

NAVAL FACILITIES ENGINEERING COMMAND NORTHWEST
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**Addendum to Third Five-Year Review Report
Jackson Park Housing Complex/Naval Hospital Bremerton
Third Five-Year Review Report Dated August 3, 2015**

A Five-Year Review (FYR) addendum is generally completed for remedies where the protectiveness determination is deferred until further information is obtained. When deferring protectiveness in the FYR report, the Navy, as lead agency, typically provides a timeframe for when the information will be obtained, and a protectiveness statement can be made. This addendum documents progress since the Third FYR for Jackson Park Housing Complex/Naval Hospital Bremerton (JPHC/NHB) and protectiveness determinations for the remedies where the statement was deferred in the Third FYR.

The Third FYR report (Report) for JPHC/NHB in Bremerton, Washington, was signed by Captain T.A. Zwolfer, Commanding Officer, Naval Base Kitsap, on September 11, 2015. The protectiveness statement(s) at that time are reiterated below. This addendum addresses the Protectiveness Statement(s) for Operable Unit (OU) 1, as they were written in the Third Five-Year Review Report.

Operable Unit 1 Protectiveness Statement:

A protectiveness determination for the remedy at OU 1 cannot be made at this time until further information is obtained through the following actions:

1. Performing mercury sampling at seeps/outfalls at Site 101-A
2. Investigating the extent of shallow soil exceeding Record of Decision (ROD) U.S. Navy et al., 2000) cleanup levels and evaluating whether contamination in shallow soil identified during the focused Phase II Site Inspection (SI) could pose unacceptable risks to human health
3. Performing indoor air, subslab vapor, and crawlspace sampling at the Naval Exchange (NEX) Gas Station Leak Area and comparing results to screening levels to evaluate whether there are unacceptable vapor intrusion risks to human health

It is expected that these actions together with the FYR addendum will take until approximately March 2017 to complete.

Operable Unit 3T JPHC Protectiveness Statement:

The remedy at OU 3T JPHC is expected to be protective of human health and the environment upon completion. The substantive elements of the remedy (land use control [LUC] implementation and anomaly removal) have been completed. LUC Management Plans were developed for OU 3T JPHC (U.S. Navy 2013) and OU 3T NHB (U.S. Navy,

2015), which constituted the remedial designs for the LUC component of the remedies. Once the Remedial Action Completion Report (RACR) for the Intertidal Zone is complete, the remedy is expected to be protective of human health and the environment.

Operable Unit 3T NHB Protectiveness Statement:

The remedy at OU 3T NHB is expected to be protective of human health and the environment upon completion. Remedy implementation consists of formalizing existing LUCs in a LUC Management Plan. The existing LUCs currently address site risks.

Progress at OU 1 Since the Third Five-Year Review Completion Date

This section summarizes the issues leading to the deferral of a protectiveness determination in the third FYR report, explains why a protectiveness determination was not made at the time of the third FYR, and summarizes the investigation performed to resolve the issues identified.

Issues Leading to Deferral of a Protectiveness Determination:

In 2014, the Navy and Forest City Residential Management (Forest City) entered into a public-private venture agreement. Under the public-private venture agreement, the Navy and Forest City entered into a ground lease. Although Naval Base Kitsap (NBK) retained ownership of the land, ownership of the majority of the structures was transferred to Forest City. The Forest City management company is now named Hunt Military Communities Northwest and manages and operates JPHC. In 2013, prior to execution of the ground lease, Forest City contracted Landau Associates to conduct a Phase I Environmental Site Assessment (ESA) and a focused Phase II SI for approximately 200 acres of property at JPHC in advance of the public-private venture agreement between Forest City and the Navy (Landau Associates 2013, 2014). The Phase I ESA identified the known and potential areas of contamination that would require further investigation at the site. The focused Phase II SI further evaluated the potential areas of contamination and documented environmental conditions at the site. The first two issues discussed below were outcomes of this investigation.

The third issue discussed below was an outcome of the Focused Feasibility Study (FFS) investigations supporting the 2013 ROD amendment for the NEX Gas Station Leak Area (U.S. Navy et al., 2013).

Issue 1 Regarding Mercury Sampling at Seeps and Outfalls. During the Phase II SI, mercury was detected in seep water to the west of Root Court along the shoreline at concentrations greater than both the focused Phase II SI screening criteria and the OU 1 ROD cleanup level. At the time of the third FYR the Navy was not sampling seeps/outfalls OF-716 and SP-715 for metals, including mercury. The Navy had discontinued monitoring in 2012 per the recommendation of the second FYR. The reporting limits for mercury have frequently been greater than the current ROD cleanup level (0.1 µg/L) and fairly consistently above the original ROD cleanup level (0.025 µg/L). (Note that mercury's cleanup level was adjusted from the ROD level of 0.025 to 0.1 µg/L based on the practical quantitation limit [PQL].) The second FYR recommended

that the cleanup level for mercury, which was based on the PQL of 0.1 µg/L, be lowered to the original ROD cleanup level of 0.025 µg/L, because lower mercury PQLs could be achieved by laboratories and mercury concentrations were likely below the original ROD cleanup level of 0.025 µg/L. However, these focused Phase II SI data indicate that mercury in these two outfalls may be above the ROD cleanup level. The third FYR recommended that monitoring for mercury be restarted at the two seeps/outfalls of Site 101-A, and an analytical method capable of achieving the ROD cleanup level should be used.

Although not specifically called out in the OU 1 protectiveness statement deferral, the third FYR also recommended assessing the presence or absence of cyanide in seeps and outfalls at Site 101-A. The Landau SI detected cyanide concentrations in groundwater at Site 101-A at concentrations exceeding the OU 1 ROD cleanup level. Although cyanide is an analyte in seep water under the long-term monitoring (LTM) program, the laboratory reporting limit being used was higher than the OU 1 ROD cleanup level. The third FYR concluded that the absence of cyanide at concentrations above the cleanup level at seeps downgradient of Site 101-A could not be verified based on the available data. The third FYR recommended monitoring using the best available laboratory technology to achieve a lower reporting limit.

Issue 2 Regarding Shallow Soil Contamination. During the Phase II SI, 13 soil borings were sampled in the area northeast of Rankin Road to depths of between 4.5 and 10 feet below ground surface (bgs). One shallow soil sample (2 to 3 feet bgs) from a boring in the southern portion of the Rankin Road area exceeded the ROD cleanup level for carcinogenic polycyclic aromatic hydrocarbons (cPAHs). Landau concluded that cPAH contamination extends farther to the south than what had been previously documented, and that the contamination was not fully delineated during its investigation. Therefore, further investigation of this area should be performed to determine the potential extent of cPAH contamination. Because the cPAH contamination was identified in shallow soil, there is a potential direct exposure pathway to human or ecological receptors, although digging is currently not allowed at JPHC. Currently, LUCs in place at JPHC require digging permits be obtained for all excavation activities per the Land Use Control Plan (U.S. Navy, 2005). However, the area where cPAH contamination exceeds the ROD cleanup level is not specifically identified as an area where LUCs are applicable in the LUC Management Plan. Because of this, excavation could occur in this area without the proper controls, and the remedy may not be protective of human health and the environment in the future.

Six bunkers formerly used for munitions storage were historically located at Site 110 (designated bunkers 98, 99, 100, 101, 103, and 104). Concentrations of cPAHs, 4-nitrotoluene, and/or arsenic in shallow soil samples (less than 3 feet bgs) from 10 borings adjacent to Bunkers 98, 99, 100, and 101 and the former locations of Bunkers 103 and 104 either exceeded the ROD cleanup level (arsenic), the State of Washington Model Toxics Control Act (MTCA) Method B cleanup level (cPAHs) or represented a potentially new contaminant of interest (4-nitrotoluene). No cleanup level was established for 4-nitrotoluene in the OU 1 ROD, however the Navy was concerned that

detection of a munitions constituent (MC) could imply a previously unidentified issue. Based on the locations of the soil cleanup level exceedances, the extent of contamination was not fully delineated during the Phase II SI. Because cPAH and arsenic contamination was identified in shallow soil, there is a potential direct exposure pathway to human or ecological receptors, although digging is currently not allowed at JPHC. Therefore, the third FYR recommended further investigation and analysis to determine the extent of exceedances and whether the exceedances could represent a potential human health or ecological risk.

Issue 3 Regarding Vapor Intrusion Risks. In 2013, an amended remedy was selected for the NEX Gas Station Leak Area, located within Site 110, which utilizes more aggressive treatment technologies with significantly higher cost than the original selected remedy. Although data collected in the FFS supporting the ROD amendment were sufficient for evaluation and selection of a remedy, additional data were needed to refine the vertical and lateral dimensions of the treatment zones beneath the source area and the nearshore area, and to assess potential vapor intrusion risk in the NEX convenience store, Building 30, and residential homes located upgradient and cross gradient of the source area.

Investigation Performed to Resolve the Issues:

The first two issues described above were addressed through a 2018 investigation documented in detail in Attachment A. The third issue was addressed during indoor air and sub-slab vapor investigations at Building 30 and the NEX convenience store in May 2015 and April 2016 as part of data collection in advance of remedial action under the 2013 ROD amendment for OU 1 as summarized below and detailed in the ROD Amendment (U.S. Navy et al., 2013).

Investigation Regarding Issue 1 – Mercury Sampling at Seeps and Outfalls.

Regarding mercury and cyanide in seep and outfall water, the investigation concluded that mercury and cyanide are present in seep/outfall water at concentrations that call into question the protectiveness of the remedy. At two of the nine seeps and outfalls sampled, either cyanide (seep SP-715) or mercury (SP-713) slightly exceeded the ROD cleanup level (cyanide at 1.4 µg/L [estimated] compared to the cleanup level of 1.0 µg/L; mercury at 0.0282 µg/L compared to the cleanup level of 0.025 µg/L). The ROD cleanup levels for cyanide and mercury are based on protection of aquatic life. These exceedances were both in seep water, not stormwater from outfalls, implying a primary transport pathway of groundwater to surface water rather than stormwater.

Cleanup levels for cyanide and mercury in surface water (e.g., seep/outfall as well) are based on protection of aquatic life and because of the exceedance of the ARAR protective of aquatic life, the remedy may not be protective. Determination of protectiveness should be based on more than one sampling event, and therefore the protectiveness of the remedy with regard to seep water remains deferred pending the following actions:

- A minimum of two additional monitoring events to establish mean cyanide and mercury concentrations in seep/outfall water, establish contaminant trends, and assess spatial patterns.
- Addition of cyanide and mercury sampling to all LTM seep/outfall locations as part of periodic monitoring, with reporting limits equivalent to those used in the investigation supporting this five-year review addendum.
- Assessment of the former Demolition Debris Landfill as a potential residual source of cyanide and mercury to groundwater and surface water.
- If these additional data verify the ARAR exceedances in seep water, perform human health and ecological risk assessments (potentially including the collection of additional data) to assess the protectiveness of the remedy.

For protection of human health, Washington State's surface water criteria for mercury are contained in 40 C.F.R. 131.36. For marine waters, the human health criterion is 140 ng/L for consumption of water and organisms and 150 µg/L for consumption of organisms only. Mercury concentrations detected in all surface water samples during 2018 are at least an order of magnitude less than the human health criteria; therefore, exposure to mercury in surface water through the ingestion of that surface water and consumption of fish obtained from that surface water is not expected to be associated with adverse health effects.

For protection of human health, Washington State's surface water quality criteria for cyanide is 19 µg/L for consumption of water and organisms and 270 µg/L for consumption of organisms only (WAC 173-201A-240). These values are risk-based, using standard exposure assumptions and a target HQ of 1 (WAC 173-340). Cyanide concentrations detected in all three surface water samples during 2018 are at least an order of magnitude less than these human health criteria; therefore, exposure to cyanide in surface water through the ingestion of that surface water and consumption of fish obtained from that surface water is not expected to be associated with adverse health effects.

Investigation Regarding Issue 2 – Shallow Soil Contamination

Regarding shallow soil contamination, the investigation concluded cPAHs and/or MCs are not present in shallow soil in the vicinity of Former Bunkers 98, 100, 103, and 104 at concentrations that call into question the protectiveness of the remedy. However, cPAH concentrations in soil at Former Bunker 101 and the Rankin Road/South Shore Road intersection vicinity were found to call into question the protectiveness of the remedy as was arsenic concentrations in surface soil at Bunker 99. Concentrations of cPAH and arsenic exceeding MTCA Method B Soil Cleanup Levels or the background concentration were not greater than USEPA Regional Removal Management Levels (RMLs). Concentrations greater than RMLs indicate a potential imminent threat to human health and support time critical removal actions.

MCs were not detected above the laboratory's limit of detection (LOD) in any of the soil samples collected in the vicinity of Former Bunkers 100, 103, or 104, and the LOD for

each of the MCs analyzed was sufficiently low to conclude that if MCs are present in soil below the LOD (and therefore not detectable by the laboratory), exposure to humans would not be associated with adverse health effects. The cPAH concentrations measured in soil samples from the vicinity of Bunker 98 did not exceed the ROD cleanup level. The arsenic concentrations measured in soil samples from the vicinity of Bunker 98 did not exceed the background arsenic concentration established in the ROD. The arsenic concentration in surface soil at DU 1, Former Bunker 99, exceeded the background arsenic concentration established in the ROD, while all other samples were below the background arsenic concentration.

One cPAH result, in surface soil at DU 2, Bunker 101, exceeded the MTCA Method B Soil Cleanup Level. The arsenic concentration in this same sample exceeded the background arsenic concentration established in the ROD. Both these cPAH and arsenic concentrations were less than their respective RMLs. Concentrations of cPAHs and arsenic in the remaining samples collected from Bunker 101 were less than the MTCA Method B Soil Cleanup Level or site background concentration, respectively.

cPAH concentrations from four samples representative of four different decision units (DUs) in the vicinity of Rankin Road/South Shore Road exceeded the ROD cleanup level. None of these cPAH concentrations were greater than the cPAH RML.

The OU 1 ROD did allow for exceedance of the MTCA Method B Soil Cleanup Level applicable or relevant and appropriate (ARAR) for cPAHs in some areas at Site 110 (though not Bunker 101 or the Rankin Road area in particular):

At the time of the removal actions at Site 110, MTCA Method A soil cleanup levels were used as the remedial goals. The MTCA Method A cleanup levels are slightly higher than the MTCA Method B soil cleanup levels. Thus, limited areas of soil in the vicinity of the removal actions at Site 110 still contain chemicals above the MTCA Method B soil cleanup levels. No further action is needed to address these residual concentrations.

There is no imminent threat to human health, and immediate action is not needed to address the ARAR exceedance in surface soil at Bunker 99, Bunker 101, or the Rankin Road area because cPAH and arsenic best value concentrations are less than USEPA RMLs.

Therefore, the remedy is considered protective in the short term, but not protective in the long term for DU 2 at Bunker 101 and DUs 3, 4, 5, and 6 at Rankin Road/South Shore Road area because of the exceedance of the MTCA ARAR for cPAHs in surface soil. The remedy is also considered not protective in the long term for DU 1 at Bunker 99 because of the exceedance of the arsenic background in surface soil. The remedy remains protective of the other DUs in these three areas.

For the remedy to be protective in the long term at Bunker 101, the LUC boundary protective of chemical exposures should be expanded to encompass all of DU 2.

In the OU 1 ROD “analytical results for chemicals in soil samples from the upper 2 feet of the soil were used for current human exposures,” (U.S. Navy et al., 2000, page 7-2). The ROD typically refers to this depth range as "surface soil." Alternatives to address soil in this depth range found to be not protective of chronic exposure should be assessed and selected through the removal action process. Further sampling of soil in DUs 4 and 6 may be necessary to better define areas of cPAH exceedance and focus any future removal action deemed necessary.

Investigation Regarding Issue 3 - Vapor Intrusion Risks

The Navy performed indoor air and sub-slab vapor investigations at Building 30 and the NEX convenience store in May 2015 and April 2016 as part of data collection in advance of remedial action under the 2013 ROD amendment for OU 1. The results of these investigations are not yet published, because they are part of extensive, on-going investigation work. However, the data showed that indoor air concentrations of petroleum-related compounds were generally higher than sub-slab vapor concentrations. This finding is consistent with the building use as a fuel station (the NEX convenience store) and a landscaping support facility (Building 30, in which fuel cans and small engine landscaping equipment is stored, fueled, and maintained). The Phase II SI included indoor air sampling from five housing units in the vicinity of NEX Gas Station Leak Area. This investigation did detect some petroleum-related compounds in indoor air, but concluded,

However, based on comparison of the results of these constituents to background ambient and indoor air values indicated in EPA and Agency for Toxic Substances and Disease Registry (ATSDR) literature, the concentrations identified in indoor air at the Site are well within or below concentrations that would be anticipated to be found in indoor air in an urban environment. Therefore, it does not appear that vapor intrusion of VOCs from the subsurface to indoor air is a significant concern at the Site. Based on the data and evaluation presented herein, we would recommend no further action with respect to investigation or mitigation related to vapor intrusion at the Site.

Since the Navy’s VI sampling at Building 30 and the NEX convenience store, and since the Landau indoor air sampling in residences, the Navy has removed more than 80,000 pounds (lbs) of petroleum from the subsurface in the NEX Gas Station Leak Area. The vapor intrusion investigation was therefore performed during worst-case conditions for petroleum contamination. In addition to these results, EPA’s 2015 petroleum vapor intrusion guidance recommends performing a vapor intrusion investigation at sites where petroleum nonaqueous phase liquid (NAPL) is present within 15 vertical feet of

structures. NAPL at the NEX Gas Station Leak Area is found at depths greater than 15 feet.

Based on the results of the investigations by the Navy and Landau, and based on the recommendations of EPA’s guidance for vapor intrusion at petroleum sites, the remedy is protective with regard to vapor intrusion, and no future vapor intrusion investigation is warranted.

Issues and Recommendations

This section provides revisions to recommendations 1, 2, 3, 5, 7, and 10 from the third FYR. These revised recommendations supersede and replace the recommendations from the third FYR. The responsible party for taking action is the U.S. Navy. The oversight agency is EPA.

<u>Issues</u>	<u>Recommendations/Follow-up Actions</u>	<u>Milestone Date</u>	<u>Affects Current Protectiveness (Y/N)</u>	<u>Affects Future Protectiveness (Y/N)</u>
Mercury and cyanide are present in seep/outfall water at concentrations that call into question the long-term protectiveness of the remedy.	<ol style="list-style-type: none"> 1. Perform a minimum of two additional monitoring events to establish mean cyanide and mercury concentrations in seep/outfall water, establish contaminant trends, and assess spatial patterns 2. Add cyanide and mercury sampling to all LTM seep/outfall locations as part of periodic monitoring, with reporting limits low enough to assess concentrations against the ROD cleanup levels 3. Assess the former Demolition Debris Landfill as a potential residual source of cyanide and mercury to groundwater and surface water 4. If these additional data verify the ARAR exceedances in seep water, perform human health and ecological risk assessments (potentially including the collection of additional data) to assess the protectiveness of the remedy 	12/31/2020	N	Y
cPAH concentrations in soil at Former Bunker 101 and the Rankin Road/South Shore Road intersection vicinity call into question the long-term protectiveness of the remedy.	<ol style="list-style-type: none"> 1. Expand the LUC boundary protective of chemical exposures at Bunker 101 to encompass all of DU 2. 2. Assess, select, and implement removal action(s) to address shallow soil contamination in the Rankin Road area. 	12/31/2020	N	Y
Arsenic concentrations in surface soil at Bunker 99 call into question the long-term protectiveness of the remedy.	<ol style="list-style-type: none"> 1. Establish LUCs protective of arsenic exposure at Bunker 99 equivalent to LUCs at Bunkers 100 and 101. 	12/31/2020	N	Y

Protectiveness Statements

Based on new information and/or actions taken since the FYR completion date, the protectiveness statement(s) for OU 1 is revised as follows:

The remedy for OU 1 is protective in the short term. To restore long term protectiveness, action must be taken to establish the temporal trends and spatial distribution of cyanide and mercury discharges to Ostrich Bay, to assess the Former Demolition Debris Landfill as a potential source of cyanide and mercury in groundwater leading to these discharges, and to perform human health and ecological risk assessments based on these data, if warranted. Action must also be taken to address shallow soil contamination that exceeds the OU 1 ROD cleanup level for cPAHs and arsenic.

Next Five-Year Review

The next FYR will be completed on September 11, 2020, five years after the signature of the last FYR report.



Date 12 Feb 20

R. G. Rhinehart
Captain, U.S. Navy
Commanding Officer, Naval Base Kitsap

References:

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U.S. Navy, Washington State Department of Ecology, and U.S. Environmental Protection Agency. 2000. *Final Record of Decision, Jackson Park Housing Complex/Naval Hospital Bremerton Operable Unit 1*. August.

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Attachments:

- A. 2018 Investigation Report, Five-Year Review Addendum, Jackson Park Housing Complex.