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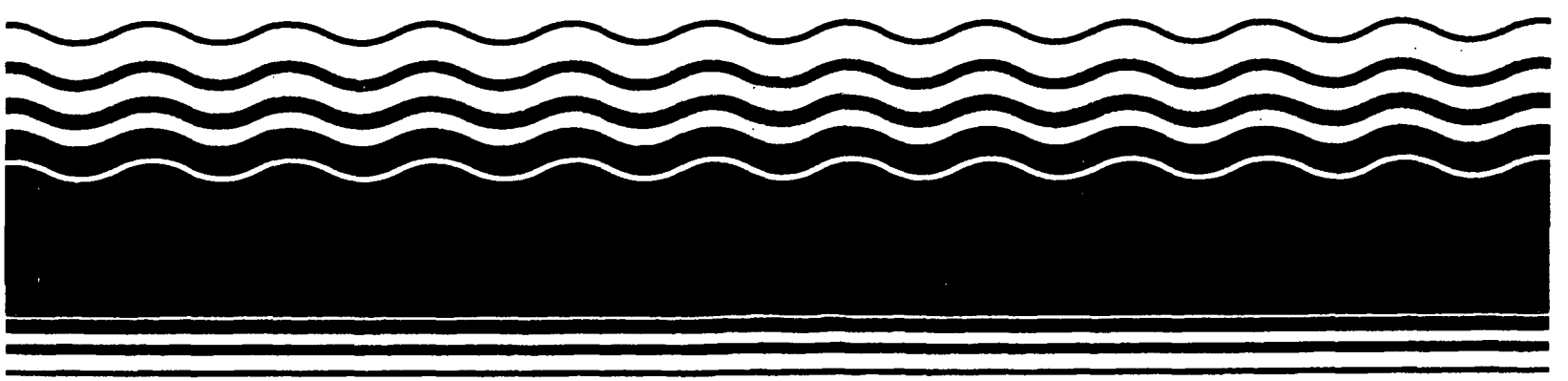
March 1995

EPA Superfund Explanation of Significant Difference for the Record of Decision:

Harbor Island (Soil and Groundwater Operable Unit), Seattle, WA 7/26/1994



United States
Environmental Protection
Agency

Region 10
1200 Sixth Avenue
Seattle WA 98101

Alaska
Idaho
Oregon
Washington

EPA

EXPLANATION OF SIGNIFICANT DIFFERENCE

INTRODUCTION

Site Name and Location:

Harbor Island, Soil and Groundwater Operable Unit
Seattle, Washington

Lead and Support Agencies:

U.S. Environmental Protection Agency (EPA)
Washington State Department of Ecology (Ecology)

Statute that requires an Explanation of Significant Difference (ESD):

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 117(c) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Section 300.435(c)(2)(i).

Need for an ESD:

One of the components of the selected remedy in the Record of Decision (ROD) for the Soil and Groundwater Unit of the Harbor Island Site (Site) was thermal desorption with condensate collection to treat petroleum contaminated soil. However, after further evaluation of the performance of this technology, it became apparent that it would not meet air emission standards for volatile organic compounds set by the Puget Sound Air Pollution Control Agency (PSAPCA).

Administrative Record:

This ESD will become part of the Administrative Record for the Harbor Island Superfund Site, which is available to the public at the following location:

U.S. Environmental Protection Agency
Record Center, 7th Floor
1200 Sixth Avenue
Seattle, Washington 98101

SITE BACKGROUND

Harbor Island is located approximately one mile southwest of downtown Seattle, in King County, Washington, and lies at the mouth of the Duwamish River on the southern edge of Elliott Bay. The island is approximately 400 acres in size and is bordered by the east and west waterways of the Duwamish River.

From 1903 to 1905, Harbor Island was created from marine sediments dredged from the Duwamish River. Dredged sediment was placed across the Duwamish tidelands to form a generally homogeneous sandy fill which is now Harbor Island. Since construction, Harbor Island has been used for commercial and industrial activities including shipping, railroad transportation, bulk petroleum storage and transfer, secondary lead smelting, lead fabrication, shipbuilding, and metal plating. Warehouses, laboratories, and office buildings have also been located on the island. Harbor Island was placed on the National Priorities List as a Superfund Site in 1983 due to elevated lead concentrations in soil from the former lead smelter on the island, (which ceased operation in 1984) as well as elevated levels of other hazardous substances identified at the Site.

EPA has divided the Site into four operable units: 1) the petroleum storage tank facilities operable unit, 2) the marine sediment operable unit, 3) the Lockheed Shipyard facility operable unit, and 4) the "soil and groundwater" operable unit which covers the rest of the island. EPA is the lead agency for the Lockheed, marine sediments, and soil and groundwater operable units. EPA has designated the Washington Department of Ecology (Ecology) as the lead agency for the petroleum storage tank operable unit because the primary contaminant there is petroleum, which is excluded from the federal Superfund statute but is a regulated substance under the State's Model Toxic Control Act (MTCA).

EPA completed a Phase I Remedial Investigation of Harbor Island in 1990. EPA initiated a Phase II investigation in May, 1991, and completed the RI/FS reports for the soil and groundwater operable unit in February, 1993. A Proposed Plan for this unit was issued in June 1993, and the ROD for this unit was completed in September 1993.

On May 2, 1994, EPA sent special notice letters to 55 Potentially Responsible Parties (PRPs) for the soil and groundwater operable unit requesting that they perform the remedy selected in the ROD. EPA intends to sign a Consent Decree with these PRPs by September 1994.

SITE CONTAMINATION

The most significant organic contaminant in soil is petroleum. The range of petroleum concentrations were between approximately 20 mg/kg and 51,000 mg/kg. Also present in smaller quantities in surface soil were polycyclic aromatic hydrocarbons (PAHs). The highest concentrations of heavy PAHs found in surface soil ranged between 10 and 50 mg/kg. Polychlorinated biphenyls (PCBs) in surface soil ranged from 2 to 420 mg/kg.

The most significant inorganic contaminant in the soil is lead, which is found over most of the island and originated primarily from the lead smelter. The majority of samples with elevated lead in the range from 5,000 to 200,000 mg/kg, occurred in the central portion of the site. The highest concentrations of other inorganics are found in soil include: arsenic at 1,830 mg/kg, cadmium at 131 mg/kg, and chromium at 791 mg/kg.

Floating petroleum product was found at one location adjacent to the shoreline on the north end of the island. Groundwater at several locations along the shoreline on the northern portion of the island also contained benzene, ethylbenzene, and xylene, vinyl chloride, and other compounds associated with petroleum products. Elevated levels of inorganic contaminants including mercury, nickel, cadmium, lead, and zinc are also found in groundwater across the island.

REMEDY SELECTED IN THE RECORD OF DECISION (ROD)

The selected remedy in the Harbor Island ROD includes the following components:

- Excavate and treat or dispose soil containing the highest levels of contamination ("hot spots"). These soil hot spots are defined as Total Petroleum Hydrocarbons (TPH) greater than 10,000 mg/kg, PCB greater than 50 mg/kg, and soil with mixed carcinogens with a total risk greater than 10^{-4}. TPH hot spot soil would be treated on-Site by thermal desorption with condensate collection. PCB and carcinogenic hot spot soil would be disposed in an off-Site hazardous waste disposal facility.

- Contain exposed contaminated soil exceeding inorganic or organic cleanup goals. Containment would be achieved with a three inch asphalt cap which would prevent infiltration of rainwater and reduce contaminant migration into the environment. Existing asphalt and concrete surfaces would be repaired to prevent infiltration of rainwater.

- Invoke institutional controls which would require long term maintenance of new and existing caps, warn future property owners of remaining contamination contained under capped areas on their properties, and specify procedures for handling and disposal of excavated contaminated soil from beneath the capped areas if future excavation is necessary.

- Remove and treat floating petroleum product and associated contaminated groundwater at Todd Shipyards to prevent its migration into the marine environment. Monitor groundwater quality for 30 years and review of groundwater quality data every 5 years to assess the effectiveness of the selected remedy.

BASIS FOR SIGNIFICANT DIFFERENCE

This ESD modifies the technology selected to treat petroleum contaminated soil from thermal desorption with condensate collection to thermal desorption with an afterburner. Thermal desorption with condensate collection was selected in the ROD because it was believed that this technology would minimize air emissions. However, after further evaluation of this technology, it became apparent that condensate collection would not be able to meet one of the Applicable or Relevant and Appropriate Requirements (ARARs) for the Harbor Island Site. This ARAR is the PSAPCA regulation which sets a destruction efficiency of greater than 99% for volatile organic compounds in a thermal desorption system. PSAPCA also identifies the best available technology for treating petroleum contaminated soil as thermal desorption with an afterburner. According to bulletins issued by EPA's Office of Research and Development, thermal desorption with an afterburner has a destruction efficiency of 99.99% for volatile organics, which exceeds PSAPCA's requirement by about two orders of magnitude.

To verify that the operation of a thermal desorption system with an afterburner on Harbor Island would not pose a significant health risk to workers operating the system, an exposure estimate was calculated (attached). Such workers would be the individuals receiving the maximum potential exposure to contaminants in the air emissions from the thermal desorption system. Because of the short duration of the exposure (3-6 months), the only significant potential health effects to these workers would be non-carcinogenic effects from exposure to low levels of benzene and polyaromatic hydrocarbons (PAHs). The exposure estimate calculates concentrations of benzene and PAHs at the stack exit of the thermal desorption system, which is the point of maximum possible exposure. Based on the assumptions used in this estimate, the concentrations of benzene and PAHs in the stack air emissions would be about four orders of magnitude below the

industrial threshold limit values (TLVs), for benzene and PAHs. The TLVs are values identified by the American Conference of Government Industrial Hygienists as safe exposure limits for an 8-hour per day, 40-hour per week worker exposure. Based on this comparison to these TLVs, it was concluded that the operation of a thermal system on Harbor Island will not pose a health hazard to workers.

In summary, the complete PSAPCA requirements for thermal desorption are: 1) greater than 99% destruction efficiency for volatile organic compounds, 2) the afterburner operates at a minimum temperature of 1400° F, 3) particulate emissions from the stack cannot exceed 0.02 grains/dry standard cubic feet, 4) opacity from the exhaust stack cannot exceed 5% for three minutes in any hour, and 5) fugitive emissions from any other part of the equipment or control equipment is prohibited. In addition to these requirements for the thermal desorption system, EPA will require that the dust collected in the baghouse be sampled for TPH concentration to determine if it is below the cleanup goal of 600 mg/kg before being mixed with treated soil. Dust which exceeds this goal will have to be retreated or taken off-Site for disposal in compliance with Ecology's regulations.

EPA will also require soil sampling before and after thermal desorption treatment to verify that treated soil is not a RCRA characteristic hazardous waste. The main concern is high concentrations of lead in some of the untreated soil which may cause it to become a characteristic hazardous waste after treatment. To prevent on-Site disposal of treated soil which may constitute a hazardous waste, EPA will require that: 1) in areas where lead concentration are suspected to exceed 1,000 mg/kg, soil will be tested for lead concentration prior to treatment, and 2) untreated soil which exceeds lead concentrations of 1,000 mg/kg will be tested after treatment by the EPA's TCLP leachate procedure to determine if it is a hazardous waste. Any soil which is identified as a hazardous waste will be disposed off-Site at a permitted hazardous waste disposal facility.

The cost estimate for thermal desorption with condensate collection provided in the Soil and Groundwater operable unit ROD was $125 per cubic yard ($100 per cubic yard plus a 25% contingency). However, cost estimates from vendors post-ROD indicate that on-Site thermal desorption with an afterburner will cost about $60-$70 per cubic yard, which is about half the cost estimate in the ROD.

AFFIRMATION OF STATUTORY DETERMINATIONS

Considering the new information on the performance and cost of thermal desorption collected since the ROD was completed, EPA

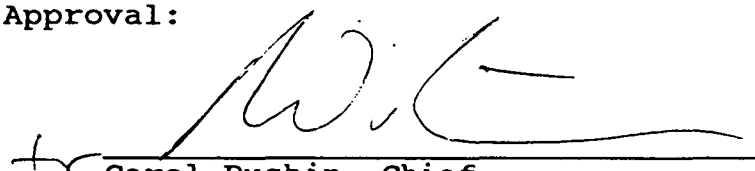
believes that the revised remedy is more protective of human health and the environment and achieves cleanup goals more cost effectively. The revised remedy utilizes permanent solutions to the maximum extent practicable for this Site. It complies with the NCP and other federal and state requirements that are applicable or relevant and appropriate to this remedial action.

PUBLIC PARTICIPATION ACTIVITIES

This ESD will become a part of the Administrative Record for the Harbor Island Site. The availability of the ESD and a summary of it impact on the site remedy will be announced in a public notice and in a fact sheet sent to the mailing list. For additional information regarding this ESD, please contact the Superfund Site Manager for the Harbor Island site:

Keith Rose
1200 Sixth Avenue, HW-113
Seattle, Washington 98101
(206) 553-7721

Approval:



7/26/94

Carol Rushin, Chief, Superfund Remedial Branch — date

Attachment

EXPOSURE ESTIMATE FOR THERMAL DESORPTION OF PETROLEUM CONTAMINATED SOIL AT HARBOR ISLAND

It is proposed that petroleum contaminated soil at Harbor Island be treated by thermal desorption with an afterburner. In order to determine if such a treatment system would produce air emissions which are safe for the system operators, who would be the individual with the greatest chance of exposure, the following calculations were performed. The petroleum constituents with the greatest potential for health effects were identified as benzene and PAHs. The air concentrations of these constituents are estimate at the point where the stack vents to the atmosphere, which would be the maximum possible concentration before mixing with ambient air. Finally, the industrial threshold values for these constituents are provided for comparison. These threshold values are based on an 8-hour work day and 40-hour work week, which are the assumed exposure durations for this case.

1. Assumptions

   a. Soil process rate: 100 tons/hr (22,500 kg/hr)
   b. Stack air flow rate: 600,000 ft^3/hr (22,222 m^3/hr)
   c. Afterburner Destruction Efficiency (DF): 99.99%
   d. Average concentration of benzene in soil: 2.0 mg/kg
   e. Average concentration of PAHs in soil: 30 mg/kg

2. Calculated Air Concentrations at Stack

a. Formula:

$$[C]_{air} = ([C]_{soil})(\text{process rate})(1-DF)/\text{stack flow rate}$$

b. Benzene Concentration:

$$[\text{Benzene}]_{air} = (2\ mg/kg)(22{,}500\ kg/hr)(10^{-4})/(22{,}222\ m^3/hr)$$
$$= 2\times10^{-4}\ mg/m^3$$

c. PAH Concentration:

$$[\text{PAH}]_{air} = (30\ mg/kg)(22{,}500\ kg/hr)(10^{-4})/(22{,}222\ m^3/hr)$$
$$= 3\times10^{-3}\ mg/m^3$$

3. Threshold Limit Values (TLVs)

$$[\text{Benzene}]_{TLV} = 30\ mg/m^3$$

$$[\text{PAH (naphthalene)}]_{TLV} = 50\ mg/m^3$$

CONCURRENCE

INITIAL	TR	CO	SK		
NAME	ROSE	ORDINE	KRUEGER		
DATE	7/25/94	7/25/94			