW-5	No	Good		
	MW-6	Yes	Good		
West of Tank D-29	OW-2	No	Poor		Well is in poor condition.
Tank D-27	MW-1	No	Good		Wells will be destroyed during decommissioning project activities.
Tank D-25	MW-2	No	Poor		
	MW-13	No	Good		
Tank D-22	MW-1	No	Good		
	MW-2	No	Good		
	MW-3	No	Good		
	MW-4	No	Good		
	MW-5	No	Good		
	MW-6	No	Good		
	MW-7	No	Good		
	MW-8	Yes	Good		
	MW-9	Yes	Good		
	MW-10	No	Good		

Table 5. Recommendations and Rationale for Monitoring Wells (Continued)

Location Description	Well ID	Sheen or Product Detected?	General Condition	Recommendation	Rationale
Tank D-22 (cont.)	MW-11	No	Good	Measure DTW and DTP; then decommission per WAC 173-160-460.	Wells will be destroyed during decommissioning project activities.
	MW-12	No	Good		
	MW-13	No	Good		
Tank 50	MW-1	No	Good	Keep well in place and conduct any required maintenance.	Well is in good condition and may provide useful information in the future.
	MW-2	No	Good	Measure DTW and DTP; then decommission per WAC 173-160-460.	Well is located inland from Little Clam Bay and will not provide critical information.

DTP – depth to product
DTW – depth to water
NR – not recorded

APPENDIX B
Public Notifications

This page intentionally left blank.

Kitsap Sun

> Advertising Receipt

Sales Rep: Nicole Campbell (GW95) Phone: Email: ncampbell@gannett.com

> Account Information

Date: 12/19/18

Account Number: 888210 /

Company Name: BATTELLE

Contact Name: goldenh@battelle.org

Email: quigleyk@battelle.org

Address: 505 KING AVENUE, COLUMBUS, OH, 43201

Phone: (614) 424-4928 Fax:

> Ad Information

Ad Id: 2180668 Ad Class: 16100

Publications: BK-Kitsap Sun, BK-kitsapsun.com

Start Date: 12/21/18 Stop Date: 12/23/18

No. of Inserts: 3 Total Cost: $728.16

Columns Wide: 1 No. of Lines: 82

Total Cost: $728.16

> Payments

METHOD	CARD TYPE	NAME ON CARD	LAST 4 DIGITS	EXPIRE DATE	CHECK NUMBER	AMOUNT PAID
CC	VISA		7621			$728.16

TOTAL COST	$728.16
PAID AMOUNT	$728.16
AMOUNT DUE	$0.00

> Copy of Ad

PUBLIC NOTICE

U.S. NAVY ANNOUNCES NOTICE TO CONDUCT FOURTH FIVE-YEAR REVIEW OF ENVIRONMENTAL CLEANUP ACTIONS FOR MANCHESTER FUEL DEPOT, PORT ORCHARD, WASHINGTON

This notice is to inform the public that the U.S. Navy will conduct a five-year review of previously implemented environmental cleanup actions or remedies for Fleet and Industrial Supply Center Manchester Fuel Depot (MFD) in Port Orchard, Washington. U.S. Navy policy requires that, if a remedy results in hazardous substances, pollutants, or contaminants remaining on a site above levels that allow for unlimited use and unrestricted exposure, a review must be conducted no less than every five years after the initiation of the cleanup action to ensure that the remedy is functioning as planned and remains protective of human health and the environment. A five-year review is also intended to identify possible deficiencies and recommend any necessary corrective actions. This will be the fourth five-year review completed for MFD. The previous five-year reviews were completed in September 2004, January 2010, and January 2015.

This fourth five-year review for MFD will focus on four petroleum sites (i.e., Site 302 [Polychlorinated Biphenyl Site], Site 303 [D-Tunnel Tanks], Site 304 [Industrial Area], and Tank 50 [Release Site]) that have undergone environmental investigation and/or remediation to address the potential impacts of contamination to human health and the environment. The remedy implemented for Sites 302, 303, 304, and Tank 50 comprises land use controls, including institutional and engineering controls.

The U.S. Navy welcomes written comments from the community during the five-year review process; comments will be accepted until February 8, 2019. A Notice of Completion for the fourth five-year review for MFD is anticipated to be published in November 2019.

For more information or to provide comments, please contact:

Ms. Leslie Yuenger
Naval Facilities Engineering Command Northwest Public Affairs Officer
1101 Tautog Circle, Suite 203
Silverdale, Washington 98315-1101
leslie.yuenger@navy.mil

Dec. 21, 22, 23, 2018 #2180668

Classified Proof

Client	240814 - Batelle	Phone	(614) 424-4928
Address	505 King Avenue	E-Mail	quigleyk@battelle.org
	Columbus, OH, 43201	Fax	

Order#	838647	Requested By	ANGELA M. PAOLUCCI	Order Price	$333.90
Classification	9908 - POI Legals	PO #		Tax 1	$0.00
Start Date	12/21/2018	Created By	1683	Tax 2	$0.00
End Date	01/04/2019	Creation Date	12/18/2018, 02:53:44 pm	Total Net	$333.90
Run Dates	3			Payment	$333.90
Publication(s)	Port Orchard Independent				

Sales Rep	1683 - Holland, Lisa	Phone	(360) 394-8714
		E-Mail	lholland@soundpublishing.com
		Fax	(360) 598-6800

PUBLIC NOTICE
U.S. NAVY
ANNOUNCES NOTICE
TO CONDUCT
FOURTH FIVE-YEAR
REVIEW OF
ENVIRONMENTAL
CLEANUP ACTIONS
FOR MANCHESTER
FUEL DEPOT, PORT
ORCHARD,
WASHINGTON

This notice is to inform the public that the U.S. Navy will conduct a five-year review of previously implemented environmental cleanup actions or remedies for Fleet and Industrial Supply Center Manchester Fuel Depot (MFD) in Port Orchard, Washington. U.S. Navy policy requires that, if a remedy results in hazardous substances, pollutants, or contaminants remaining on a site above levels that allow for unlimited use and unrestricted exposure, a review must be conducted no less than every five years after the initiation of the cleanup action to ensure that the remedy is functioning as planned and remains protective of human health and the environment. A five-year review is also intended to identify possible deficiencies and recommend any necessary corrective actions. This will be the fourth five-year review completed for MFD. The previous five-year reviews were completed in September 2004, January 2010, and January 2015. This fourth five-year review for MFD will focus on four petroleum sites (i.e., Site 302 [Polychlorinated Biphenyl Site], Site 303 [D-Tun-

nel Tanks], Site 304 [Industrial Area], and Tank 50 [Release Site]) that have undergone environmental investigation and/or remediation to address the potential impacts of contamination to human health and the environment. The remedy implemented for Sites 302, 303, 304, and Tank 50 comprises land use controls, including institutional and engineering controls.

The U.S. Navy welcomes written comments from the community during the five-year review process; comments will be accepted until February 8, 2019. A Notice of Completion for the fourth five-year review for MFD is anticipated to be published in November 2019.

For more information or to provide comments, please contact:

Ms. Leslie Yuenger
Naval Facilities Engineering Command Northwest Public Affairs Officer
1101 Tautog Circle, Suite 203
Silverdale, Washington 98315-1101
leslie.yuenger@navy.mil

Published: Port Orchard Independent
December 21, 28, 2018 and January 4, 2019
Legal #: (POI)838647

Classified Proof

Client	240814 - Batelle	Phone	(614) 424-4928
Address	505 King Avenue	E-Mail	quigleyk@battelle.org
	Columbus, OH, 43201	Fax	

Order#	838648	Requested By	ANGELA PAOLUCCI	Order Price	$333.90
Classification	9910 - Herald Legals	PO #		Tax 1	$0.00
Start Date	12/21/2018	Created By	1683	Tax 2	$0.00
End Date	01/04/2019	Creation Date	12/18/2018, 02:54:55 pm	Total Net	$333.90
Run Dates	3			Payment	$333.90
Publication(s)	North Kitsap Herald				

Sales Rep	1683 - Holland, Lisa	Phone	(360) 394-8714
		E-Mail	lholland@soundpublishing.com
		Fax	(360) 598-6800

PUBLIC NOTICE
U.S. NAVY
ANNOUNCES NOTICE
TO CONDUCT
FOURTH FIVE-YEAR
REVIEW OF
ENVIRONMENTAL
CLEANUP ACTIONS
FOR MANCHESTER
FUEL DEPOT, PORT
ORCHARD,
WASHINGTON

This notice is to inform the public that the U.S. Navy will conduct a five-year review of previously implemented environmental cleanup actions or remedies for Fleet and Industrial Supply Center Manchester Fuel Depot (MFD) in Port Orchard, Washington. U.S. Navy policy requires that, if a remedy results in hazardous substances, pollutants, or contaminants remaining on a site above levels that allow for unlimited use and unrestricted exposure, a review must be conducted no less than every five years after the initiation of the cleanup action to ensure that the remedy is functioning as planned and remains protective of human health and the environment. A five-year review is also intended to identify possible deficiencies and recommend any necessary corrective actions. This will be the fourth five-year review completed for MFD. The previous five-year reviews were completed in September 2004, January 2010, and January 2015. This fourth five-year review for MFD will focus on four petroleum sites (i.e., Site 302 [Polychlorinated Biphenyl Site], Site 303 [D-Tun-

nel Tanks], Site 304 [Industrial Area], and Tank 50 [Release Site]) that have undergone environmental investigation and/or remediation to address the potential impacts of contamination to human health and the environment. The remedy implemented for Sites 302, 303, 304, and Tank 50 comprises land use controls, including institutional and engineering controls.

The U.S. Navy welcomes written comments from the community during the five-year review process; comments will be accepted until February 8, 2019. A Notice of Completion for the fourth five-year review for MFD is anticipated to be published in November 2019.

For more information or to provide comments, please contact:

Ms. Leslie Yuenger
Naval Facilities Engineering Command Northwest Public Affairs Officer
1101 Tautog Circle, Suite 203
Silverdale, Washington 98315-1101
leslie.yuenger@navy.mil

Published: North Kitsap Herald
December 21, 28, 2018 and January 4, 2019
Legal #: (NKH)838648

APPENDIX C
FYR Interview Records

This page intentionally left blank.

Fourth Five-Year Review Interview Record
Manchester Fuel Depot
Port Orchard, WA

TYPE 1 INTERVIEW – U.S. NAVY

Individual Contacted: Doug Tailleur	
Title: Environmental Specialist	
Organization: Manchester Fuel Depot	
Telephone: (360) 476-2664	**Email:** douglas.tailleur@navy.mil
Contact Made By: A. Paolucci and S. Moore	**Date:** 03/07/19

QUESTIONNAIRE

1. Please describe your degree of familiarity with Sites 302, 303, and 304 and Tank 50 at Manchester Fuel Depot (MFD); implementation of the remedies at these four sites; inspection, operation, and maintenance activities that have taken place since implementation of the remedies; and recommendations made during the third five-year review (FYR) finalized in 2015.

Response:

Quite familiar with the sites, and somewhat familiar with the recommendations from the previous FYR. As an on-base personnel, very familiar with activities occurring at these sites.

2. What is your overall impression of remedy operations at Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:

LUCs seem to be working well. Implemented excavation permit process and not aware of any digging without permit since last FYR. Since the 3rd FYR, there has not been any digging at Site 304. In Site 303, there has been environmental investigations dealing with the Phase II ESA. Do not believe there has been any digging at Site 302; excess soil at Site 302 has been there for more than five years. There is a sign at Site 304. Signs seem to have worked at Site 303. Site 302 is not easy to access; therefore, downed fencing in woods does not seem as a significant issue/deficiency.

3. Have there been any significant changes in site conditions, remedy operations, or MFD operations since the third FYR?

Response:

No, nothing has substantially changed since the last FYR. Next FYR will be during MILCON/new above ground storage tank project.

4. Are you aware of any prior or pending land use or ownership changes since the No Further Action determinations from Ecology that may impact the effectiveness of the remedies for these four sites?

Response:

No.

5. Please describe any requests you have received or are aware of regarding work at these four sites to alter site conditions that would result in land use or groundwater use which is inconsistent with current land use controls (LUCs). Are you aware of any groundwater use from beneath (or downgradient) of any of these four sites?

Response:

No, groundwater is not used, believe a vast majority stays on Navy property once it enters Navy property. MFD is on Manchester Water District water. Non-potable well located in the northwest corner of property (not within any site or hydraulically connected) which feeds into Water Tank on top of the hill and then gravity feeds into the non-potable hydrants. There is also a water well (not very productive at ~6 gpm) that is outside of Site 302 - it supplies water to NOAA fisheries because needs continuous source of clean water for fish studies. Believe water well is ~120 ft deep and installed in November/December 1992.

6. To the best of your knowledge, have the annual LUC inspections been sufficiently thorough and frequent to ensure protection of human health and the environment? Please indicate the basis for your assessment.

Response:

Personal experience that there have been no human health concerns. There do not appear to be any environmental impacts from the sites and from Phase II Investigation, no contamination has been found. No contamination leaching out Site 304. No issues with stormwater/OWS monthly sample results. OWS 8/8A has been performing as expected; however, there was a small release in January 2017. Since small release, reconfigured system by removing an ineffective oil collection unit and have an annual cleaning process for the OWSs. Rather than have algae, moss, etc. which seems to hold onto oil, OWS system is cleaned/pressure washed annually. No increase in test results since reconfiguring system.

7. To the best of your knowledge, have the recommendations made during the third FYR been adequately implemented/incorporated into the remedies for Sites 302, 303, and 304 and Tank 50? Please indicate the basis for your assessment.

Response:

Some recommendations are still in the works, specifically the soil sampling for Site 302. Other items have been implemented and successful.

8. What is your overall impression of addressing the recommendations from the third FYR?

Response:

More feasible recommendations have been implemented, while more difficult recommendations need to take more time.

9. What do you understand as a major accomplishment for Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:

No additional soil has been placed at Site 302. Annual environmental awareness training for MFD personnel, informing personnel that you cannot dig at the these sites and disposal can not occur at Site 302.

10. Are you aware of any community concerns regarding the remedies for Sites 302, 303, and 304 and Tank 50? If so, please provide details.

Response:

No, not aware of any concerns from the community.

11. Do you have any other comments, concerns, or suggestions regarding the effectiveness of the remedies implemented at MFD to protect human health and the environment?

Response:

No.

Fourth Five-Year Review Interview Record
Manchester Fuel Depot
Port Orchard, WA

TYPE 1 INTERVIEW – U.S. NAVY

Individual Contacted: Michael Hardiman	
Title: Environmental Director	
Organization: Manchester Fuel Depot	
Telephone: (360) 476-5737	**Email:** michael.hardiman@navy.mil
Contact Made By: A. Paolucci and S. Moore	**Date:** 03/07/19

QUESTIONNAIRE

1. Please describe your degree of familiarity with Sites 302, 303, and 304 and Tank 50 at Manchester Fuel Depot (MFD); implementation of the remedies at these four sites; inspection, operation, and maintenance activities that have taken place since implementation of the remedies; and recommendations made during the third five-year review (FYR) finalized in 2015.

Response:

Familiar with the basic information regarding each sites. Site 302 is a former disposal sites with PCBs (treatments, caps, and fenced off). Site 303 is the D-tunnel tanks, due to a couple overfill events in the 1980s and 1990s. Sites 302 and 303 have dig restrictions in-place which are reviewed by MFD. Site 304 coincided with operations near Building 12, swale used for disposal from historical practices. There are two monitoring wells at Site 304 and excavated soil has been tested before off site disposal. At Site 303, tanks being decommissioned and over-excavated because do not want any stress points due to the columns in the current tanks on the new above ground storage tanks.

2. What is your overall impression of remedy operations at Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:

Conducting annual LUC inspections - its fine and level of effort seems adequate for these sites. At Site 303, there is minimal to no contamination left, so wants to modify or eliminate LUCs. Supportive of plan to decommission all vapor monitoring wells.

3. Have there been any significant changes in site conditions, remedy operations, or MFD operations since the third FYR?

Response:

Site 304 included some excavations and contaminated soil found and properly disposed of off site, backfilled, and capped. At Site 303, several environmental and geotechnical investigations have been done in support of the new above ground storage tanks. There are no changes at Site 302. Tank 50 is a currently operational tank and there are no changes.

4. Are you aware of any prior or pending land use or ownership changes since the No Further Action determinations from Ecology that may impact the effectiveness of the remedies for these four sites?

Response:

No.

5. Please describe any requests you have received or are aware of regarding work at these four sites to alter site conditions that would result in land use or groundwater use which is inconsistent with current land use controls (LUCs). Are you aware of any groundwater use from beneath (or downgradient) of any of these four sites?

Response:

No, not aware of any groundwater use from within the site or downgradient. No, activities that would be inconsistent with LUCs. New above ground storage tank project is consistent with industrial land use.

6. To the best of your knowledge, have the annual LUC inspections been sufficiently thorough and frequent to ensure protection of human health and the environment? Please indicate the basis for your assessment.

Response:

Yes, the LUC inspections are sufficiently thorough and frequent. Aware of all operations and activities that occur on the sites, as an on-site base personnel.

7. To the best of your knowledge, have the recommendations made during the third FYR been adequately implemented/incorporated into the remedies for Sites 302, 303, and 304 and Tank 50? Please indicate the basis for your assessment.

Response:

Planning to test soil at Site 302 in 2019. MFD is planning to have discussions with Ecology and NAVFAC NW once soil sample results are in to discuss regrading/revegetation. Fence at Site 302 has not been repaired. This is a single-use base, not like other installations, so activities are under control. Building 12 is the source of Site 304. Tank 50 was no in the Third FYR.

8. What is your overall impression of addressing the recommendations from the third FYR?

Response:

Only a few outstanding items and are working on it. Sampling will be done before the 4th FYR is complete. Anticipates having discussions with Ecology on other recommendations at Site 302, including regrading, revegetation, and fencing. Questioning need for additional fence around Site 302.

9. What do you understand as a major accomplishment for Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:

Tank 50 was not part of the Third FYR. Major accomplishments would be drafting the LUC Plan, conducting the annual LUC inspections, dig permit process in-place, posting signage at Site 303, understanding and working to address soil placement issues at 302.

10. Are you aware of any community concerns regarding the remedies for Sites 302, 303, and 304 and Tank 50? If so, please provide details.

Response:

Not aware of any community concerns. For new tank project, sent our flyers, conducted a number of community meetings (with Manchester Community Group), conducted open house at the high school, and discussed past activities at the site. No comments from the community on the environmental issues at MFD. Community was more concerned with visuals, noise, truck traffic.

11. Do you have any other comments, concerns, or suggestions regarding the effectiveness of the remedies implemented at MFD to protect human health and the environment?

Response:

Regarding Site 303, wants to know if we have sufficient information to reduce or eliminate it as being a site.

Fourth Five-Year Review Interview Record
Manchester Fuel Depot
Port Orchard, WA

TYPE 1 INTERVIEW – U.S. NAVY

Individual Contacted: Glenn Schmitt	
Title: Regional Fuels Manager	
Organization: Manchester Fuel Depot	
Telephone: NA	**Email:** glenn.schmitt@navy.mil
Contact Made By: A. Paolucci and S Moore	**Date:** 03/07/19

QUESTIONNAIRE

1. Please describe your degree of familiarity with Sites 302, 303, and 304 and Tank 50 at Manchester Fuel Depot (MFD); implementation of the remedies at these four sites; inspection, operation, and maintenance activities that have taken place since implementation of the remedies; and recommendations made during the third five-year review (FYR) finalized in 2015.

Response:

Understand where sites are located and other on-base personnel manage the sites.

2. What is your overall impression of remedy operations at Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:

This facility is restricted by the fact that its a fuel terminal. LUCs are effective and no plans to change land use at the sites, will always be industrial.

3. Have there been any significant changes in site conditions, remedy operations, or MFD operations since the third FYR?

Response:

No. Additional sampling along Site 303 D-Tunnel tanks showed no contamination above screening levels.

4. Are you aware of any prior or pending land use or ownership changes since the No Further Action determinations from Ecology that may impact the effectiveness of the remedies for these four sites?

Response:

No. Navy continues to own land and there are no future plans to change ownership or land use.

5. Please describe any requests you have received or are aware of regarding work at these four sites to alter site conditions that would result in land use or groundwater use which is inconsistent with current land use controls (LUCs). Are you aware of any groundwater use from beneath (or downgradient) of any of these four sites?

Response:

No request for groundwater use at MFD. Construction of new above ground storage tanks above D-Tunnel tanks, but no change in land use.

6. To the best of your knowledge, have the annual LUC inspections been sufficiently thorough and frequent to ensure protection of human health and the environment? Please indicate the basis for your assessment.

Response:

Yes, based on the results of MFD environmental staff reviewing sites.

7. To the best of your knowledge, have the recommendations made during the third FYR been adequately implemented/incorporated into the remedies for Sites 302, 303, and 304 and Tank 50? Please indicate the basis for your assessment.

Response:

There is an outstanding request for sampling at Site 302 PCB site. Recommendations for signage and fencing are in-place.

8. What is your overall impression of addressing the recommendations from the third FYR?

Response:

Other than sampling the soil (from Beaver Creek) at Site 302, everything is still operational and working well.

9. What do you understand as a major accomplishment for Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:

Phase II Investigation showed that there is no contamination at Site 303. Concern is how do we close these sites, so no longer spending Navy funding on No Further Action sites.

10. Are you aware of any community concerns regarding the remedies for Sites 302, 303, and 304 and Tank 50? If so, please provide details.

Response:

No.

11. Do you have any other comments, concerns, or suggestions regarding the effectiveness of the remedies implemented at MFD to protect human health and the environment?

Response:

The entire facility is a restricted site; therefore, additional fencing at Site 302 is redundant. No plans for housing, LUCs are in place, remedies are in place. Site 302 remedy was conducted in 1992. There are real-estate deed restrictions. MFD will be a fuel facility for the foreseeable future. Single tenant and purpose facility: receive, manage, and distribute fuel.

Fourth Five-Year Review Interview Record
Manchester Fuel Depot
Port Orchard, WA

TYPE 2 INTERVIEW – REGULATORY AGENCY

Individual Contacted: Mahbub Alam	
Title: Environmental Engineer	
Organization: WA Dept of Ecology	
Telephone: 360 407 6913	**Email:** mala461@ecy.wa.gov
Contact Made By: Angela M. Paolucci	**Date:** 02/26/2019

QUESTIONNAIRE

1. Please describe your degree of familiarity with Sites 302, 303, and 304 and Tank 50 at Manchester Fuel Depot (MFD); implementation of the remedies at these four sites; inspection, operation, and maintenance activities that have taken place since implementation of the remedies; and recommendations made during the third five-year review (FYR) finalized in 2015.

Response:

As a cleanup project manager, I am providing regulatory oversight for these sites. I am very familiar with the remedy implementation at these sites.

2. What is your overall impression of remedy operations at Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:

The remedy operations at all of these sites are only based on land use controls at this time. Ecology believes the Navy is not maintaining or following through all institutional controls that are stipulated in the land use control plan which could impact human health and environment. In addition, there is no formal long-term monitoring program to verify whether contaminants that remained on-site are not impacting surrounding environment.

3.To the best of your knowledge, have the annual LUC inspections been sufficiently thorough and frequent to ensure protection of human health and the environment? Please indicate the basis for your assessment.

Response:

The annual LUC inspections seems to be sufficiently thorough and frequent. The inspection report provides field notes, photos, figures, and recommendations. However, the Navy did not follow through the recommendations from these LUC inspections.

4. To the best of your knowledge, have the recommendations made during the third FYR been adequately implemented/incorporated into the remedies for Sites 302, 303, and 304 and Tank 50? Please indicate the basis for your assessment.

Response:

It appears not all recommendations put forth in the third FYR review were completed. It seems the sites have been used for further dumps of excess soil, equipment, and storage without justification. For example, excess soils that were put on site 302 was recommended for further testing in last the FYR. Ecology does not know whether this has been implemented at all.

5. What is your overall impression of addressing the recommendations from the third FYR?

Response:

The Navy has put put low priority on maintaining the land use controls at NBK Manchester sites. The Navy is supposed to consult with Ecology prior to any planned land use changes. It seems the Navy plans to decommission it's underground tanks in place (which may include site 302/303 tanks) in favor of above ground tanks. So far, Ecology was not consulted on any planned land use changes or any environmental assessment work,the Navy has performed.

6. What do you understand as a major accomplishment for Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:

The major accomplishment for these sites is that after 15 years or so, a Land Use Control plan was developed in 2016 and regular LUC inspections are happening.

7. Do you feel the remedies for Sites 302, 303, and 304 and Tank 50 continue to be effective? Please indicate the basis for your assessment.

Response:

Apparently it seems the containment remedy is cost effective. However, due to other concerns e.g., placement of foreign material at the sites, no long-term environmental media monitoring put into questions the effectiveness of the remedy. When contaminants above cleanup levels are contained within a site, it is difficult to say whether it is still protective of human health and environment without performing long-term monitoring.

8. To your knowledge, since the No Further Action determinations from Ecology, have there been any new scientific findings that relate to potential site risks which might call into question the protectiveness of the remedies?

Response:

Since the No Further Action determinations, new scientific findings resulted in revised cleanup levels, improved analytical methods, and rule changes. Specifically, sediment management standards (SMS), surface water quality standards have changed. It is unknown whether these changes relate to potential site risks without a proper evaluation and collection of recent environmental data. For example, Little Clam Bay sediment was only evaluated for benthic standards per the prior SMS, where few samples exceeded standards. No human health risk was assessed per the new SMS regulation.

9. Since 2015, have there been any complaints, violations, or other incidents related to MFD environmental issues that require a response by your office? If so, please provide details of the events and results of the responses.

Response:

I am not aware of any complaints or violations at MFD facility.

10. Are you aware of any community concerns regarding the remedies for Sites 302, 303, and 304 and Tank 50? If so, please provide details.

Response:

No.

11. Do you have any other comments, concerns, or suggestions regarding the effectiveness of the remedies implemented at MFD to protect human health and the environment?

Response:

1. Ecology believes a long-term monitoring program should be implemented at these sites to confirm/verify the effectiveness of the remedies and to protect the human health and environment.
2. Ecology believes the signage at the sites are not adequate. It is true general public cannot access the sites as they are within the Naval base boundary. However, temporary workers and staff can access the sites without seeing any warning signs. For example, there is no proper signs at site 302 that would prevent a staff or temporary worker to disturb the site soils.
3. Whenever recommendations are made in any inspections, the Navy should implement a formal process to follow through the recommendations.

Fourth Five-Year Review Interview Record
Manchester Fuel Depot
Port Orchard, WA

TYPE 2 INTERVIEW – REGULATORY AGENCY

Individual Contacted: Denice Taylor	
Title: Environmental Scientist	
Organization: Suquamish Tribe	
Telephone: 360-394-8449	**Email:** dtaylor@suquamish.nsn.us
Contact Made By:	**Date:** March 7, 2019

QUESTIONNAIRE

1. Please describe your degree of familiarity with Sites 302, 303, and 304 and Tank 50 at Manchester Fuel Depot (MFD); implementation of the remedies at these four sites; inspection, operation, and maintenance activities that have taken place since implementation of the remedies; and recommendations made during the third five-year review (FYR) finalized in 2015.

Response:
I have reviewed the third FYR, including the recommendations, and have also reviewed the March 2018 Phase II ESA report and the most recent LUC Inspection tech memo (2018).

2. What is your overall impression of remedy operations at Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:
From the 2018 LUC tech memo, it appears that some issues related to stock piled soils have not been addressed. The Phase II ESA also recommended preparation of a soil management plan ahead of the proposed MILCON action and additional soil characterization

3.To the best of your knowledge, have the annual LUC inspections been sufficiently thorough and frequent to ensure protection of human health and the environment? Please indicate the basis for your assessment.

Response:
Based on my review of the 2018 LUC tech memo, the annual LUC inspections appear to be frequent enough and to encompass an appropriate scope. It does not appear, however, that there is an effective process in place to track follow through on recommendations.

4. To the best of your knowledge, have the recommendations made during the third FYR been adequately implemented/incorporated into the remedies for Sites 302, 303, and 304 and Tank 50? Please indicate the basis for your assessment.

Response:
I have not been actively involved in ongoing site management/decision-making. I will need to review the draft fourth FYR to determine if the previous recommendations have be implemented/incorporated.

5. What is your overall impression of addressing the recommendations from the third FYR?

Response:
I do not have an impression at this time. I will need to review the draft fourth FYR and expect to submit comments on behalf of the Suquamish Tribe.

6. What do you understand as a major accomplishment for Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:
Please see responses to questions 4 and 5.

7. Do you feel the remedies for Sites 302, 303, and 304 and Tank 50 continue to be effective? Please indicate the basis for your assessment.

Response:
I am under the impression that soil testing at the site conducted during the Phase II ESA has confirmed that there is no additional petroleum-related contamination associated with fuel storage and transport within the construction footprint for the proposed MILCON action. The Phase II ESA, however, did not include the Decommissioning Project Area and recommended that additional soil characterization be performed. Unless additional studies reveal unremediated levels of contamination or uncontrolled migration/ exposure routes, or site operations/conditions change, I expect the remedies to remain protective of human health and environment in accord with Ecology NFA determinations.

8. To your knowledge, since the No Further Action determinations from Ecology, have there been any new scientific findings that relate to potential site risks which might call into question the protectiveness of the remedies?

Response:
I believe the Navy is planning to conduct a PA/SI regarding the potential for PFOA/PFOS contamination at the site, and as previously mentioned, the Phase II ESA recommended additional soil characterization in the Decommissioning Project Area. The protectiveness of the remedies should be evaluated to incorporate any new data that are generated.

9. Since 2015, have there been any complaints, violations, or other incidents related to MFD environmental issues that require a response by your office? If so, please provide details of the events and results of the responses.

Response:
I do not know of any complaints, violations or incidents related to MFS environmental issues that have required a response by Suquamish Fisheries Department

10. Are you aware of any community concerns regarding the remedies for Sites 302, 303, and 304 and Tank 50? If so, please provide details.

Response:
I am not aware of any community concerns at this time.

11. Do you have any other comments, concerns, or suggestions regarding the effectiveness of the remedies implemented at MFD to protect human health and the environment?

Response:
Please provide a draft of the fourth FYR for review and comment. In addition, please inform me of any proposed changes in site operations or conditions that may impact the remedies or the protectiveness determinations, including proposed testing, investigations and evaluations.

Fourth Five-Year Review Interview Record
Manchester Fuel Depot
Port Orchard, WA

TYPE 3 INTERVIEW – COMMUNITY MEMBER

Individual Contacted: Robert V Cairns	
Title: Deputy Director(Aug 1985-Jan 2014). Retired now	
Organization: Fuel Department, FISC Puget Sound	
Telephone: 360-689-1300	**Email:** bobandchriscairns@wavecable.com
Contact Made By: Angela M. Paolucci	**Date:** 10 Mar 2019

QUESTIONNAIRE

1. Please describe your degree of familiarity with Sites 302, 303, and 304 and Tank 50 at Manchester Fuel Depot (MFD); implementation of the remedies at these four sites; inspection, operation, and maintenance activities that have taken place since implementation of the remedies; and recommendations made during the third five-year review (FYR) finalized in 2015.

Response:
I am aware of the 3 sites and tank 50 including where fuel was discovered and the assumed cause of the fuel leakage. I cannot speak to the FYR finalized in 2015 as it was after my retirement date. The remedies during my tenure consisted primarily of drilling wells and soil sampling to determine the extent of contamination and monitoring of the sites for spreading.

2. What is your overall impression of remedy operations at Sites 302, 303, and 304 and Tank 50 since the third FYR?

Response:
I believe that the remedy operations were adequate for the 3 sites and tank 50. Any happenings to these sites after my Jan 2014 retirement, I am not conversant on.

3. Are you aware of any community concerns regarding the remedies for Sites 302, 303, and 304 and Tank 50? If so, please provide details.

Response:
No. I am a member of the Manchester Community Advisory Committee so I am actively involved in the Manchester Community. I am not aware of any concerns.

4. What effects have remedy operations at Sites 302, 303, and 304 and Tank 50 had on the surrounding community?

Response:
No. The local community recognizes the Fuel Depot as an outstanding steward of the environment. They are aware of the many awards that the Fuel Depot has received including the award 3 times for having the best environmental operation in the entire US Navy.

5. Do you feel well-informed about the ongoing activities at MFD?

Response:
Yes. Glenn Schmitt and I are members of the Port Orchard Rotary Club and we see each other on a weekly basis. Glenn keeps me informed on what is happening. We occasionally go to lunch together also where we talk "Fuel" talk.

6. Do you have any other comments, concerns, or suggestions regarding the effectiveness of the remedies implemented at MFD to protect human health and the environment?

Response:
No.

APPENDIX D
Site Inspection Checklists

This page intentionally left blank.

NBK Manchester
Site 302 - PCB Site
Naval Facilities Engineering Command Northwest

LAND USE CONTROLS (LUCs) INSPECTION CHECKLIST

DATE(S) (MM|DD|YY):
03/04/19

INSPECTOR(S):	COMPANY:
A. Paolucci, S. Moore	Battelle

LUCs

- *ENSURE THAT SITE SIGNAGE IS READABLE AND ADEQUATE.*
- ENSURE THAT LAND USE REMAINS FOR INDUSTRIAL PURPOSES.
- ENSURE THAT THERE HAS BEEN NO UNAUTHORIZED SOIL EXCAVATION OR DISTURBANCE.
- ENSURE THAT THERE HAS BEEN NO UNAUTHORIZED PLACEMENT OF EXCESS SOIL FROM ANOTHER LOCATION.
- ENSURE INTEGRITY OF THE SOIL COVER VEGETATION, SO THAT ANY EXCAVATION OR IMPROPER DISPOSAL IS APPARENT.
- ENSURE THAT ANY SOIL EXCAVATED FROM THE SITE IS PROPERLY CHARACTERIZED AND DISPOSED OFF-SITE AND THAT ON-SITE WORKERS ARE PROTECTED DURING SUCH ACTIVITIES.
- ENSURE THAT SITE FENCING IS INTACT AND THAT GATES ARE SECURED AND LOCKED.

NOTE: LUCs THAT ARE ITALICIZED ARE REQUIRED LUCs FROM THE NFA LETTER.

LUCs INSPECTION ACTIONS

HAS SITE OR ADJACENT LAND USE CHANGED SINCE LAST INSPECTION? ☐ YES ☒ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY) ☒ SITE WALK ☐ INTERVIEW W/_____ ☐ SECURITY CHECK ☐ OTHER_____

FINDINGS: Industrial land use

IS THERE VISUAL OR ADMINISTRATIVE EVIDENCE OF SOIL EXCAVATION OR DISTURBANCE? IF SO, DETERMINE IF SITE APPROVAL PROCESS HAS BEEN FOLLOWED. ☐ YES ☒ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY) ☒ SITE WALK ☐ INTERVIEW W/_____ ☐ SECURITY CHECK ☐ OTHER_____

FINDINGS:

IS THERE VISUAL OR ADMINISTRATIVE EVIDENCE OF THE UNAUTHORIZED PLACEMENT OF EXCESS SOIL FROM ANOTHER LOCATION? ☒ YES ☐ NO ☐ NA

INSPECTION PERFORMED? (CHECK ALL THAT APPLY) ☒ SITE WALK ☐ INTERVIEW W/_____ ☐ SECURITY CHECK ☐ OTHER_____

FINDINGS: Central portion of site is covered with stockpiles of soil and debris.

HAS THE INTEGRITY OF THE VEGETATIVE COVER AT THE SITE BEEN MAINTAINED? ☐ YES ☒ NO ☐ NA

INSPECTION PERFORMED? (CHECK ALL THAT APPLY) ☒ SITE WALK ☐ INTERVIEW W/_____ ☐ SECURITY CHECK ☐ OTHER_____

FINDINGS: Central portion of site is covered with stockpiles of soil and debris.

HAS ACCESS CONTROL BEEN MAINTAINED? ☒ YES ☐ NO, EXPLAIN _____

SECURITY POC: Not applicable

IS SIGNAGE READABLE AND ADEQUATE? ☒ YES ☐ NO ☐ NA

IS FENCING INTACT AND SECURE? ☐ YES ☒ NO ☐ NA

ARE BOTH THE NORTH AND SOUTH GATES SECURED AND LOCKED ☐ YES ☒ NO ☐ NA

INSPECTION PERFORMED? (CHECK ALL THAT APPLY) ☒ SITE WALK ☐ INTERVIEW W/_____ ☐ SECURITY CHECK ☐ OTHER_____

FINDINGS: No lock or LUC signage on north gate. Approx. 60 ft of damaged fencing to northwest.

NBK Manchester
Site 302 - PCB Site
Naval Facilities Engineering Command Northwest

LUCs INSPECTION CHECKLIST (CONTINUED)

WERE PICTURES TAKEN? ☒ YES ☐ NO

PHOTO IDs See Appendix D

ADDITIONAL NOTES:

Similar findings to 2017 and 2018 inspections; however, damaged/collapsed fencing was observed along the northwest boundary of the site. This observation was not noted during the 2017 and 2018 inspections because these inspections were conducted during the spring/summer time frame when vegetation was significantly higher, making it not possible to access the area of the site with the collapsed fencing.

I CERTIFY THAT THE CONDITIONS OF THE AREA ON THE INSPECTION DATES(S) WERE AS REPORTED ABOVE.

INSPECTOR SIGNATURE:	DATE:
Samuel Moore	04/07/19

NBK Manchester
Site 303 - D-Tunnel Tanks
Naval Facilities Engineering Command Northwest

LAND USE CONTROLS (LUCs) INSPECTION CHECKLIST

DATE(S) (MM|DD|YY):
03/05/19

INSPECTOR(S):	COMPANY:
A. Paolucci, S. Moore	Battelle

LUCs

- *ENSURE THAT LAND USE REMAINS FOR INDUSTRIAL PURPOSES. COORDINATE WITH ECOLOGY PRIOR TO CHANGE IN PROPERTY OWNERSHIP OR LAND USE CONCERNING THE NEED FOR REMEDIAL ACTIONS.*
- *ENSURE THAT WARNINGS ARE POSTED FOR WORKERS TO GUARD AGAINST EXPOSURE TO RESIDUAL PETROLEUM CONTAMINATED SOIL.*
- *IDENTIFY REMAINING AREAS OF CONCERN ON FACILITY MAPS AND SPECIFY IN FACILITY EXCAVATION PERMIT INSTRUCTION.*
- ENSURE NO PRODUCTION WELLS ARE INSTALLED AND GROUNDWATER IS NOT USED EXCEPT FOR MONITORING AND/OR REMEDIATION.
- PROTECT EXISTING VAPOR MONITORING WELLS UNTIL FORMALLY ABANDONED.
- ENSURE THAT THERE HAS BEEN NO UNAUTHORIZED SOIL EXCAVATION OR DISTURBANCE.
- CONFINE AUTHORIZED REUSABLE MATERIAL* TO APPROVED STAGING AREA.
- ENSURE THAT ANY SOIL EXCAVATED FROM THE SITE IS PROPERLY CHARACTERIZED AND DISPOSED OFF-SITE AND THAT ON-SITE WORKERS ARE PROTECTED DURING SUCH ACTIVITIES.

NOTE: LUCs THAT ARE ITALICIZED ARE REQUIRED LUCs FROM THE NFA LETTER.
*THOSE MATERIALS FOR WHICH ONSITE PLACEMENT HAS BEEN COORDINATED WITH THE ECOLOGY SITE MANAGER AND THAT HAVE BEEN CHARACTERIZED IN COLLABORATION WITH THE ECOLOGY SITE MANAGER.

LUC INSPECTION ACTION

HAS SITE OR ADJACENT LAND USE CHANGED SINCE LAST INSPECTION? ☐ YES ■ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
■ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____

FINDINGS: Industrial land use

DO FACILITY MAPS IDENTIFY REMAINING AREAS OF CONCERN? ■ YES ☐ NO

DESCRIBE: Contractor Environmental & Safety Guide

DOES THE FACILITY EXCAVATION PERMIT INSTRUCTION SPECIFY REMAINING AREAS OF CONCERN? ■ YES ☐ NO

DESCRIBE: Contractor Environmental & Safety Guide

IS THERE VISUAL EVIDENCE OF UNAUTHORIZED ON-SITE WELL INSTALLATION OR GROUNDWATER USE? ☐ YES ■ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
■ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____
☐ WELL INSPECTIONS

FINDINGS:
☐ SEE WELL INSPECTION LOGS
☐ OTHER _____

ARE ALL MONITORING WELLS IN GOOD CONDITION AND ACCESSIBLE? (REFER TO COMPLETED MONITORING WELL INSPECTION CHECKLISTS) ■ YES ☐ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
☐ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____
■ WELL INSPECTIONS

FINDINGS:
■ SEE WELL INSPECTION LOGS
☐ OTHER _____

IS THERE VISUAL OR ADMINISTRATIVE EVIDENCE OF SOIL EXCAVATION OR DISTURBANCE? IF SO, DETERMINE IF SITE APPROVAL PROCESS HAS BEEN FOLLOWED. ☐ YES ■ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
■ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____

FINDINGS: _____

NBK Manchester
Site 303 - D-Tunnel Tanks
Naval Facilities Engineering Command Northwest

LUCs INSPECTION CHECKLIST (CONTINUED)

IS THERE VISUAL OR ADMINISTRATIVE EVIDENCE OF THE UNAUTHORIZED PLACEMENT EXCESS SOIL, FILL, OR SEDIMENT FROM ANOTHER LOCATION? ☒ YES ☐ NO ☐ NA

INSPECTION PERFORMED? (CHECK ALL THAT APPLY) ☒ SITE WALK ☐ INTERVIEW W/_____ ☐ SECURITY CHECK ☐ OTHER _____

FINDINGS: Soil on tarp in laydown area north of Tank 29.

HAS ACCESS CONTROL BEEN MAINTAINED? ☒ YES ☐ NO, EXPLAIN _____

SECURITY POC: Not applicable

IS SIGNAGE READABLE AND ADEQUATE? ☒ YES ☐ NO ☐ NA

INSPECTION PERFORMED? (CHECK ALL THAT APPLY) ☒ SITE WALK ☐ INTERVIEW W/_____ ☐ SECURITY CHECK ☐ OTHER _____

FINDINGS:

WERE PICTURES TAKEN? ☒ YES ☐ NO

PHOTO IDs See Appendix D

ADDITIONAL NOTES:

Similar findings to 2017 and 2018 inspections.

I CERTIFY THAT THE CONDITIONS OF THE AREA ON THE INSPECTION DATES(S) WERE AS REPORTED ABOVE.

INSPECTOR SIGNATURE:	DATE:
Samuel Moore	04/07/19

NBK Manchester
Site 304 - Industrial Area
Naval Facilities Engineering Command Northwest

LAND USE CONTROLS (LUCs) INSPECTION CHECKLIST

DATE(S) (MM|DD|YY):
03/04/19

INSPECTOR(S):	COMPANY:
A. Paolucci, S. Moore	Battelle

LUCs

- *ENSURE THAT LAND USE REMAINS FOR INDUSTRIAL PURPOSES. COORDINATE WITH ECOLOGY PRIOR TO CHANGE IN PROPERTY OWNERSHIP OR LAND USE CONCERNING THE NEED FOR REMEDIAL ACTIONS.*
- *ENSURE THAT WARNINGS ARE POSTED FOR WORKERS TO GUARD AGAINST EXPOSURE TO RESIDUAL PETROLEUM CONTAMINATED SOIL.*
- *IDENTIFY REMAINING AREAS OF CONCERN ON FACILITY MAPS AND SPECIFY IN FACILITY EXCAVATION PERMIT INSTRUCTION.*
- ENSURE NO PRODUCTION WELLS ARE INSTALLED AND GROUNDWATER IS NOT USED EXCEPT FOR MONITORING AND/OR REMEDIATION.
- PROTECT EXISTING MONITORING WELLS UNTIL FORMALLY ABANDONED.
- ENSURE THAT THERE HAS BEEN NO UNAUTHORIZED SOIL EXCAVATION OR DISTURBANCE.
- ENSURE THAT ANY SOIL EXCAVATED FROM THE SITE IS PROPERLY CHARACTERIZED AND DISPOSED OFF-SITE AND THAT ON-SITE WORKERS ARE PROTECTED DURING SUCH ACTIVITIES.

NOTE: LUCs THAT ARE ITALICIZED ARE REQUIRED LUCs FROM THE NFA LETTER.

LUC INSPECTION ACTIONS

HAS SITE OR ADJACENT LAND USE CHANGED SINCE LAST INSPECTION? ☐ YES ☒ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
☒ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____

FINDINGS:
Industrial land use

DO FACILITY MAPS IDENTIFY REMAINING AREAS OF CONCERN? ☒ YES ☐ NO

DESCRIBE:
Contractor Environmental & Safety Guide

DOES THE FACILITY EXCAVATION PERMIT INSTRUCTION SPECIFY REMAINING AREAS OF CONCERN? ☒ YES ☐ NO

DESCRIBE:
Contractor Environmental & Safety Guide

IS THERE VISUAL EVIDENCE OF UNAUTHORIZED ON-SITE WELL INSTALLATION OR GROUNDWATER USE? ☐ YES ☒ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
☒ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____
☐ WELL INSPECTIONS

FINDINGS:
☐ SEE WELL INSPECTION LOGS
☐ OTHER _____

ARE ALL MONITORING WELLS IN GOOD CONDITION AND ACCESSIBLE? (REFER TO COMPLETED MONITORING WELL INSPECTION CHECKLISTS) ☒ YES ☐ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
☐ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____
☒ WELL INSPECTIONS

FINDINGS:
☒ SEE WELL INSPECTION LOGS
☐ OTHER _____

IS THERE VISUAL OR ADMINISTRATIVE EVIDENCE OF SOIL EXCAVATION OR DISTURBANCE? IF SO, DETERMINE IF SITE APPROVAL PROCESS HAS BEEN FOLLOWED. ☐ YES ☒ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
☒ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____

FINDINGS:

NBK Manchester
Site 304 - Industrial Area
Naval Facilities Engineering Command Northwest

LUCs INSPECTION CHECKLIST (CONTINUED)

HAS ACCESS CONTROL BEEN MAINTAINED? ■ YES ☐ NO, EXPLAIN _____

SECURITY POC: Not applicable

IS SIGNAGE READABLE AND ADEQUATE? ☐ YES ■ NO ☐ NA

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
■ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____

FINDINGS: LUC signage is north of actual site boundary.

WERE PICTURES TAKEN? ■ YES ☐ NO

PHOTO IDs See Appendix D

ADDITIONAL NOTES:

Similar findings to 2018 inspections.

I CERTIFY THAT THE CONDITIONS OF THE AREA ON THE INSPECTION DATES(S) WERE AS REPORTED ABOVE.

INSPECTOR SIGNATURE:	DATE:
Samuel Moore	04/07/19

NBK Manchester
Tank 50 Release Site
Naval Facilities Engineering Command Northwest

LAND USE CONTROLS (LUCs) INSPECTION CHECKLIST

DATE(S) (MM|DD|YY):
03/04/19

INSPECTOR(S):	COMPANY:
A. Paolucci, S. Moore	Battelle

LUCs

- *ENSURE THAT WARNINGS ARE POSTED FOR WORKERS TO GUARD AGAINST EXPOSURE TO RESIDUAL PETROLEUM CONTAMINATED SOIL.*
- *IDENTIFY REMAINING AREAS OF CONCERN ON FACILITY MAPS AND SPECIFY IN FACILITY EXCAVATION PERMIT INSTRUCTION.*
- ENSURE THAT LAND USE REMAINS FOR INDUSTRIAL PURPOSES. COORDINATE WITH ECOLOGY PRIOR TO CHANGE IN PROPERTY OWNERSHIP OR LAND USE CONCERNING THE NEED FOR REMEDIAL ACTIONS.
- ENSURE NO PRODUCTION WELLS ARE INSTALLED AND GROUNDWATER IS NOT USED EXCEPT FOR MONITORING AND/OR REMEDIATION.
- PROTECT EXISTING MONITORING WELLS UNTIL FORMALLY ABANDONED.
- ENSURE THAT THERE HAS BEEN NO UNAUTHORIZED SOIL EXCAVATION OR DISTURBANCE.
- ENSURE THAT ANY SOIL EXCAVATED FROM THE SITE IS PROPERLY CHARACTERIZED AND DISPOSED OFF-SITE AND THAT ON-SITE WORKERS ARE PROTECTED DURING SUCH ACTIVITIES.

NOTE: LUCs THAT ARE ITALICIZED ARE REQUIRED LUCs FROM THE NFA LETTER.

LUC INSPECTION ACTION

HAS SITE OR ADJACENT LAND USE CHANGED SINCE LAST INSPECTION? ☐ YES ☒ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
☒ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____

FINDINGS: Industrial land use

DO FACILITY MAPS IDENTIFY REMAINING AREAS OF CONCERN? ☒ YES ☐ NO

DESCRIBE: Contractor Environmental & Safety Guide

DOES THE FACILITY EXCAVATION PERMIT INSTRUCTION SPECIFY REMAINING AREAS OF CONCERN? ☒ YES ☐ NO

DESCRIBE: Contractor Environmental & Safety Guide

IS THERE VISUAL EVIDENCE OF UNAUTHORIZED ON-SITE WELL INSTALLATION OR GROUNDWATER USE? ☐ YES ☒ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
☒ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____
☐ WELL INSPECTIONS

FINDINGS:
☐ SEE WELL INSPECTION LOGS
☐ OTHER _____

ARE ALL MONITORING WELLS IN GOOD CONDITION AND ACCESSIBLE? (REFER TO COMPLETED MONITORING WELL INSPECTION CHECKLISTS) ☒ YES ☐ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
☐ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____
☒ WELL INSPECTIONS

FINDINGS:
☒ SEE WELL INSPECTION LOGS
☐ OTHER _____

IS THERE VISUAL OR ADMINISTRATIVE EVIDENCE OF SOIL EXCAVATION OR DISTURBANCE? IF SO, DETERMINE IF SITE APPROVAL PROCESS HAS BEEN FOLLOWED. ☐ YES ☒ NO

INSPECTION PERFORMED? (CHECK ALL THAT APPLY)
☒ SITE WALK ☐ INTERVIEW W/_____
☐ SECURITY CHECK ☐ OTHER _____

FINDINGS: _____

NBK Manchester
Tank 50 Release Site
Naval Facilities Engineering Command Northwest

LUCs INSPECTION CHECKLIST (CONTINUED)

IS THERE VISUAL OR ADMINISTRATIVE EVIDENCE OF THE UNAUTHORIZED PLACEMENT EXCESS SOIL, FILL, OR SEDIMENT FROM ANOTHER LOCATION? ☐ YES ■ NO ☐ NA

INSPECTION PERFORMED? (CHECK ALL THAT APPLY) ■ SITE WALK ☐ INTERVIEW W/_____ ☐ SECURITY CHECK ☐ OTHER _____

FINDINGS:

HAS ACCESS CONTROL BEEN MAINTAINED? ■ YES ☐ NO, EXPLAIN _____

SECURITY POC: Not applicable

IS SIGNAGE READABLE AND ADEQUATE? ☐ YES ■ NO ☐ NA

INSPECTION PERFORMED? (CHECK ALL THAT APPLY) ■ SITE WALK ☐ INTERVIEW W/_____ ☐ SECURITY CHECK ☐ OTHER _____

FINDINGS: No LUC signage at primary entry way.

WERE PICTURES TAKEN? ■ YES ☐ NO

PHOTO IDs See Appendix D

ADDITIONAL NOTES:

Similar findings to 2017 and 2018 inspections.

I CERTIFY THAT THE CONDITIONS OF THE AREA ON THE INSPECTION DATES(S) WERE AS REPORTED ABOVE.

INSPECTOR SIGNATURE:	DATE:
Samuel Moore	04/07/19

APPENDIX E
Monitoring Well Inspection Checklists

This page intentionally left blank.

NBK Manchester
Naval Facilities Engineering Command Northwest

MONITORING WELL CHECKLIST FOR LUC INSPECTION

DATE (MM|DD|YY):	TIME (HH:MM):	WEATHER/TEMPERATURE:
03/05/19	11:42	Partly cloudy, high 49F, winds N 13mph

INSPECTOR:	COMPANY:
A. Paolucci, S. Moore	Battelle

SITE:	DESCRIPTION:
Site 303	D-Tunnel Tanks, South of Tank 24

WELL ID:	NORTHING:	EASTING:
MW-1	64015.29	371481.26

INSPECTION CHECKLIST:

TYPE OF MONITORING WELL: ■ GROUNDWATER ☐ SOIL VAPOR

MONITORING WELL LOCATED? ■ YES ☐ NO

IS THE WELL CLEARLY LABELED? ☐ YES ■ NO

IS THE MONUMENT IN GOOD CONDITION? ■ YES ☐ NO

TYPE OF WELL CASING: ☐ STICK-UP ■ FLUSH-MOUNT ☐ OTHER _____

SIZE & NUMBER OF BOLTS ON FLUSH-MOUNT LID: 3 of 3 bolts on well.

CASING DIAMETER ■ 2" ☐ 4" ☐ 6" ☐ 8" ☐ OTHER _____

IS THE CASING IN GOOD CONDITION? ■ YES ☐ NO

IS THERE A CAP ON THE MONITORING WELL? ■ YES ■ NO

TYPE OF CAP:
- ☐ PVC SLIP CAP
- ■ J-PLUG
- ☐ EXPANSION
- ☐ PRODUCTION W/TUBING
- ☐ OTHER _____

IS THERE ANY EVIDENCE OF TAMPERING WITH THE WELL CASING OR CAP? ☐ YES ■ NO

ARE THERE ANY ODORS? ☐ YES ■ NO

IF YES, DESCRIBE ODOR:
- ☐ SOLVENT
- ☐ SULFIDE/ROTTEN EGGS
- ☐ PETROLEUM
- ☐ OTHER _____

WERE PICTURES TAKEN? ■ YES ☐ NO

PHOTO IDs: See Appendix D

ADDITIONAL NOTES OR COMMENTS:

GENERAL CONDITION (CHECK ONE):
- ■ GOOD CONDITION
- ☐ MODERATE CONDITION
- ☐ POOR CONDITION

Able to open well during 2019 inspections. PVC casing too high/tall to fit cap under well lid. Cap in well monument, not on casing. Well monument and lid rusty, but still competent/functional.

NBK Manchester
Naval Facilities Engineering Command Northwest

MONITORING WELL CHECKLIST FOR LUC INSPECTION

DATE (MM|DD|YY):	TIME (HH:MM):	WEATHER/TEMPERATURE:
03/05/19	13:46	Partly cloudy high 49F, winds N 13mph

INSPECTOR:	COMPANY:
A. Paolucci, S. Moore	Battelle

SITE:	DESCRIPTION:
Site 303	D-Tunnel Tanks, North of Tank 30

WELL ID:	NORTHING:	EASTING:
MW-3	64625.80	371219.60

INSPECTION CHECKLIST:

TYPE OF MONITORING WELL: ■ GROUNDWATER ☐ SOIL VAPOR

MONITORING WELL LOCATED? ■ YES ☐ NO

IS THE WELL CLEARLY LABELED? ☐ YES ■ NO

IS THE MONUMENT IN GOOD CONDITION? ■ YES ☐ NO

TYPE OF WELL CASING: ☐ STICK-UP ■ FLUSH-MOUNT ☐ OTHER _____

SIZE & NUMBER OF BOLTS ON FLUSH-MOUNT LID: 2 of 2 bolts on well.

CASING DIAMETER ☐ 2" ■ 4" ☐ 6" ☐ 8" ☐ OTHER _____

IS THE CASING IN GOOD CONDITION? ■ YES ☐ NO

IS THERE A CAP ON THE MONITORING WELL? ■ YES ■ NO

TYPE OF CAP:
- ☐ PVC SLIP CAP
- ☐ J-PLUG
- ☐ EXPANSION
- ☐ PRODUCTION W/TUBING
- ☐ OTHER _____

IS THERE ANY EVIDENCE OF TAMPERING WITH THE WELL CASING OR CAP? ☐ YES ■ NO

ARE THERE ANY ODORS? ☐ YES ■ NO

IF YES, DESCRIBE ODOR:
- ☐ SOLVENT
- ☐ SULFIDE/ROTTEN EGGS
- ☐ PETROLEUM
- ☐ OTHER _____

WERE PICTURES TAKEN? ■ YES ☐ NO

PHOTO IDs: See Appendix D

ADDITIONAL NOTES OR COMMENTS:

No cap on casing; casing too tall to fit cap under well lid.

GENERAL CONDITION (CHECK ONE):
- ■ GOOD CONDITION
- ☐ MODERATE CONDITION
- ☐ POOR CONDITION

NBK Manchester
Naval Facilities Engineering Command Northwest

MONITORING WELL CHECKLIST FOR LUC INSPECTION

DATE (MM|DD|YY):	TIME (HH:MM):	WEATHER/TEMPERATURE:
03/04/19	14:30	Sunny, high 46F, winds ENE 10mph

INSPECTOR:	COMPANY:
A. Paolucci, S. Moore	Battelle

SITE:	DESCRIPTION:
Site 304	Industrial Area

WELL ID:	NORTHING:	EASTING:
MW-1	64019.42	371750.40

INSPECTION CHECKLIST:

TYPE OF MONITORING WELL: ☑ GROUNDWATER ☐ SOIL VAPOR

MONITORING WELL LOCATED? ☑ YES ☐ NO

IS THE WELL CLEARLY LABELED? ☐ YES ☑ NO

IS THE MONUMENT IN GOOD CONDITION? ☑ YES ☐ NO

TYPE OF WELL CASING: ☐ STICK-UP ☑ FLUSH-MOUNT ☐ OTHER _____

SIZE & NUMBER OF BOLTS ON FLUSH-MOUNT LID: 1 of 2 3/4" bolts on well.

CASING DIAMETER ☑ 2" ☐ 4" ☐ 6" ☐ 8" ☐ OTHER _____

IS THE CASING IN GOOD CONDITION? ☑ YES ☐ NO

IS THERE A CAP ON THE MONITORING WELL? ☑ YES ☐ NO

TYPE OF CAP:
- ☐ PVC SLIP CAP
- ☑ J-PLUG
- ☐ EXPANSION
- ☐ PRODUCTION W/TUBING
- ☐ OTHER _____

IS THERE ANY EVIDENCE OF TAMPERING WITH THE WELL CASING OR CAP? ☐ YES ☑ NO

ARE THERE ANY ODORS? ☐ YES ☑ NO

IF YES, DESCRIBE ODOR:
- ☐ SOLVENT
- ☐ SULFIDE/ROTTEN EGGS
- ☐ PETROLEUM
- ☐ OTHER _____

WERE PICTURES TAKEN? ☑ YES ☐ NO

PHOTO IDs: See Appendix D

ADDITIONAL NOTES OR COMMENTS:

GENERAL CONDITION (CHECK ONE):
- ☑ GOOD CONDITION
- ☐ MODERATE CONDITION
- ☐ POOR CONDITION

Well casing needs to be cut shorter and J-plug needs to be replaced. One ear of the flush-mount monument has broken off.

NBK Manchester
Naval Facilities Engineering Command Northwest

MONITORING WELL CHECKLIST FOR LUC INSPECTION

DATE (MM|DD|YY):	TIME (HH:MM):	WEATHER/TEMPERATURE:
03/04/19	14:42	Sunny, high 46F, winds ENE 10mph

INSPECTOR:	COMPANY:
A. Paolucci, S. Moore	Battelle

SITE:	DESCRIPTION:
Site 304	Industrial Area

WELL ID:	NORTHING:	EASTING:
MW-2	64105.94	371803.60

INSPECTION CHECKLIST:

TYPE OF MONITORING WELL: ■ GROUNDWATER ☐ SOIL VAPOR

MONITORING WELL LOCATED? ■ YES ☐ NO

IS THE WELL CLEARLY LABELED? ☐ YES ■ NO

IS THE MONUMENT IN GOOD CONDITION? ■ YES ☐ NO

TYPE OF WELL CASING: ☐ STICK-UP ■ FLUSH-MOUNT ☐ OTHER _____

SIZE & NUMBER OF BOLTS ON FLUSH-MOUNT LID: 2 of 2 3/4" bolts on well.

CASING DIAMETER ■ 2” ☐ 4” ☐ 6” ☐ 8” ☐ OTHER _____

IS THE CASING IN GOOD CONDITION? ■ YES ☐ NO

IS THERE A CAP ON THE MONITORING WELL? ■ YES ☐ NO

TYPE OF CAP:
- ☐ PVC SLIP CAP
- ■ J-PLUG
- ☐ EXPANSION
- ☐ PRODUCTION W/TUBING
- ☐ OTHER _____

IS THERE ANY EVIDENCE OF TAMPERING WITH THE WELL CASING OR CAP? ☐ YES ■ NO

ARE THERE ANY ODORS? ☐ YES ■ NO

IF YES, DESCRIBE ODOR:
- ☐ SOLVENT
- ☐ SULFIDE/ROTTEN EGGS
- ☐ PETROLEUM
- ☐ OTHER _____

WERE PICTURES TAKEN? ■ YES ☐ NO

PHOTO IDs: See Appendix D

ADDITIONAL NOTES OR COMMENTS:

GENERAL CONDITION (CHECK ONE):
- ■ GOOD CONDITION
- ☐ MODERATE CONDITION
- ☐ POOR CONDITION

Well casing needs to be cut shorter and J-plug needs to be replaced.

NBK Manchester
Naval Facilities Engineering Command Northwest

MONITORING WELL CHECKLIST FOR LUC INSPECTION

DATE (MM|DD|YY):	TIME (HH:MM):	WEATHER/TEMPERATURE:
03/04/19	14:00	Sunny, high 46F, winds ENE 10mph

INSPECTOR:	COMPANY:
A. Paolucci, S. Moore	Battelle

SITE:	DESCRIPTION:
Tank 50	Tank 50 Release Site

WELL ID:	NORTHING:	EASTING:
MW-1	64406.94	370945.00

INSPECTION CHECKLIST:

TYPE OF MONITORING WELL: ■ GROUNDWATER ☐ SOIL VAPOR

MONITORING WELL LOCATED? ■ YES ☐ NO

IS THE WELL CLEARLY LABELED? ☐ YES ■ NO

IS THE MONUMENT IN GOOD CONDITION? ■ YES ☐ NO

TYPE OF WELL CASING: ■ STICK-UP ☐ FLUSH-MOUNT ☐ OTHER _____

SIZE & NUMBER OF BOLTS ON FLUSH-MOUNT LID: _____

CASING DIAMETER ■ 2” ☐ 4” ☐ 6” ☐ 8” ☐ OTHER _____

IS THE CASING IN GOOD CONDITION? ■ YES ☐ NO

IS THERE A CAP ON THE MONITORING WELL? ■ YES ☐ NO

TYPE OF CAP:
- ☐ PVC SLIP CAP
- ■ J-PLUG
- ☐ EXPANSION
- ☐ PRODUCTION W/TUBING
- ☐ OTHER _____

IS THERE ANY EVIDENCE OF TAMPERING WITH THE WELL CASING OR CAP? ☐ YES ■ NO

ARE THERE ANY ODORS? ☐ YES ■ NO

IF YES, DESCRIBE ODOR:
- ☐ SOLVENT
- ☐ SULFIDE/ROTTEN EGGS
- ☐ PETROLEUM
- ☐ OTHER _____

WERE PICTURES TAKEN? ■ YES ☐ NO

PHOTO IDs: See Appendix D

ADDITIONAL NOTES OR COMMENTS:

No lock on lid or cap.

GENERAL CONDITION (CHECK ONE):
- ■ GOOD CONDITION
- ☐ MODERATE CONDITION
- ☐ POOR CONDITION

APPENDIX F
Responses to Stakeholder Comments on Draft Report

This page intentionally left blank.

Response to Comments – REVISION3
Draft Fourth Five-Year Review Sites 302, 303, and 304 and Tank 50
Fleet Logistics Center Puget Sound, Manchester Fuel Depot, Manchester, Washington
(Dated October 2019)

Comment Number	Page/Section Numbers	Comment	Response
Comments from Ms. Denice Taylor, Suquamish Tribe (dated November 13, 2019)			
1.	NA	It is suggested that this review discuss the MILCON action, the results of the Phase II ESA and any recent additional testing as information related to a change in site conditions. Based on the Phase II ESA data, it does not appear that inclusion of this information will change the protectiveness determination.	Based on Suquamish Tribe and Ecology comment, Phase I and II Environmental Site Assessment (ESA) activities only which overlap with the boundaries of Sites 302, 303, 304, and/or Tank 50 have been added and discussed in Section 3.2 (Additional Actions Taken) and Section 4.2 (Data Review). Phase I and II ESA activities which occurred outside these boundaries, requiring LUCs, are not applicable to this FYR for Sites 302, 303, 304, and Tank 50.
2.	NA	This report does not adequately address changes to the SMS rule or to surface water quality standards. Note that on the interview questionnaire Ecology's project manager also commented on these changes as new information that may call into question the protectiveness of the remedies.	Please see response to Comment #2 from Ecology.
3.	NA	Based on review of the draft Fourth Five-Year Review I concur with the protectiveness determinations for the site, if changes to the SMS rule and surface water quality standards, or any recent environmental data, do not call into question the determination.	Through this FYR process, it has been confirmed that the changes to the SMS rule, establishment of state surface water quality standards, and recent environmental data do not call into question the determinations; therefore, the determinations will remain protective for Sites 302, 303, 304, and Tank 50 and sitewide at MFD.
Additional Comments from Ms. Denice Taylor, Suquamish Tribe (dated February 3, 2020)			
4.	Pages 42-43/Section 5	The SMS criterion of 12 mg/kg OC for PCBs is only protective for benthic organisms. It is not protective of ecological risks via bioaccumulation/biomagnification through the food chain, nor is it protective of human health risks, particularly those associated with tribal exposure scenarios. This discussion needs to be revised to include an evaluation of the 2013 revisions to the SMS rule which included narrative provisions for evaluating ecological risks to higher level organisms and to human health. In general, given the high consumption rates of the Suquamish Tribe, sediment clean up levels for contaminants such as PCBs often default to natural background levels. Suggest considering this approach for PCBs in sediment.	The text in Section 5.5.1 (Changes in Cleanup Levels; Site 302; Sediment) has been updated to include an evaluation of the 2013 revisions to the SMS rule, specifically narrative provisions for evaluating ecological risks to higher trophic organisms and human health.
5.	Pages 43-44/Section 5	Please revise this discussion to reflect the human health water quality criteria currently in effect. In 2016 EPA promulgated	The text in Section 5.5.1 (Changes in Cleanup Levels; Site 302; Surface Water) has been updated specify the human health

Comment Number	Page/Section Numbers	Comment	Response
		CWA-effective human health criteria for surface water for Washington State, for consumption of organisms and water/organisms. The appropriate value for PCBs is 7 X 10^{-6} ug/l. (EPA is in the process of withdrawing these values, but the rule has not yet been finalized. I verified this information with Matt Szelag, EPA Region 10 water quality criteria coordinator on 1/27/2020. I have provided a link to the criteria for your reference: https://www.epa.gov/sites/production/files/2016-11/documents/cwa_effective_criteria_11_2_16_508c.pdf) There are no WQC that specifically incorporate a Suquamish ingestion rate of 615.4 g/day. The current WQC were established using an agreed to tribal consumption rate of 175 g/day. The tribes that participated in the drafting of the EPA rule agreed to this rate as a compromise to keep the process moving forward.	water quality criteria for PCBs currently in effect (i.e., 0.000007 µg/L). The Navy acknowledges/recognizes that there are no WQC that specifically incorporate a Suquamish ingestion rate of 615.4 g/day.
6.	Page 58/Section 5	The SMS rule revisions apply to sediment criteria, not surface water. Regardless of whether or not tribal members currently harvest, the tribe has treaty-reserved rights and expects to be able to exercise these rights throughout the U&A. The remedy must be protective of future uses, including tribal consumption of fish and shellfish from Little Clam Bay. At least some of the post-closure sediment samples are reported to exceed levels that would currently not be considered to be protective of human health and the environment. Please revise this section to include the relevant sediment criteria and include a recommendation for sediment sampling of the Little Clam Bay receiving environment.	The text regarding the SMS rule has been removed from Section 5.5.1 (Changes in Cleanup Levels; Site 302; Surface Water). The text in Sections 5.5.1 (Changes in Cleanup Levels; Site 302; Sediment) and 5.5.2 (Review of Exposure Assumptions; Site 302) has been updated to discuss relevant sediment cleanup criteria and Suquamish Tribe consumption of fish/shellfish from Little Clam Bay. The text in Sections 5.5.1 (Changes in Cleanup Levels; Site 302; Sediment) and 5.5.2 (Review of Exposure Assumptions; Site 302) has been updated to indicate that the sediment cleanup criteria will most likely default to natural/regional background levels or practical quantitation limits (PQLs), but must be appropriate cleanup criteria in accordance with the SMS rule. Table 6-2 has been updated to include a recommendation for sediment sampling along the western shoreline of Little Clam Bay.
7.	Pages 58-59/Section 5	How were potential ecological impacts related to PCB exposure evaluated in light of the SMS revisions regarding higher trophic level organisms?	Text in Section 5.5.2.1 (Review of Ecological Exposure Assumptions) has been updated to discuss how potential ecological impacts related to PCB exposure were evaluated in

Comment Number	Page/Section Numbers	Comment	Response
			light of the 2013 revisions to the SMS rule regarding higher trophic organisms.
8.	Table 6-2	Given the nature of PCBs, it is more likely to find evidence of offsite migration in sediment rather than surface water. However, the Tribe agrees that surface water should be resampled. Revise the recommendation for additional sampling and analysis to include sediment sampling along the shore of Little Clam Bay, considering historic sampling locations proximate to the discharge of the freshwater creek.	As stated previously, Table 6-2 has been updated to include a recommendation for sediment sampling along the western shoreline of Little Clam Bay.
9.	Tables 6-2 and 7-1	There is a disconnect between recommending additional sampling and conclusions that the findings of the future sampling will not affect the protectiveness determination. Please clarify these statements. Suggest wording that explains that, given current site conditions and land use, as well as the NFA issued by Ecology, it is assumed that the remedy remains protective. Future sampling is expected to confirm this determination.	The protectiveness statement for Site 302 has been updated to state: "The remedy at Site 302 remains protective of human health and the environment because PCB source soil has been removed or capped; off-site contamination from surface water run-off has been effectively diminished from pre-remedy conditions; land use remains industrial; and LUCs are maintained to prevent exposure. In addition, Ecology issued an NFA letter in 2000 stating "contaminants found during investigation of this property were either properly remediated or do not pose a risk to human health or the environment" which was based primarily on the current and future land use at the site (i.e., industrial). Additional sediment, surface water, seep/groundwater discharge sampling at Site 302 and/or along the western shoreline of Little Clam Bay are anticipated to confirm this protectiveness determination."
Comments from Dr. Mahbub Alam, Ecology (dated November 14, 2019)			
1.	NA	**RAOs for the Sites:** The draft Five-Year Review did not list the remedial action objectives (RAOs) for the sites listed in the FYR, especially the sites that have a ROD. Include the RAOs in section 2.	Site 302 is the only site with a Record of Decision (ROD) and the RAOs from the ROD (U.S. Navy, 1991) are listed in Table 2-1. There is no ROD for Site 303, Site 304, and/or Tank 50. However, comparable RAOs from the Site 303 and 304 NFA Letter (Ecology, 2001) have been added to Table 2-1. There are no comparable RAOs in the Tank 50 NFA Letter (Ecology, 1998).
2.	NA	**Data Assessment needs for Sites due to changes in SMS rule and water quality criteria**: The FYR did not discuss the new SMS rule or new Washington water quality standards (finalized 2016) and whether these changes affect protectiveness of relevant sites.	Due to changes to the SMS rule and establishment of state surface water quality standards, the answer to Question B (Are the exposure assumptions, cleanup levels, and RAOs used at the time of the remedy still valid?) has been updated to "no" for

Comment Number	Page/Section Numbers	Comment	Response
		It appears Site 302 monitoring performed about 20 years ago found PCBs in seeps, sediments surrounding the site. Many data may have been non-detect due to analytical limitations at that time while screening levels were below the practical quantitation limit. Table 5-2 shows the cleanup levels. As it can be seen, the human health screening level was not shown/considered for total PCBs. If not assessed earlier, this is a new exposure scenario and should be evaluated further. For site 303 and 304, screening criteria for PAHs have changed. Since the screening criteria for some pollutants (e.g., PCBs and PAHs) have changed and analytical methods have improved, it is necessary to verify protectiveness with new empirical data. In addition, it appears, Site 302 has been a dump ground for unknown waste/debris/soil. This debris was not characterized despite recommendation from last FYR. In addition to excess debris characterization, Ecology strongly recommends to monitor the exposure area (e.g., seeps, sediment) to verify protectiveness.	Site 302. To address this finding, a recommendation has been added to Table 6-2 calling for a data gap investigation to: 1) determine if additional surface water sampling along the western shoreline of Little Clam Bay is needed to establish concentrations/presence of PCBs; 2) if so, develop and conduct a monitoring program that would assess Site 302 as a potential residual source of PCBs impacting Little Clam Bay from surface water runoff; and 3) if these additional data verify the ARAR exceedances in surface water, re-evaluate impacts to human and ecological receptors (potentially including additional sampling) to assess protectiveness of the remedy. Despite this update, the remedy remains protective of human health and the environment based on a multiple lines of evidence approach: 1) PCB source soil has been removed or capped and seven years of post-remedy monitoring historically supports that off-site contamination from surface water run-off has been effectively diminished from pre-remedy conditions; 2) land use has not changed since the RODs (U.S. Navy, 1991 and 1992), nor is it expected to change; and 3) LUCs are maintained to prevent and control exposure to PCBs at Site 302.
3.	NA	**Implementation of Land Use Control Inspection recommendations**: It appears that the recommendations from the land use control inspection are not followed through. For example, there is no LUC signage along the boundary of Site 302 except for "restricted area/Keep out" sign. This is not a signage specific to a contaminated site and may be found at common base boundary at other areas. It is necessary to implement a proper signage that is specific to site contamination. Similarly, Stockpile near Tank 24 and 29 should be characterized and disposed of properly. No stockpile should be placed on the NFA sites without regulatory approvals since these sites were given no further action with land use control restrictions. These are not unrestricted land use sites.	As noted, some recommendations identified in the LUC Technical Reports have not been completed by the U.S. Navy. These recommendations have been elevated to the fourth FYR Report, as listed in Table 6-2 (Findings and Recommendations Not Affecting Protectiveness) with the Responsibly Party (U.S. Navy), Oversight Party (Ecology), and Milestone Date for completion. The U.S. Navy intends to use these findings and subsequent recommendations listed in Table 6-2 as a scheduling tools for further actions to be conducted at MFD. As stated in the fourth FYR Report, these findings and recommendations do not impact protectiveness of the remedy (i.e., LUCs) or threaten human health and/or the environment. The findings are consistent with industrial land use.
4.	NA	**Land Use Control Technical Report:** Ecology was provided	As stated in the *LUC Plan* (U.S. Navy, 2016), the

Comment Number	Page/Section Numbers	Comment	Response
		with a final copy of the LUC inspection report. There were no opportunities for review and comment. Ecology asks that the Navy provide a draft of the document for Agency review and comment.	role/responsibility of Ecology is: 1) to provide regulatory review of the LUC requirements detailed in the NFA letters at each five-year review; 2) to provide review of this Plan; and 3) to receive completed LUC checklists for each site on an annual basis. However, per Ecology request, the U.S. Navy will provide stakeholders/regulatory agencies the opportunity to review and comment on the Draft LUC Inspection Technical Memorandum. This deviation from the *LUC Plan* (U.S. Navy, 2016) will be documented via a Field Change Request (FCR) Form, to be developed prior to each annual LUC inspection.
5.	NA	**MILCON Project**: The Navy is involved in a MILCON project to decommission some underground storage tanks to replace with above ground tanks. The project area includes some of these sites. This FYR did not discuss the project or any environmental investigation and data collection. Ecology was provided with a final copy of the Phase II Environmental Assessment report for the project. There were no opportunities for review and comment. Ecology asks that whenever the Navy produces any environmental documents involving these sites, Ecology cleanup project manager should be consulted for any review and comment.	Based on Suquamish Tribe and Ecology comment, Phase I and II Environmental Site Assessment (ESA) activities only which overlap with the boundaries of Sites 302, 303, 304, and/or Tank 50 have been added and discussed in Section 3.2 (Additional Actions Taken) and Section 4.2 (Data Review). Phase I and II ESA activities which occurred outside these boundaries, requiring LUCs, are not applicable to this FYR for Sites 302, 303, 304, and Tank 50.
6.	NA	**PFAS Investigations:** Ecology would like to be informed and involved in any PFAS related environmental investigations.	The U.S. Navy is in the process of completing a Preliminary Assessment (PA; and will begin a Site Inspection) for per- and polyfluoroalkyl substances (PFAS). The U.S. Navy plans to submit the Draft Final MFD PFAS PA Report to all stakeholders and then conduct an in-person meeting/presentation to discuss the findings and receive/address comments.
Additional Comments from Dr. Mahbub Alam, Ecology (dated January 15, 2020)			
7.	Recommendation	Conduct a data gap investigation to: 1) determine if additional surface water sampling along the western shoreline of Little Clam Bay is needed to establish concentrations/presence of PCBs; 2) if so, develop and conduct a monitoring program that would assess Site 302 as a potential residual source of PCBs impacting Little Clam Bay from surface water runoff <u>and seep/groundwater discharge</u>; and 3) if these additional data verify the ARAR exceedances in surface water, re-evaluate impacts to human and ecological receptors (potentially including additional sampling) to	The recommendation in Table 6-2 has been updated with 'and seep/groundwater discharge' and 'Washington State and', as underlined in the comment.

Comment Number	Page/Section Numbers	Comment	Response
		assess protectiveness of the remedy. Conduct additional sampling ensuring the use of analytical methods able to achieve proper PQL and assess data by comparing to current State and ambient water quality criteria.	
8.	Page 44, second paragraph/Table 5-2	Add the following criteria for total PCBs in the Table and revise the text accordingly. These are ARARs for the site. See attached CLARC master Table (updated 2019). Click "SW Method B & ARARs" spreadsheet for details Surface Water Human Health 40 CFR 131.45 (marine and freshwater): 7.00E-06 ug/L Surface Water Human Health CWA §304 (marine and freshwater): 6.40E-05 ug/L There is no water quality criterion that equates to the Suquamish Tribe's consumption rate of 615.4 g/day. However, we can back-calculate using MTCA Method B cancer formula [Equation 730-2, WAC 173-340-730(3)(b)(iii)(B)]. CUL (ug/L) = (Risk*ABW*AT*UCF1*UCF2)/(CPF*BCF*FCR*FDF*ED) With FCR 615.4 g/day, the CUL will be = 9.00E-06 ug/L (using default MTCA parameters except FCR). If you use CWA formula, the criteria could be further lower as CWA uses RSC (relative source contribution) with a default value of 0.2. Anyway the details can be worked out later with Tribe's input on RME. Note these numbers can only be evaluated using PCB congener analysis with Method 1668.	Table 5-2 and text in Section 5.5.1 (Changes in Cleanup Levels; Site 302; Surface Water) have been updated with the Surface Water Human Health 40 CFR 131.45 and Surface Water Human Health CWA §304 criteria for total PCBs. The Navy acknowledges and appreciates the information provided regarding calculations to determine a water quality criterion that equates to the Suquamish Tribe's consumption rate of 615.4 g/day.