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Letter of Transmittal

To: EFA NW
19917 - 7th NE
Poulsbo, Washington

Date: February 9, 1998

Job No.: 4654-14

Attn: Ellen Brown

Re: ESD No. 2 for Site A

We are sending the following items:

Date	Copies	Description
2/9/98	18	Explanation of Significant Differences (ESD) No. 2 for Soil and Groundwater Remediation Changes, Site A

These are transmitted:

☐ For your information ☐ For action specified below ☐ For review and comment ☒ For your use ☐ As requested

Remarks

Ellen,

This represents our final submittal of ESD No. 2 for Site A. EPA comments which were faxed to Craig Thompson on September 26, 1997, have been incorporated.

By: David A. Heffner
David A. Heffner, P.E.

Copies to:

Title: Associate

EXPLANATION OF SIGNIFICANT DIFFERENCES (ESD) NO. 2 FOR SOIL AND GROUNDWATER REMEDIATION CHANGES SITE A SUBASE, BANGOR SILVERDALE, WASHINGTON

Introduction

Bangor Ordnance Disposal Site A at the Naval Submarine Base, Bangor (SUBASE, Bangor) is located at the north end of SUBASE, Bangor. SUBASE, Bangor is located in Kitsap County, Washington, on Hood Canal approximately 10 miles north of Bremerton. The lead agency for this National Priorities List (NPL) site is the U.S. Navy. The U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) have provided support and oversight on the preliminary studies, site investigations, remedial action alternative selection, remedial design, and remedial action. Ecology is currently the lead regulatory agency providing support and oversight for Site A.

This Explanation of Significant Differences (ESD) is prepared in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Section 300.435(c)(2)(i) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). It addresses the following changes to Site A soil and groundwater remediation requirements as described in the Site A Record of Decision (ROD):

- Bioremediation (composting) technology was used to complete remediation of leach basin soils; and

- Granular activated carbon (GAC) technology is being used for groundwater treatment rather than ultraviolet/oxidation (UV/Ox) technology.

Based on confirmation sampling conducted in April 1997 (28 months after startup of the passive leaching system), approximately 1,000 cubic yards of soils in the leach basin still contained ordnance concentrations above cleanup criteria for direct contact protection. These soils (7 to 8 percent of the total basin soil volume) were excavated and treated on-Base using composting technology to achieve direct contact cleanup criteria. Composting was selected because it was a faster and potentially more cost-effective remedial alternative than continuing to operate the leaching system until all basin soils achieved direct contact cleanup levels.

GAC technology has been used for more than two years to treat basin leachate, consistently achieving groundwater cleanup levels. The existing GAC treatment system is also capable of treating Site A groundwater to below cleanup levels, and has more than enough spare capacity to handle the additional flow from the groundwater extraction system. Therefore, costs for UV/Ox treatment system design and construction (estimated at $300,000) are saved by using the existing GAC treatment system for groundwater as well as leachate treatment.

Public notice of this ESD will be published in the ***Sun***, a major local newspaper. The ESD will be available for review in the information repositories located at the following Kitsap regional libraries:

Central Kitsap Library (206) 377-7601
1301 Sylvan Way
Bremerton, Washington 98310

Bangor Branch (206) 779-9724
Naval Submarine Base, Bangor
Silverdale, Washington 98315-5000

The ESD will also become part of the Administrative Record File in accordance with NCP 300.825(a)(2). The Administrative Record for Site A is available between the hours of 0800 and 1600 at:

Engineering Field Activity, Northwest
Naval Facilities Engineering Command
19917 - 7th Avenue NE
Poulsbo, WA 98370-7570
(206) 396-5984

Summary of Site History, Contamination Problems, and Selected Remedy

Prior to implementation of the remedial action, Site A consisted of a Burn Area, two Debris Areas, and a Stormwater Discharge Area. The Burn Area, which included 24 burn mounds, an incinerator, and support facilities, was used to detonate and incinerate various ordnance materials, including trinitrotoluene (TNT), flares, fuses, primers, smoke pots, smokeless powder, and black powder. The majority of these activities occurred between 1962 and 1975, followed by more limited disposal and testing through 1986. Inert solid waste materials (e.g., metal casings) from the Burn Area operations were deposited at the two adjacent Debris Areas. The Stormwater Discharge Area received surface water runoff from the Burn Area after a diversion structure was completed in 1983. As

a result of these activities, soil, surface water, and groundwater within various areas of Site A have received different types and quantities of releases of ordnance compounds, ordnance breakdown products, and metals.

In 1978, evaluation of SUBASE, Bangor waste disposal sites (including Site A) began under the Navy Assessment and Control of Installation Pollutants (NACIP) program. Work at Site A continued in 1981 as part of an Initial Assessment Study (IAS) and in 1986 as part of a Characterization Study, both under the NACIP program. With the enactment of the Superfund Amendments and Reauthorization Act (SARA) in 1986, the Navy suspended further NACIP program activities and phased into the EPA Remedial Investigation/Feasibility Study (RI/FS) program. In July 1987, EPA included Site A on the NPL of hazardous waste sites.

The Site A ROD was signed on December 10, 1991. The selected remedy contained in the ROD has two parts, which address contaminated soil and groundwater, respectively. The selected soil remedy consists of the following:

- Excavate approximately 7,000 cubic yards of ordnance-contaminated surface soil from the Burn Area and approximately 100 cubic yards of ordnance- and/or lead-contaminated surface soil from Debris Area 2;

- Modify excavated soils as necessary to enhance leaching, and place modified soils in a lined leach basin constructed in the Burn Area. Place lead-contaminated soil (from Debris Area 2) in a segregated cell within the leach basin;

- Leach ordnance contaminants from the excavated soils in the basin using a passive soil leaching system, and treat the circulating leachate with UV/Ox technologies until ordnance cleanup levels are achieved for direct contact protection in soil and groundwater protection in the leachate; and

- Remove lead-contaminated Debris Area 2 soils from the leach basin and dispose of them at an off-site landfill.

The selected groundwater remedy specified in the ROD consists of extracting groundwater from the Shallow Aquifer, treating it using UV/Ox technologies, and disposing of the treated water on base by reintroduction to the Shallow Aquifer.

A previous ESD for soil and groundwater remediation changes at Site A was approved by EPA and Ecology in July 1994. It documented the following changes to the selected remedies contained in the ROD:

- Contaminated soil was amended with clean sand prior to placement in the leach basin, and calcium chloride was added to the circulating leachate to enhance leaching of ordnance compounds from the soil;

- GAC technology replaced UV/Ox technology for soil leachate treatment;

- Surface soils in Debris Area 2 containing lead concentrations which exceed the cleanup standard were left in place to minimize potential impacts to human health and the environment associated with soil removal; and

- A leachate management plan will be developed and implemented to assure that leachate releases from the closed leach basin will be protective of groundwater and surface water quality.

The ESD also stated that groundwater treatment would commence no later than July 1, 1996. However, extension of this deadline was later requested by the Navy, and approved by Ecology.

Description of the Significant Differences and the Basis for those Differences

Use Bioremediation (Composting) Technology to Complete Remediation of Leach Basin Soils

When Burn Area soils were sampled for ordnance constituents prior to excavation in Spring 1993, it was observed that TNT concentrations were approximately an order of magnitude higher in the burn mounds compared to the surrounding surface soils. In addition, these soils contained "chunks" of ordnance burn residue which may not be as conducive to passive soil leaching for ordnance removal. Therefore, burn mound soils were stockpiled separately and placed in a segregated cell (also known as the "hot zone") in the southwestern corner of the leach basin. The passive soil leaching system began operation in December 1994, and soil sampling and analysis were conducted periodically to monitor system performance.

Analytical results for soil samples in the main basin (i.e., excluding the hot zone) indicated that ordnance concentrations were approaching direct contact cleanup criteria in Summer 1996. Cleanup of main basin soils was ultimately demonstrated by the Spring 1997 confirmation sampling event, with the

exception of three localized "hot spots" where TNT concentrations in soils still exceeded the direct contact cleanup criteria.

Substantial ordnance removal was also observed in the hot zone soils, although TNT results were highly variable in the hot zone. Six sampling and analysis events performed during March through December 1996 indicated between 75 and 95 percent removal of TNT. However, several additional years of passive leaching were predicted to be required to achieve the TNT cleanup criteria in the hot zone soils.

Ordnance-contaminated soils from two other SUBASE, Bangor sites (Sites D and F) have been successfully treated using composting technology. Treatment of these soils at an on-Base composting facility began in Spring 1996, and was scheduled for completion in Spring 1997. No permits were required to build and operate the composting facility. Therefore, to accelerate the cleanup of leach basin soils, the Navy decided early in 1997 to excavate soils from the hot zone and the three hot spots in the main basin, and compost the excavated soil at the existing on-Base facility.

Approximately 1,000 cubic yards of soil were excavated from the leach basin, with about 30 cubic yards coming from the main basin hot spots, and the remainder from the hot zone. (This represents 7 to 8 percent of the total basin soil volume.) Procedures and protocols similar to those used to treat soils from Sites D and F were used to compost the excavated soil. The soil was mixed with composting amendments (e.g., potato waste, cow manure, wood chips, and alfalfa), and formed into windrows inside the covered on-Base composting facility. The windrows were tilled periodically, and windrow pH and moisture content were maintained in the optimum range. Laboratory analysis were used to verify that direct contact cleanup criteria have been achieved in the composted soil.

Composting of Site A soils has been completed, and the treated soils have been returned to Site A and placed adjacent to the south end of the basin. The leaching system is still operating to treat the basin leachate. The leachate will be treated until it reaches surface water cleanup criteria in accordance with the Leach Basin Closure Plan for Site A, dated August 21, 1997.

Composting the hot zone soils cost approximately $700,000. Operating the leach basin in its current configuration costs an estimated $120,000 per year. Because the hot zone soils contained chunks of ordnance burn residue which are more resistant to leaching, it was not certain whether the hot zone would meet direct contact cleanup levels within 6 years (6 years of leach basin

operation costs about the same as composting). Since the composting facility was to be closed in 1997, there was a unique opportunity to use an existing facility to quickly remediate soils for which the prospect of cleanup through leaching was uncertain.

Treat Extracted Groundwater Using GAC Instead of UV/Ox Technology

The ROD stipulates that, pending successful completion of water treatability studies, UV/Ox technology will be used to treat extracted groundwater to achieve groundwater cleanup levels. UV/Ox technology was also specified in the ROD for treatment of basin leachate. However, the previous ESD prepared for Site A (approved July 1994) changed the leachate treatment technology to GAC. This change resulted from new information which showed that GAC was equally implementable, equally effective, and substantially less expensive than UV/Ox treatment.

A 300 gpm GAC treatment plant was constructed, and has been in operation since December 1994. A second, nearly identical GAC plant was constructed at Site F (about 4 miles south of Site A) to treat ordnance-contaminated groundwater, and has operated since November 1994. Both plants have proved to be highly reliable at consistently removing ordnance compounds to below groundwater cleanup levels.

The existing GAC treatment plant at Site A is overdesigned for its current service (i.e., leachate treatment), and can easily handle the additional flow from the groundwater extraction system. During the initial months of passive leaching system operation, the leachate contained 3 to 4 mg/L of ordnance compounds, and leachate flow rate was generally in the range of 60 to 90 gpm. Leachate ordnance concentrations and flow rate have both declined over time. Ordnance concentrations in the range of 0.4 to 0.5 mg/L, and leachate flow rates below 20 gpm, are typical of recent system operation.

The groundwater extraction system is expected to produce less than 20 gpm of groundwater containing less than 0.2 mg/L of ordnance compounds. Therefore, the existing GAC treatment system has already demonstrated (during its initial months of operation) that it can handle higher ordnance concentrations and higher flow rates than those which would result from combined leachate and groundwater treatment under current conditions.

Effective procedures for monitoring GAC breakthrough, for transporting spent GAC, and for off-site thermal regeneration (a process which destroys the adsorbed ordnance compounds) are already in-place, and will not change with

the addition of the extracted groundwater stream to the treatment system influent. Effluent from the GAC units will continue to be monitored and recirculated through the irrigation system, with excess water discharged to the Stormwater Discharge Area. Lead unit GAC is replaced after ordnance is detected in the effluent from that unit As the second GAC unit continuously treats the effluent from the lead unit, no water containing detectable ordnance should ever be discharged from the treatment system.

The capital cost to design, purchase and install a UV/Ox system is estimated at $300,000, and O&M costs are estimated at $1.50 per 1000 gallons treated. For a groundwater flow rate of 20 gpm, the estimated annual O&M cost would be $16,000. (This cost does not include labor associated with monitoring leach basin operation and leachate quality sampling.) By comparison, incremental O&M costs associated with using the existing GAC treatment system to treat groundwater are estimated to be less than $2,000 annually.

Affirmation of the Statutory Determinations

Considering the new information that has been developed and the changes that have been made to the selected remedy, the Navy believes that the remedy remains protective of human health and the environment, complies with federal and state requirements that were identified in the ROD as applicable or relevant and appropriate to this remedial action at the time the original ROD was signed, and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

The revised remedy utilizes permanent solutions. Composting uses biological processes to degrade ordnance compounds in soils. Ordnance compounds adsorbed from extracted groundwater onto GAC are thermally destroyed in the regeneration process.

Ecology has reviewed this ESD and supports the changes.

Public Participation Activities

Public notice of this ESD will be published in the ***SUN***, a major local newspaper. The elements of the ESD were presented at a meeting of the Base Restoration Advisory Board (RAB) on September 22, 1997. Based on comments at that meeting, the RAB is supportive of this ESD.

Notice has been issued previously that the contents of the Administrative Record File are available for public review and comment.

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