FOURTH FIVE-YEAR REVIEW REPORT FOR UNITED HECKATHORN SUPERFUND SITE RICHMOND, CONTRA COSTA COUNTY, CALIFORNIA

PREPARED BY

U.S. Army Corps of Engineers

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FOR

U.S. Environmental Protection Agency

Region IX

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Date: August 9, 2016

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Executive Summary

This is the fourth Five-Year Review (FYR) of the United Heckathorn Superfund Site (Site) located in Richmond, California. The purpose of this FYR is to determine if the remedy is protective of human health and the environment. The triggering action for this FYR was the signing of the previous FYR on September 21, 2011.

The Site is located on the eastern shore of San Francisco Bay in an industrial area of the City of Richmond, California, and consists of two adjacent areas: an upland area with contaminated soils, and a marine area with contminated sediments in harbor channels, including Lauritzen Channel, Parr Canal, Santa Fe Channel, and Richmond Inner Harbor. From the mid-1940s to the mid-1960s, several companies, including R.J. Prentiss, Heckathorn and Company, United Heckathorn, United Chemetrics, and Chemwest Inc., used the Site to process, package, and ship pesticides, particularly total dichlorodiphenyl trichloroethane (total DDT). Poor management and housekeeping practices during the Site's use as a pesticide processing facility released Site contaminants of concern (COCs) to upland soils (e.g., total DDT (sum of 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT), dieldrin, aldrin, endrin, and lead) and sediments (e.g., total DDT and dieldrin).

The U.S. Environmental Protection Agency (EPA) listed the Site on the National Priorities List in 1990. On October 26, 1994, EPA selected a remedy that consisted of capping the contaminated upland soils and dredging and offsite disposal of contaminated marine sediments (EPA, 1994). Major components of the 1994 remedy, as documented in EPA's Record of Decision (ROD) included:

- Dredging of all Younger Bay Mud from the Lauritzen Channel and Parr Canal, with offsite disposal of dredge material.
- Placement of clean material after dredging.
- Construction of a 5-acre upland cap around the former Heckathorn facility to prevent erosion.
- A deed restriction limiting use of the property at the former Heckathorn facility location to non-residential uses.
- Marine monitoring to verify the effectiveness of the remedy.

The former United Heckathorn property is an approximate 5-acre upland area located at the northern portion of the Levin Richmond Terminal. A 1996 deed restriction limited the use of portions of the Levin Richmond Terminal property to non-residential. In 1997, Montrose Chemical Corporation of California, Inc., under EPA oversight, dredged approximately 107,000 cubic yards of marine sediment from the Lauritzen Channel and Parr Canal and, in 1999, Levin Richmond Terminal, under EPA oversight, capped approximately 4.5 acres of the upland area.

The United Heckathorn Superfund Site remedy for the upland area, capping of contaminted soils combined with routine montitoring and maintenance to prevent both human exposure and erosion, is protective of human health and the environment. However, the remedy for the marine area of the Site

is not protective. Total DDT and dieldrin concentrations reported in Lauritzen Channel sediment, surface water, and tissue analytical sampling results have regularly exceeded ROD remediation levels since 1999, and marine area sediments continue to present unacceptable risks to both human and ecological receptors. Consequently, a new remedial action is required to ensure protectiveness.

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List of Abbreviations

ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DDD	dichlorodiphenyl dichloroethane
DDE	dichlorodiphenyl dichloroethylene
DDT	dichlorodiphenyl trichloroethane
EPA	Environmental Protection Agency
FFS	Focused Feasibility Study
FYR	Five-Year Review
IC	Institutional Control
NAS	National Academy of Sciences
NCP	National Contingency Plan
ng/g	nanograms per gram
NPL	National Priorities List
OBM	older bay mud
OEHHA	California Office of Environmental Health Hazard Assessment
O&M	Operations and Maintenance
µg/L	micrograms per liter
µg/kg	micrograms per kilogram
RAO	remedial action objective
ROD	Record of Decision
Total DDD	sum of 2,4'-DDD and 4,4'-DDD
Total DDE	sum of 2,4'-DDE and 4,4'-DDE
Total DDT	sum of 2,4'-DDT and 4,4'-DDT
Total DDT	sum of 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT
USACE	United States Army Corps of Engineers
UU/UE	unlimited use and unrestricted exposure
YBM	younger bay mud

1. Introduction

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is protective of human health and the environment. The methods, findings, and conclusions of these reviews are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, 40 Code of Federal Regulation, Section 300.430(f)(4)(ii) of the National Contingency Plan (NCP), and EPA policy.

This is the fourth FYR for the United Heckathorn Superfund Site (Site) located in Richmond, Contra Costa County, California. The triggering action for this statutory review is the completion of the third FYR on September 21, 2011. The FYR is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of an upland area and a marine area. In 1997, Montrose Chemical Corporation of California, Inc., under EPA oversight, dredged approximately 107,000 cubic yards of marine sediment from the Lauritzen Channel and Parr Canal.In 1999, Levin Richmond Terminal, under EPA oversight, capped approximately 4.5 acres of the upland area to prevent exposure of contaminated sediments and soils to people and wildlife.

The United Heckathorn Superfund Site Five-Year Review was led by Karen Jurist, Remedial Project Manager, EPA Region IX. Participants included Jayson Osborne, biologist, United States Army Corps of Engineers (USACE); Cathy Martin, chemist, USACE; Jake Williams, chemist, USACE; Kayla Patten, Environmental Engineer, USACE; and Cynthia Wetmore, FYR Coordinator, EPA Region IX. The review began on November 6, 2015. A list of documents reviewed during the course of this Five-Year Review can be found in Appendix A. West County Times published a public notice of the commencement of this FYR on February 20, 2016 (Appendix E).

Table 1. Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: United Heckathorn Superfund Site		
EPA ID: CAD981436363		
Region: 9	**State:** CA	**City/County:** Richmond, Contra Costa County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Karen Jurist		
Author affiliation: EPA Region IX		
Review period: 11/6/2015 - 9/21/2016		
Date of site inspection: 1/11/2016		
Type of review: Statutory		
Review number: 4		
Triggering action date: 9/21/2011		
Due date *(five years after triggering action date)*: 9/21/2016		

1.1. Physical Characteristics

The Site is located on the Richmond Harbor on the eastern shore of San Francisco Bay, Contra Costa County, California (Figure 1). The Site consists of a 5-acre upland area, encompassing the property of the

former United Heckathorn facility, and a 15-acre marine area comprised of marine waters adjacent to the upland area. The marine area includes contaminated sediments in the Lauritzen Channel, Parr Canal, Santa Fe Channel, and Richmond Inner Harbor. The marine area is part of the larger San Francisco Bay, a unique and sensitive environmental area that provides habitat for numerous marine and avian species.

Bulk petroleum distribution and shipping terminals are the primary businesses operating on the upland area and properties adjacent to the United Heckathorn Site. Historically, the upland area has been an industrial area, which is consistent with the *San Francisco Bay Plan* (San Francisco Bay Conservation and Development Commission, 2006), which designates the area for port priority or water-related industrial use, and the *Richmond General Plan 2030* (Richmond City Council, 2012), which designates the area as a port area for industrial use. No significant changes to land use, future land use, or land-use restrictions are anticipated at the Site in the near future.

Due to the Site's proximity to San Francisco Bay, the shallow groundwater at the Site is naturally saline and is not a source of drinking water under State or Federal law. There are no known uses or restrictions on groundwater usage at the Site.

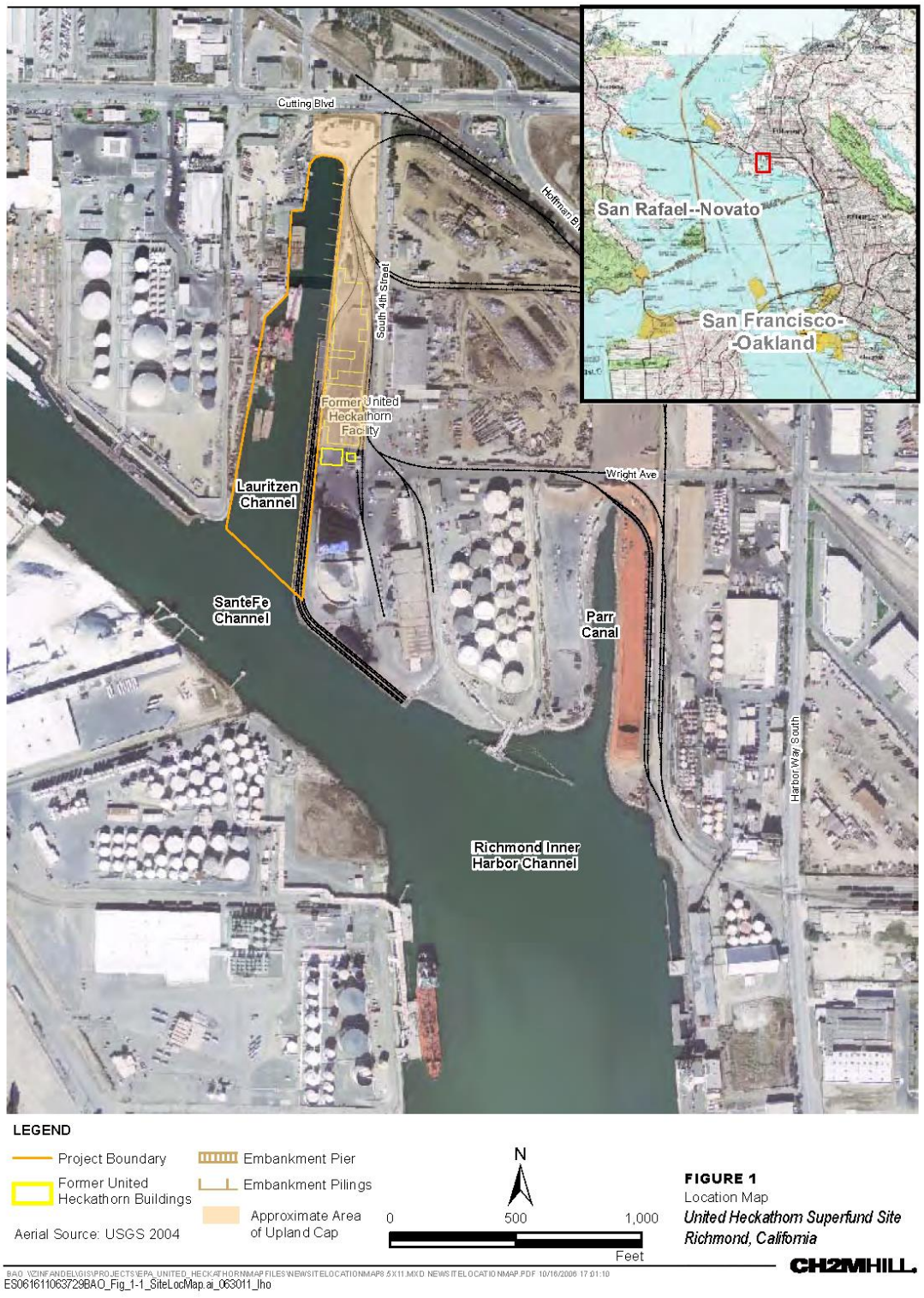

Figure 1. Location Map for the United Heckathorn Superfund Site

Figure 2. Detailed Map of the United Heckathorn Superfund Site

2. Remedial Actions Summary

2.1. Basis for Taking Action

Poor chemical handling and management practices resulted in the release of elevated levels of total DDT and dieldrin to soils in the 5-acre upland area, as well as marine sediments in Lauritzen Channel, Parr Canal, Santa Fe Channel, and Richmond Inner Harbor (Figure 2).

Both human and ecological receptors are at risk from the COCs at the United Heckathorn Site. The 1994 human health risk assessment (HHRA) reported a significant potential exposure pathway to human health through fish consumption. The 1994 ROD reported that the ecological risk assessment, also performed in 1994, found that sediment organochlorines (total DDT, dieldrin) at the Site affected organisms at all trophic levels, with the most sensitive ecological receptors likely to be fish-eating marine birds.

2.2. Remedy Selection

EPA signed the ROD on October 26, 1994. The remedy selected in the ROD for the upland area is construction of a cap around the former Heckathorn facility to prevent erosion, and associated maintenance, as well as monitoring to demonstrate effectiveness. The cap covers approximately 4.5 acres of the upland area.

The remedy selected for the marine area in the ROD is dredging of all Younger Bay Mud (YBM) from the Lauritzen Channel and Parr Canal, with offsite disposal of dredged material followed by placement of clean sediment after dredging. Following dredging, the remedy requires monitoring of the marine area to verify remedy effectiveness. The remedy requires a deed restriction that limits parts of the Levin-Richmond terminal to the current industrial uses.

For the marine area, the remedial action objective (RAO) is to reduce concentrations of the COCs, DDT and dieldrin, in marine sediments and water to levels that would be protective of human health and the environment. For the upland area, the RAO is to prevent contact with DDT in upland soil and erosion of upland soil into the adjacent marine area.

The EPA Ambient Water Quality Criteria is the basis for the 1994 ROD surface water total DDT and dieldrin remediation levels of 0.00059 µg/L and 0.00014 µg/L, respectively. The ROD total DDT remediation level for marine sediments is 590 µg/kg. This remediation level is based on the ecological assessment conducted as part of the underlying risk assessment for the Site, as well as on an action level related to fish tissue. Specifically, the ROD adopted the National Academy of Sciences (NAS) saltwater action level for total DDT in fish tissue of 50 ng/g as a "To Be Considered" action level used to determine the necessary level of cleanup. Table 2 presents a summary of remediation levels for the selected remedy.

Table 2. Summary of Remediation Levels

Media	Constituents	Level	Basis
Marine Surface Water	Total DDT Dieldrin	0.00059 µg/L 0.00014 µg/L	EPA Ambient Water Quality Criteria
Marine Sediment	Total DDT	590 µg/kg	Ecological Assessment

Note: Site cleanup levels were set in the 1994 ROD. No remediation level for dieldrin in sediments was established in the ROD.

2.3. Remedy Implementation

2.3.1. Upland Area

Construction of the concrete cap at the upland area began in July 1998 and was completed in July 1999. Over most of the 5-acre cap, the cap is comprised of reinforced concrete; a geotextile fabric and gravel cap in the railroad track area.

The cap design included installation of a drainage system to collect surface runoff, including best management practices for stormwater pollution prevention. The ROD, however, does not set a remediation level for stormwater discharge from the upland cap area. Prior to May 2014, Site stormwater discharges went to the publicly owned treatment works. In response to third-party litigation regarding stormwater violations, Levin Richmond Terminal installed an on-site treatment system in 2014, at a central location on the western edge of the upland area (**Error! Reference source not found.**). Stormwater from the five interceptors is now pumped to this treatment system, which uses flocculation, settling, and sand filtration to remove contaminants. Influent and effluent to the treatment system is sampled monthly. In accordance with the discharge permit, treated stormwater is then discharged to the Lauritzen Channel via an outfall at the western edge of the upland area.

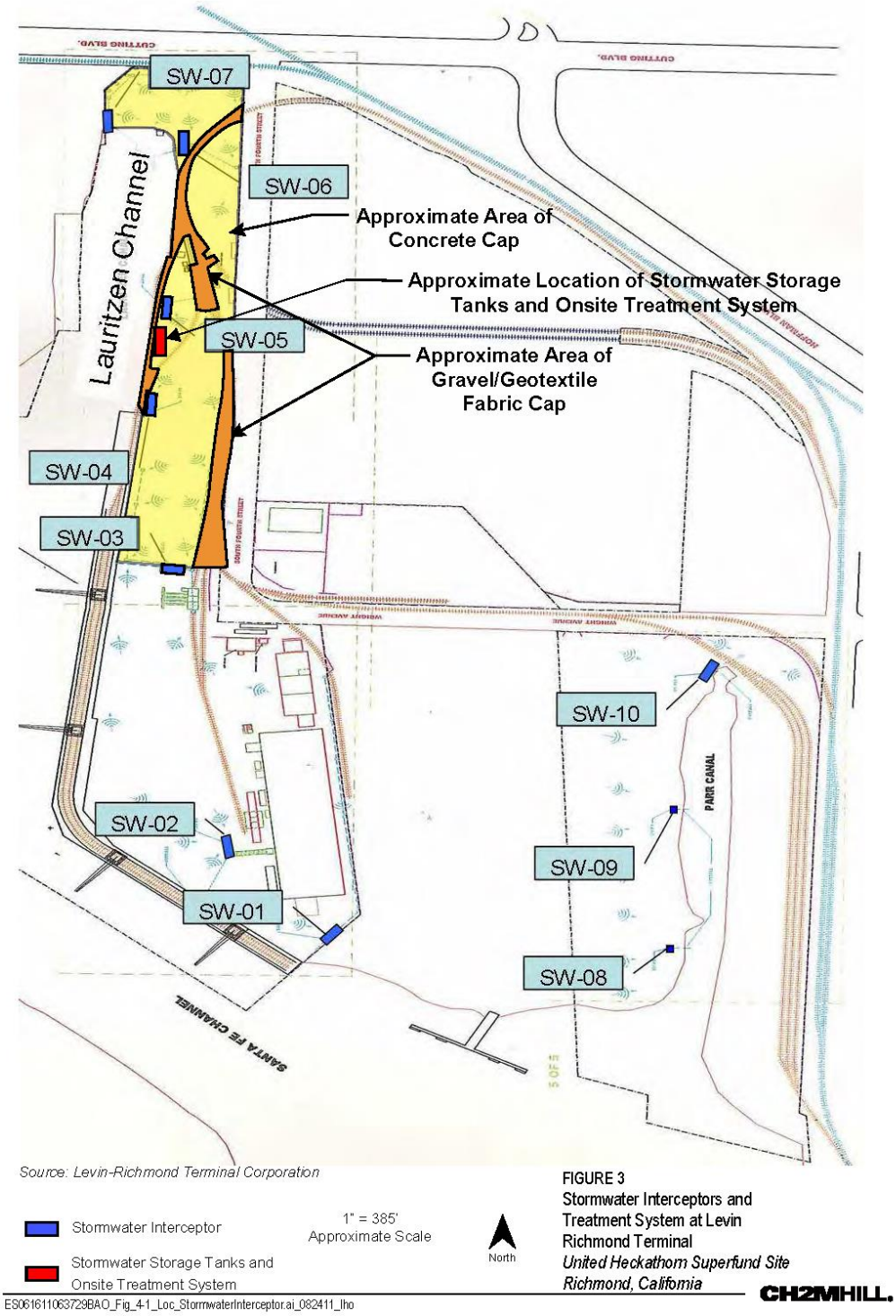

Figure 3. Stormwater Interceptors and Treatment System at Levin Richmond Terminal

Pursuant to the ROD, Institutional Controls (ICs) were implemented at the Site in 1996. On August 2, 1996, the property owner of the upland area recorded an environmental restriction covenant, which limits the property to non-residential use. Table 3 summarizes the ICs. A copy of the recorded deed restriction is included in Appendix C.

Table 3. Summary of Implemented Institutional Controls

Media, Engineered Controls, and Areas That do not Support Unlimited Use and Unrestricted Exposure (UU/UE) Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date
Soils	Yes	Yes	560-380-008, 560-380-002, and 560-280-011	Restrict use of the land to non-residential uses.	"Covenant to Restrict Use of Property" recorded August 2, 1996 as Instrument No. 96-145362 of Contra Costa County Official Records.

2.3.2. Marine Area

Sediment dredging of Lauritzen Channel and Parr Canal at the marine area began in August 1996 and was completed in March 1997. Montrose Chemical Corporation of California, Inc. performed the remedial action. Approximately 107,000 cubic yards of sediment was transported by rail from the Site, and disposed of at designated disposal facilities.

After completion of the dredging operation, sediment samples were taken at the dredging area to confirm that the remedial action had been effective. Before remediation, the median total DDT concentration at the head of Lauritzen Channel and Parr Canal were 47,000 µg/kg and 840 µg/kg, respectively. After remediation, confirmation sampling in 1997 indicated that the average total DDT concentration in Lauritzen Channel were 264 µg/kg and in Parr Canal they were 200 µg/kg (EPA, 2001).

An average of 18 inches of clean sand was placed over the dredged areas for the purpose of Site restoration.

2.4. Operations and Maintenance

2.4.1. Upland Area

The objective of long-term monitoring of the upland area is to verify that contaminated upland soil is not exposed or eroding into the adjacent marine area. Monitoring of the upland area includes inspection of the upland cap and sampling of stormwater runoff originating from the upland cap.

The Site inspection-monitoring program includes inspection of the concrete cap and stormwater collection and drainage system. Levin Richmond Terminal Corporation onsite personnel observe the upper layer of the concrete capping system on a daily basis during normal operations, conduct monthly inspections of the drainage system around manholes and drop inlets, and performa formal Site inspection once a year. The Levin Richmond Terminal Corporation office is the annual report repositiory.

According to the Operations and Maintenance (O&M) Plan (Environmental Technical Services, 2006), capped areas showing signs of deterioration and a potential for exposure of the underlying material are to be repaired within 2 weeks of discovery; deterioration, or erosion, and exposure of the underlying material is to be repaired within 1 week; and, all repairs are to be documented in annual reports.

2.4.2. Marine Area

The objective of the marine monitoring program is to evaluate the long-term effectiveness of the implemented remedy by demonstrating a reduction in contaminants resulting from the EPA remedial actions. The post-remediation marine monitoring program includes: (1) surface water monitoring, and (2) biological monitoring. Trends of COC concentration levels in surface water and mussel tissue samples are used as indicators of whether the remedy is effective and functioning as intended. Results from each marine monitoring event were documented in a post-remediation marine monitoring report.

3. Progress Since the Last Five-Year Review

3.1. Previous Five-Year Review Protectiveness Statements and Issues

The protectiveness statements from the 2011 FYR for the United Heckathorn Site stated the following:

> *The remedy implemented at the upland area of the United Heckathorn Superfund Site is protective of human health and the environment, due to capping of contaminated soil, which has eliminated human exposure pathways and prevented erosion. Routine inspection and monitoring assures the protectiveness of the upland remedy at the Site.*
>
> *The remedy implemented at the marine area of the Site is not protective because concentrations of DDT and dieldrin in sediment within the Channel indicate that the dredging remedy was incomplete: sediment data show an apparent increase in DDT concentrations compared to remedy confirmation samples; surface water concentrations remain above the ROD remediation goals and are near pre-remediation concentrations; mussel tissue data show an increasing trend in DDT concentrations*

between 2002 and 2009; and a re-evaluation of the risk to human health and ecological receptors indicates that sediment in Lauritzen Channel continues to pose a risk. Although there is increased security around the facility as required by the Office of Homeland Security and the US Coast Guard and an updated State advisory that warns against consumption of any fish from the Lauritzen Channel, these controls may be ignored or misunderstood. In addition, contaminated biota (e.g., fish) cannot be prevented from migrating outside of the Site, where they might be caught and consumed by fishermen, or wildlife. EPA is conducting a Focused Feasibility Study (FFS) to evaluate alternatives for addressing concentrations that exceed the Site Remedial Action Objectives (RAOs) to determine what, if any, remedial actions should be taken to address DDT and dieldrin in sediment, water and tissues.

The 2011 FYR included two issues and recommendations.

Table 4. Status of Recommendations from the 2011 Five-Year Report

Site Area	Issue	Recommendations	Current Status	Current Implementation Status Description
Marine Area	The RAOs for DDT and dieldrin in the marine area[1] water and sediment have not been maintained.	Complete the Focused Feasibility Study, which is currently underway.	Ongoing	A draft Focused Feasibility Study to address contamination remaining in the Lauritzen Channel was completed in February 2015 (CH2M Hill 2015) and was released for public comment. The draft FFS is currently being revised.
Marine Area	Signage needs to be updated to include the State of California Office of Environmental Health Hazard Assessment May 2011 updated fish advisory recommending no consumption of fish from the Lauritzen Channel and limited consumption of fish from San Francisco Bay (California Office of Environmental Health Hazard Assessment, 2011)	Update signs at the Site.	Completed	New warning signs have been installed at the Site (see photos in Appendix H). New signs state: "Lauritzen Channel Do Not Eat fish caught here have toxic chemicals" The new warning signs include pictographs illustrating that fish should not be eaten.

[1]Specifically in the Lauritzen Channel

3.2. Work Completed at the Site Since the Last Five-Year Review

At the upland area, a new onsite stormwater treatment system was installed in 2014, as a result of third-party litigation. After May 2014, discharges of Site stormwater to the City of Richmond treatment works were no longer allowed. In order to accommodate onsite treatment of stormwater, a treatment system was installed at a central location on the western edge of the upland area. Stormwater is now collected and

pumped to this treatment system, which uses flocculation, settling, and sand filtration to remove contaminants. Treatment system influent and effluent is sampled monthly. In accordance with State Water Resources Control Board Water Quality Order No. 2014-0057-DWQ, National Pollutant Discharge Elimination System General Permit No. CAS000001 (General Permit for Storm Water Discharges Associated with Industrial Activities), treated stormwater flows discharge via the outfall near the new onsite treatment system to the Lauritzen Channel.

Since 2001, FYRs continue to present the conclusion that the Site's marine area remedy is not protective because sediment total DDT and dieldrin concentrations within the Lauritzen Channel remain above or inconsistent with ROD remediation levels and goals. EPA is currently in the process of selecting a revised remedy for the Site. A number of studies have been performed in the marine area in order to refine the conceptual site model and gather information to support a future modification of the marine area remedy. The following studies have been completed in the past five years:

- *2012 and 2013 Post-remediation Biomonitoring.*
  Mussel tissue and surface water total DDT and dieldrin concentrations were sampled in 2012 and 2013. Surface water samples were collected in 2013 at the historic sampling locations in the marine area. The results of the surface water sampling are discussed in section 4.2.2.2. Mussel samples were collected and analyzed in 2012 and 2013, and included samples of resident and transplanted mussels. Samples were collected at the locations established during previous post-remedial characterization investigations as well as locations sampled during the first five-year monitoring programs, and at expanded locations. Fish tissue samples were collected in 2013 from the Santa Fe Channel, Ferry Point and Sheridan Point. The results of the 2013 mussel and fish sampling are discussed in Section 4.2.2.4.

- *2013 Fish Tissue Investigation (CH2M Hill, 2015).*
  A 2013 study was conducted to determine tissue concentrations of DDT and dieldrin in recreationally harvested fish species at locations in Richmond Inner Harbor, adjacent to Lauritzen Channel where local fishermen are known to fish.

- *2013 Tier 1 Sediment Transport Study (Sea Engineering, Inc., 2013) and 2014 Tier 2 Sediment Transport Study (Sea Engineering, Inc., 2014b).*
  The sediment transport studies were conducted with the goal of understanding the distribution of contaminants in the Lauritzen Channel, and in particular to evaluate whether contaminants may have been deposited following remedial activities at the Site.

- *2014 Final Source Identification Study Report (CH2M Hill, 2014).*
  The purpose of the source identification study was to identify and quantify if possible any ongoing source(s) of contamination to the Lauritzen Channel. The study was performed as part of the Focused Feasibility Study and considered the following: embankment soil, groundwater discharge from the upland area, wood pilings, stormwater outfalls, sources outside of the Lauritzen Channel, and areas not previously dredged.

- *2014 Final DDT Fate and Transport Study (Sea Engineering, Inc., 2014a).*
  This study developed a quantitative contaminant fate and transport conceptual site model and DDT mass balance for the Lauritzen Channel sediments.

- *2015 Draft Focused Feasibility Study (CH2M Hill, 2015).*
  A draft Focused Feasibility Study to address contamination remaining in the Lauritzen Channel was completed in February 2015. This report synthesizes an updated conceptual site model and develops new remedial alternatives to address contamination remaining in the Lauritzen Channel. The draft Focused Feasibility Study evaluates remedial alternatives for addressing areas at the Site at which concentrations exceed Site remediation levels, as well as potential ongoing sources. Following completion of the final FFS, a Proposed Plan that documents EPA's preferred remedy for the United Heckathorn Superfund Site will be prepared. A public comment period, including a public meeting, will be held to obtain comments on the Proposed Plan. EPA's responses to comments received on the Proposed Plan during the public comment period will be presented in a Responsiveness Summary that is included in the Amended Record of Decision. The Amended Record of Decision will document the chosen remedial alternative. The Remedial Design is then developed to provide detailed engineering of specific components for the chosen remedial alternative.

Figure 4. Marine Area Surface Water and Tissue Sample Stations

4. Five-Year Review Process

4.1. Community Notification and Site Interviews

The *West County Times* published a notice on February 20, 2016, announcing the commencement of a Five-Year Review for the Site and inviting the public to submit any comments to EPA. No one contacted EPA in response to the notice.The results of the review and the report will be made available at the Site information repository located at the Richmond Public Library, 325 Civic Center Plaza, Richmond, California, and online at EPA's website (https://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/vwsoalphabetic/United+Heckathorn+Co.).

Interview forms are presented in Appendix F.

On January 11, 2016, Jim Holland, the Director of Facilities and Equipment for Levin Richmond Terminal Corporation and Scott Bourne, the Principal Engineer for their environmental consultant, Weiss Associates, were interviewed regarding the status of the United Heckathorn Site. They indicated that the remedy for the upland area was functioning as intended, but that the marine area remedy had failed. They stated that they were not aware of any changes to regulations or new regulations that would affect the protectiveness of the remedy. They noted that they have provided extensive comments and suggestions to EPA regarding ways to better manage the Site via participation in the ongoing Focused Feasibility Study.

4.2. Data Review

The following data and reports were reviewed:

- Annual Reports for the United Heckathorn Superfund Site Upland Capping System (Weiss Associates, 2013, 2014, and 2015). These reports summarize the condition of the upland cap and stormwater collection system and any maintenance or repairs made to these systems.

- 2015 draft Focused Feasibility Study (CH2M Hill, 2015).

4.2.1. Upland Area

Annual monitoring of the upland cap to date indicates that the cap is intact and functioning as intended (Weiss Associates, 2013, 2014, and 2015). The monitoring program helps alert facility staff to problems with the cap in order to initiate timely repairs.

Monitoring helps to determine compliance with the RAO preventing physical contact and erosion of contaminated soil. Annual monitoring reports document whether the storm drain system is functioning as designed and preventing erosion of contaminated soil from the upland area.

The O&M Plan (Environmental Technical Services, 2006) requires sampling and analysis for pesticides in stormwater discharges originating from the upland area. The analytical results from this sampling help

determine the cap's effectiveness in preventing transport of contaminated soil from the upland area to Lauritzen Channel. EPA's anlayis of the stormwater monitoring data collected for the storm drain system that serves the upland cap indicates that the system is functioning as designed, with only infrequent direct discharges to the Lauritzen Channel. EPA determined that detections of low concentrations of pesticides, periodically detected in stormwater samples collected from the stormwater interceptors are not the primary contributer to the elevated levels of pesticides observed in in the Lauritzen Channel sediments (Source Identification Study (CH2M Hill, 2014)), as described further below.

4.2.2. Marine Area

4.2.2.1 Source Identification Study

The 2014 Source Identification Study, designed to identify and quantify possible ongoing sources of pesticide contamination to the Lauritzen Channel, evaluated the following sources: embankment soils and sediment; groundwater discharge from the upland area; wood pilings; stormwater outfalls; sources outside of Lauritzen Channel; and areas not previously dredged. The Study did not identify any ongoing sources of contamination to the Lauritzen Channel that are of sufficient magnitude to account for the high DDT concentrations seen throughout the channel sediments. Undredged contaminated embankment sediments in either the upland or marine remedial actions, appear to be responsible for the majority of the DDT mass currently found in the channel. However, many of the other sources of contamination that were investigated (e.g., stormwater, stormdrain sediments, etc.) are still active and may lead to the recontamination of channel sediments, surface water, and biota in the future if not controlled (CH2M Hill, 2014). The general conclusions for potential source are listed in Table 5.

Table 5 Conclusions of Source Identification Study

Potential Ongoing Source	Character of Potential Source
Embankment Areas	Pipes and outfalls are unlikely to be significant sources of pesticides to the Lauritzen Channel during dry weather conditions because they do not convey dry weather flow. One seep that was sampled contained low levels of pesticides. Pipes and outfalls have not been inspected or sampled during wet weather conditions. Some of the identified and possible unidentified pipes and conveyances could have and may still act as preferential pathways for contaminant transport from upland areas with DDT-contaminated soil and groundwater to the Lauritzen Channel. DDT contamination above the remediation goal is widespread along the eastern, northern, and northwestern shorelines of the channel. Although the shoreline is largely armored with rip rap, concrete, and sheetpile, fine-grained sediments are present in pockets in the rip rap and soils are eroding from under the sheetpile in some areas.
Groundwater Seepage	Estimated contribution to channel is 167 g DDT per year, which is not sufficient to account for concentrations currently observed in sediments but continues to impact channel sediments, surface water, and biota.
Wood Pilings	Desorption is not a significant source of DDT to surface water or sediment. Mechanical weathering of the pilings could result in incorporation of DDT-contaminated particles into the sediment bed and potentially into the food web.
Stormwater Outfalls	The municipal storm drain system cannot be fully evaluated as an ongoing source of contamination until DDT-contaminated residual sediments are removed from the system. The storm drain system that serves the upland cap on the Levin Richmond Terminal property is generally functioning as designed. Low levels of pesticides are periodically detected in stormwater samples.
Source Material Outside of the Lauritzen Channel	There were no sources of DDT outside of the Lauritzen Channel that were identified as having potential to act as an outside source to the site.
Areas Not Previously Dredged	Dredging residuals appear to be the primary source of present day contamination in the Lauritzen Channel.

Source: *Final Source Identification Study Report, United Heckathorn Superfund Site, Richmond, California. (*CH2M Hill, 2014)

4.2.2.2 Marine Surface Water

Surface water in the Lauritzen Channel does not currently meet ROD remediation levels for total DDT or dieldrin. Filtered and unfiltered marine surface water samples were collected in 2013 at five sampling stations: Richmond Inner Harbor, south end of Lauritzen Channel, mid-point of Lauritzen Channel, Santa Fe Channel, and Parr Canal. The highest pesticide levels for both filtered and unfiltered surface water samples were observed at the mid-point of Lauritzen Channel; and all results from the mid-point Lauritzen Channel sample station since 1998 have been above the 1994 remediation goals. The lowest pesticide levels for both filtered and unfiltered samples were observed at Richmond Inner Harbor.

Table 6. Averages for 2013 Lauritzen Channel Surface Water Data (Presented in 2015 Draft Focused Feasibility Study)

Data subset	Number of samples	Average total DDT concentration (µg/L)	Range of observed concentrations total DDT (µg/L)	Average dieldrin concentration (µg/L)	Range of observed concentrations dieldrin (µg/L)
Surface water (filtered)	2	**0.00436**	Non-detect (at 0.0020737) – **0.0066558**	**0.0016**	**0.00068**– **0.00251 J**
Surface water (unfiltered)	2	**0.00839**	Non-detect (at 0.00387)– **0.0129085**	**0.00194**	Non-detect (at 0.000814)– **0.00306**

Notes:

- ROD remediation level for total DDT in marine surface water is 0.00059 µg/L
- ROD remediation level for dieldrin in marine surface water is 0.00014 µg/L
- ROD remediation levels are based on 1994 Ambient Water Quality Criteria.
- Total DDT = sum of 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT
- All values in µg/L
- Exceedences of ROD remediation levels are in bold type.
- J = Concentration or reporting limit estimated by laboratory or data validation

Surface water data for Parr Canal, Santa Fe Channel, and Richmond Inner Harbor have exceeded remediation standards of dieldrin and DDT over the past eleven years (2002 to 2013), although at concentrations significntly less than concentrations observed in the Lauritzen Channel. Dieldrin in surface water peaked at Richmond Inner Harbor in 2007 and decreased in 2013. Dieldrin concentrations in surface water at the south end of Lauritzen Channel, at Santa Fe Channel, and at Parr Canal have increased since 2002. Total DDT measured in surface water at Parr Canal peaked in 2007 and has decreased since 2007. Total DDT in surface water at Richmond Inner Harbor peaked and fell below Site remediation levels in 2013. Total DDT in surface water at the south end of Lauritzen Channel have been increasing since 2003. Total DDT at Santa Fe Channel shows no clear trend, however surface water collected from Santa Fe Channel and Richmond Inner Harbor consistently contained the lowest DDT and dieldrin concentrations. It is expected in a tidal area with other influences, such as ship traffic at an active harbor and upland runoff, to see variability in data over time.

Table 7. Average DDT Surface Water Data Presented in 2015 Draft Focused Feasibility Study

	Average Total DDT concentration (all in µg/L)				
Year:	2000	2002	2003	2007	2013
Richmond Inner Harbor (Stn 303.01	0.0024	0.00077	0.00052	0.0005U	0.000451
Santa Fe Channel (Stn 303.04)	0.0037	0.0006	0.00034	0.0028	0.002
Parr Canal (Stn 303.06)	Not sampled	0.00257	0.0018	0.0205	0.005
Lauritzen Channel (Stn 303.02, 303.03)	0.90	0.03	0.198	0.23	0.0084

4.2.2.3 Marine Sediments

Marine area sediments at the Site do not currently meet ROD sediment remediation levels for total DDT in Lauritzen Channel. The average total DDT concentration in YBM, or the shallow sediments up to eight feet below the sediment surface, is several orders of magnitude higher in the Lauritzen Channel than in the Santa Fe Channel. The average total DDT concentrations in surface sediment samples from the Lauritzen Channel are above the remediation level. Dieldrin concentrations show similar trends. Analysis of the Lauritzen Channel and embankment sample data collected since 1997 indicate DDT concentrations above the remediation level of 590 µg/kg since the remedy was completed. Median total DDT concentrations in sediment cores since 1999 exceeded the Site remediation level for sediments at the eastern and northern portions of Lauritzen Channel. The highest surface concentrations are generally located in the northern and eastern portions of Lauritzen Channel near the shoreline (see Figure 8). The highest maximum sediment concentrations are generally located in the northern and eastern portions of Lauritzen Channel (see Figure 9). These contaminant spatial patterns are consistent with the historical pesticide releases that occurred at the former United Heckathorn pesticide processing facilities located near the northern and eastern shoreline of Lauritzen Channel.

Concentrations of DDT decrease as the sample locations move from the upper and middle areas of the Lauritzen Channel into the Santa Fe Channel. In 2013, median total DDT concentrations in subtidal and intertidal surface sediments was 7,557 µg/kg and median total DDT concentrations in embankment surface soil was 8,050 µg/kg. The highest total DDT sediment concentration observed in 2013 was in the upper Lauritzen at 105,150 µg/kg (CH2M Hill. 2015). The highest 2013 DDT concentration from the

mouth of the Lauritzen Channel was 6,147 µg/kg. Sediment samples collected in 2013 from the Santa Fe Channel reported DDT concentrations below the remediation level ranging up to 190.5 µg/kg.

The United States Army Corps of Engineers (USACE) sampled sediments in the Richmond Inner Harbor in 2012 (CH2M Hill. 2015). USACE sampling results reported some elevated pesticide concentrations at depth in the upper reaches of Richmond Inner Harbor. However, considering the lack of DDT concentration gradient between the USACE sampling locations in the upper reaches of the Richmond Inner Harbor and the Lauritzen Channel, which are approximately 800 meters apart, the position of the sampling location on a small shoal, and the observation that the highest concentrations reported were at depth, the data indicates Richmond Inner Harbor sediments do not act as an additional source of contamination to the Lauritzen Channel.

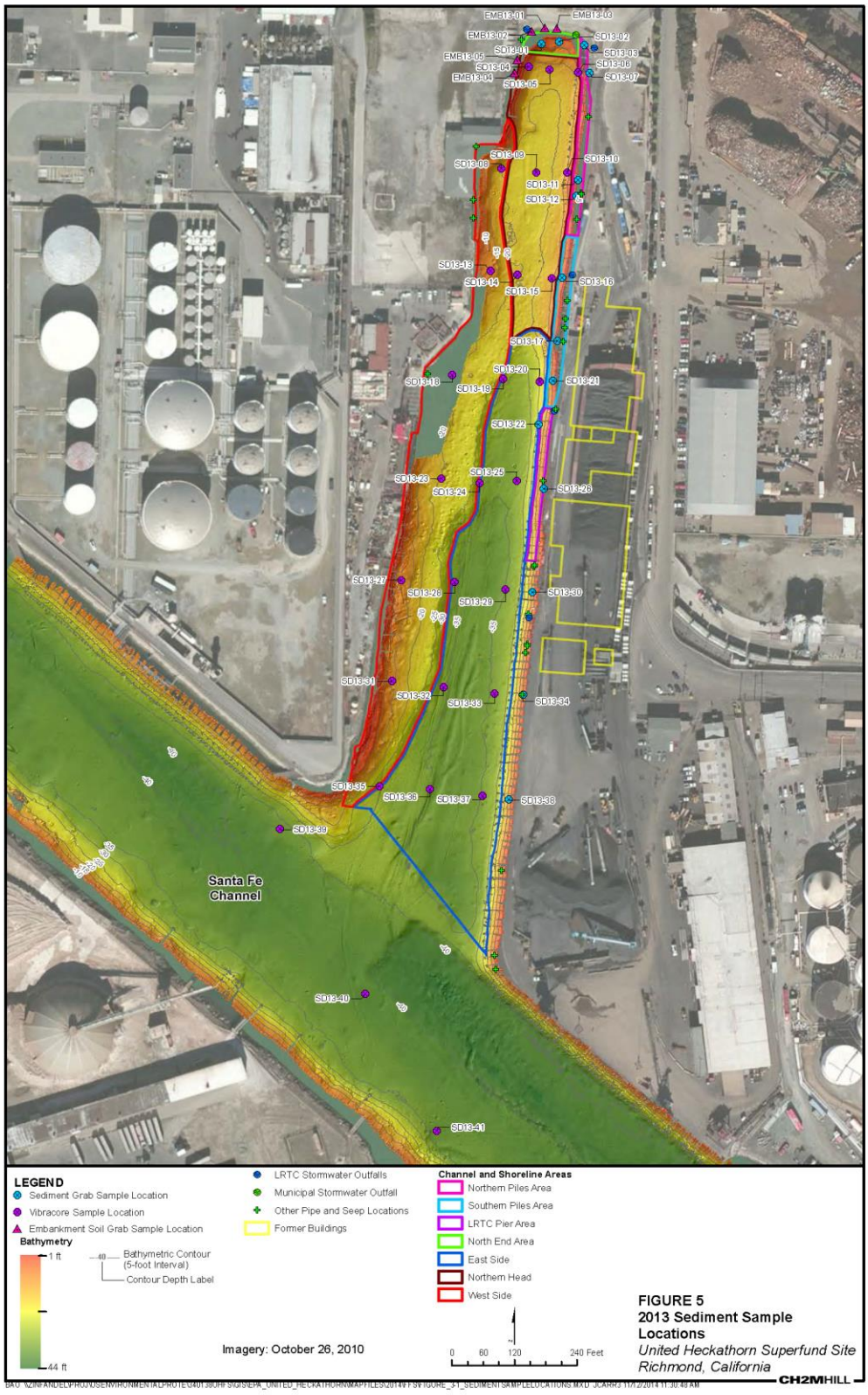

Figure 7. 2013 Sediment Sample Locations

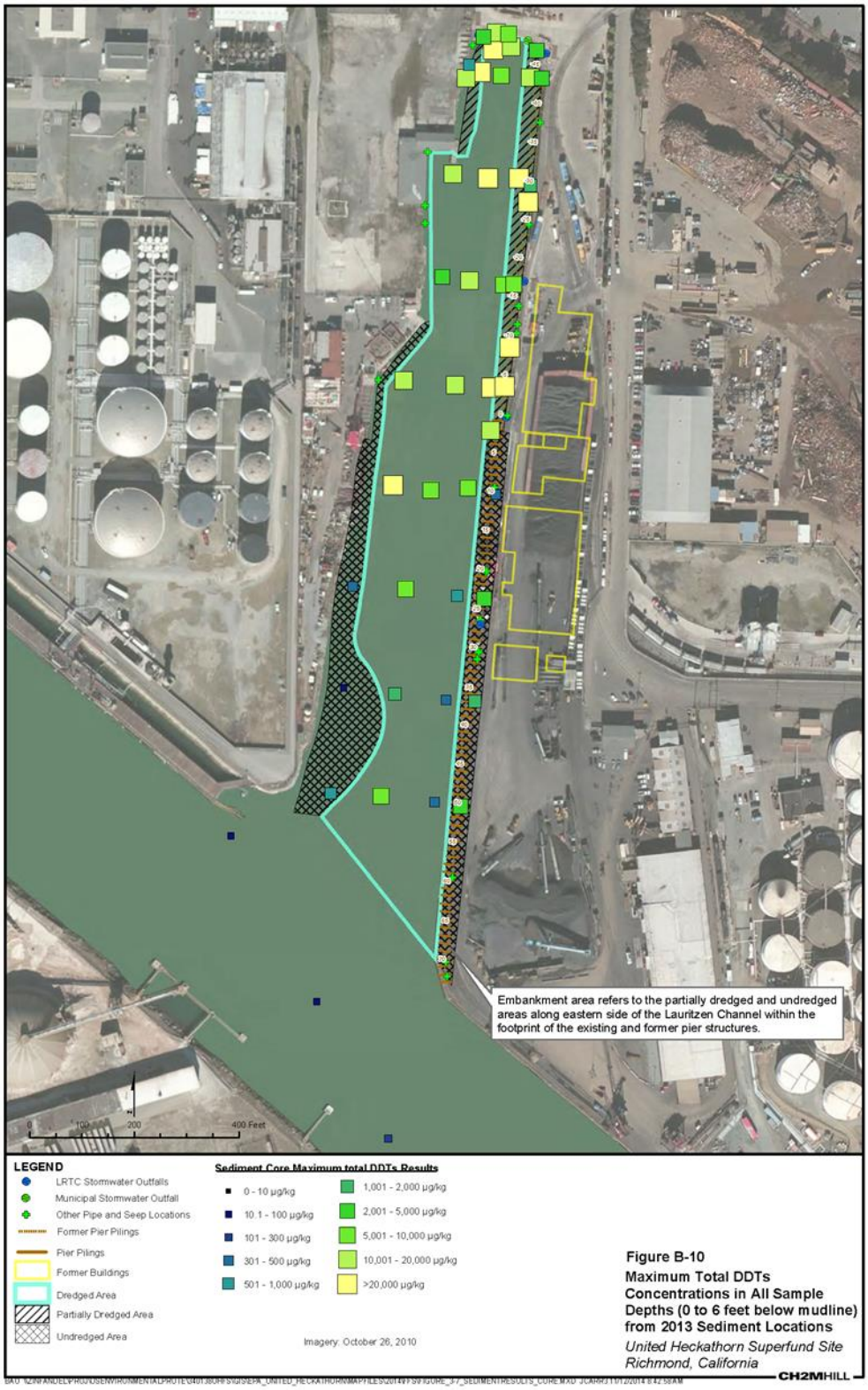

Figure 9. 2013 Maximum Total DDT Concentrations in All Sample Depths

Table 8. Summary of 2013 Lauritzen Channel Surface Sediment Data (Presented in 2015 Draft Focused Feasibility Study)

Data subset	Number of samples	Number exceeding remediation level	Average total DDT µg/kg	Highest value total DDT µg/kg	Lowest value total DDT µg/kg
Subtidal and intertidal (YBM) sediment	14	13	**45,228**	**298,920**	434
Embankment soil	5	4	**7,657**	**14,100**	530

Notes:

- ROD remediation level for sediment: 590 µg/kg
- YBM = younger bay mud
- Exceedences of remediation levels are in bold type
- Total DDT = sum of 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT

Table 9. Summary of Core Sediment Data for 1999, 2007, and 2013 for Lauritzen and Santa Fe Channels (Presented in 2015 Draft Focused Feasibility Study)

Data subset		Number of samples	Number exceeding remediation level	Average total DDT µg/kg	Highest value total DDT µg/kg	Lowest value total DDT µg/kg
Lauritzen Channel core sediments	1999 samples	23	21	**31,603**	180,840	26
	2007 samples	70	45	**6,021**	88,830	3
	2013 samples	98	55	**5,946**	105,150	Non-detect
Santa Fe Channel core sediments	1999 samples	1	0	582	582	582
	2007 samples	7	1	236	913	36
	2013 samples	12	0	49	191	Non-detect

Notes:

- ROD remediation level for sediment: 590 µg/kg
- Inludes both Young Bay Mud and Old Bay Mud samples
- Exceedences of remediation levels are in bold type
- Total DDT = sum of 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT
- U = not detected above reporting limit

Table 10. Summary of 2013 Core Sediment Data for Lauritzen and Santa Fe Channels (Presented in 2015 Draft Focused Feasibility Study)

Data subset	Number of samples	Number exceeding remediation level	Average total DDT	Highest value total DDT µg/kg	Lowest value total DDT µg/kg	Difference between highest and lowest value µg/kg
Lauritzen Channel East	39	20	**5,439**	**105,150**	2.8	105,147
Lauritzen Channel North	40	28	**7,152**	**48,887**	4.2	48,883
Santa Fe Channel	12	0	49	190.5	Non-detect	190.5
Lauritzen Channel West	19	7	**4,449**	**30,000**	Non-detect	30,000

Notes:

- ROD remediation level for total DDT in sediment: 590 µg/kg
- Exceedences of remediation levels are in bold type
- Total DDT = sum of 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT

4.2.2.4 Marine Tissue

Fish and mussel tissue collected at and near the Site does not currently meet the National Academy of Sciences (NAS) action level, adopted by the ROD as a "To Be Considered" action level used to determine the necessary level of cleanup for total DDT in fish tissue of 50 nanograms per gram (ng/g).

In addition to exceeding the NAS action level for tissue, mussel tissue data shows that average total DDT, as well as the highest detected total DDT values from 1999 to 2013 show no notable decrease compared to available pre-remedial data (Table 11). Fish tissue data collected in 2008 and again in 2013; show that the concentrations of total DDT were above tissue advisory, or remediation, levels, with the highest detected value being 11,000 ng/g (Table 12).

Fish were collected from the five biomonitoring locations in 2008: two in the Lauritzen Channel, one in Santa Fe Channel, one in Parr Canal, and one in Richmond Inner Harbor. The fish species collected included shiner surfperch, bay shrimp, anchovy, staghorn sculpin, starry flounder, walleyed perch, sanddabs, California halibut, bay goby, and jacksmelt. White croaker, a target fish species, was not caught. Fish were collected 2013 from the Santa Fe Channel, Ferry Point, and Sheridan Point. Fish species captured and processed during this event included barred surfperch, white surfperch, shiner surfperch, and jacksmelt.

Concentrations of DDT and dieldrin in sediment and in Macoma clam tissue from a 28-day bioaccumulation test, field-collected benthic infauna, mussels, and whole fish (shiner perch) were highest in samples from the Lauritzen Channel and decreased with increasing distance from the site.

Table 11. Summary of Lauritzen Channel Mussel Tissue Data (Presented in 2015 Draft Focused Feasibility Study)

Data subset	Number of samples	Number exceeding NAS action level	Average total DDT ng/g	Highest value ng/g	Lowest value ng/g
Mussel tissue 1999	4	4	**511**	981	176
Mussel tissue 2009	14	14	**1495**	3346	424
Mussel tissue 2013	6	6	**1544**	3426	147

Notes:

- Site remediation level for tissue: 50 ng/g
- Exceedences of remediation level are in bold type
- Total DDT = sum of 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT

Table 12. Summary of Fish Tissue Data (Presented in 2015 Draft Focused Feasibility Study)

Data subset	Number of samples	Number exceeding NAS action level	Average total DDT ng/g	Highest value ng/g	Lowest value ng/g
Fish tissue 2008	42	33	**1,537**	11,000	25
Fish tissue 2013	45	35	**287**	789.36	4.45

Notes:

- Site remediation level for tissue: 50 ng/g
- Exceedences of remediation level are in bold type
- Total DDT = sum of 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT

4.2.3. Data Review Summary

Surface water results are highest at the mid-point of Lauritzen Channel where there have been regular exceedences of the surface water remediation levels for total DDT and dieldrin (Figures 5 and 6). Surface water samples collected from Santa Fe Canal and Richmond Inner Harbor have consistently contained the lowest concentrations of DDT and dieldrin within the data set.

The most recent sediment samples from Lauritzen Channel (2013) are above 1994 remediation levels (Table 7). While there has been an apparent drop in average sediment concentrations since 1999, surface sediment concentrations in Lauritzen Channel are frequently observed to be one to two orders of magnitude above the remediation level. Recent data collected in 2013 indicates that concentrations of DDT in sediments in the Santa Fe Channel are below the remediation level.

DDT concentrations in mussel tissue samples collected from the Lauritzen Channel have not decreased significantly since the remedial action was implemented. Fish tissue data sampled and analyzed in 2008 and 2013, reported concentrations of total DDT above tissue advisory, or remediation, levels.

DDT and dieldrin contaminant concentrations regularly exceed remediation standards in Lauritzen Channel for all media types (surface water, sediment, and tissue) and analysis of the Site data collected indicate this trend will continue unless additional remedial actions are implemented.

4.3. Site Inspection

The Site inspection was conducted on January 11, 2016. Aaron King, Environmental Engineer, USACE, conducted the inspection. Also in attendance were Taly Jolish, Attorney, EPA; Jamie Eby, Project Manager, CH2M; Jim Holland, the Director of Facilities and Equipment for Levin Richmond Terminal Corporation; and Scott Bourne, the Principal Engineer for Weiss Associates. The purpose of the inspection was to assess the protectiveness of the upland area remedy. Activities included inspection of the upland cap and the stormwater collection/treatment system. The upland area was in active use as a bulk product storage area on the day of the Site inspection. Areas of planned maintenance were shown to the group. The upland area cap and stormwater system were in good condition and operating as intended. The Site inspection checklist is presented in Appendix G. The trip report with photographs from the Site inspection are included in AppendixH.

5. Technical Assessment

5.1. Question A: Is the Remedy Functioning as Intended by the Decision Documents?

5.1.1. Upland Area

Yes, the remedy at the upland area is functioning as intended by the decision documents. The 4.5-acre cap area has achieved the remedial action objective for the upland area by eliminating human exposure to contaminated soils and the potential of erosion of contaminated soils from the upland capping area.

O&M of the upland cap and drainage structures continue to be effective in preventing exposure to contaminted Site soils. There are no opportunities for system optimization observed during this review.

The implementation of institutional controls is effective. The property is operating as a marine terminal under industrial land use/port classification. A deed restriction allows only commercial or industrial (non-residential) uses.

5.1.2. Marine Area

No, review of Site documents, ARARs, and risk assumptions indicate that the remedy at the marine area is not functioning as intended by the ROD. Monitoring results since 1999 report total DDT and dieldrin concentrations in sediment, marine surface water, and mussel and fish tissues exceed ROD remediation levels in the Lauritzen Channel. Therefore, the ROD remedial action objectives for the marine area are either not achieved (e.g., Site COC tissue concentrations) or have not been sustained (e.g., Site COCs sediment concentrations). The risk reviews contained in the 2015 draft Focused Feasibility Study (CH2M Hill, 2015), Appendix D, and the May 23, 2011 Fish Advisory for Lauritzen Channel (California Office of Environmental Health Hazard Assessment, 2011) support this conclusion.

5.2. Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of Remedy Selection Still Valid?

Yes, the exposure assumptions, toxicity data, cleanup levels and remedial action objectives are still valid. The exposure assumptions used at the time of remedy selection are unchanged.

No major changes in the Site conditions of the upland area that might affect the exposure pathways were identified. The Levin Richmond Terminal Corporation facility is fenced and access is limited. No new human health or ecological routes of exposure were identified that would affect the protectiveness of the remedy, and no new contaminants were identified.

No major changes in the Site conditions of the marine area that might affect the exposure pathways were identified. In accordance with the May 2011 fish advisory update from the State of California Office of Environmental Health Hazard Assessment (California Office of Environmental Health Hazard Assessment, 2011), warning signs have been installed at the Site during the past five years indicating that fish caught in Lauritzen Channel should not be consumed (see photos in Appendix H).

No new contaminants have been identified. Changes to toxicity values have been identified; however, these changes do not affect the protectiveness of the remedy.

In 2010, human health and ecological risk were reexamined at the Site (EPA, 2015). An updated evaluation of risks and hazards to human health from fish consumption was performed using 2008 fish tissue data. The updated risk calculations indicated that total DDT and dieldrin concentrations in fish tissue from the Lauritzen Channel could pose unacceptable risk to people consuming fish. Based on the

updated risk evaluation, OEHHA updated the fish advisory for Lauritzen Channel in May 2011. The fish advisory indicates that fish caught in Lauritzen Channel should not be consumed.

The primary remedial action objective identified for the Site is the attainment of the EPA water quality criteria and equivalent state objectives for bay waters. Based on recent data, EPA water quality criteria and equivalent state objectives for bay waters are not being met, and a Focused Feasibility Study (CH2M Hill, 2015) to evaluate remedy revisions to address contamination remaining in the Lauritzen Channel, including revised RAOs, is being finalized. Another remedial action objective is to prevent the erosion and transport of upland soils into the Lauritzen Channel. Erosion is occurring only within the marine area – specifically, under the sheet pile along the Lauritzen Channel embankment; no erosion has been observed in the area of the upland cap. This RAO for the upland area has been met.

5.3. Question C: Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

EPA published a technical fact sheet in April 2015 addressing climate change adaptation at contaminated sediment remedies (EPA, 2015). Future climate change could affect rates of sediment erosion and deposition and the frequency of intense storms, which may negatively affect the performance of remedy in the marine area of the Site. Future sea level rise associated with climate change could affect the drainage of the upland cap, groundwater levels, and hydrology of the upland area, and the viability of access and utilities serving the onsite stormwater treatment system. A climate-change exposure assessment and a climate-change sensitivity assessment may be useful to estimate the likelihood for potential climate change hazards to reduce the effectiveness of the remedy.

6. Issues/Recommendations

Table 13. Issues and Recommendations Identified in the Five-Year Review

Issues and Recommendations Identified in the Five-Year Review:				
Marine Area	**Issue Category: Remedy Performance**			
	Issue: Sediment, surface water, and tissue data in the Lauritzen Channel continue to exceed remediation goals nearly twenty years after remedy implementation.			
	Recommendation: Select a new remedy that addresses the remaining contamination in the Lauritzen Channel and prevents recontamination from ocurring.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	EPA	EPA	12/31/2017

6.1. *Other Findings*

The following recommendation was identified during the FYR, but does not affect current and/or future protectiveness of the remedy:

- The detection limits of the analytical methods used in the O&M program to measure pesticide concentrations in stormwater collected by the upland area stormwater collection system are not sensitive enough to make meaningful comparisons to marine surface water cleanup levels. It is recommended that analytical methods with detection limits lower than the marine surface water cleanup levels be used in the future in order to make this comparison.

7. Protectiveness Statement

Table 14. Protectiveness Statement

Protectiveness Statement(s)	
Site Area: Upland Area	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy at the upland area of the United Heckathorn Superfund Site is protective of human health and the environment. Capping of contaminated soil has eliminated human exposure pathways and prevented erosion. Routine inspection and monitoring assures the protectiveness of the upland remedy at the Site.	
Site Area: Marine Area	*Protectiveness Determination:* Not Protective
Protectiveness Statement: The remedy at the marine area of the Site is not protective because concentrations of total DDT and dieldrin in sediment, surface water, and tissue samples in the Lauritzen Channel have regularly exceeded ROD remediation standards since 1999; and a re-evaluation of the risk to human health and ecological receptors indicates that sediment in Lauritzen Channel continues to pose a risk. A new remedial action will need to be implemented to ensure protectiveness.	

8. Next Review

The next Five-Year Review report for the United Heckathorn Superfund Site is required five years from the completion date of this review.

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Appendix A: List of Documents Reviewed

List of Documents Reviewed

California Office of Environmental Health Hazard Assessment. 2011. *Guide to Eating Fish and Shellfish from San Francisco Bay.* November. Accessed at http://www.oehha.ca.gov/fish/pdf/SFBay110411.pdf on April 20th, 2016.

CH2M Hill. 2014. *Final Source Identification Study Report, United Heckathorn Superfund Site, Richmond, California.* Prepared for EPA, Region 9. March.

CH2M Hill. 2015. *Draft Focused Feasibility Study, United Heckathorn Superfund Site, Richmond, California.* Prepared for EPA, Region 9. February.

Environmental Technical Services. 2006. *Operations and Maintenance Plan, Levin-Richmond Terminal, 402 Wright Avenue, Richmond, California, July 2005 – June 2006.* July

EPA. 1994. *Record of Decision, United Heckathorn Site, Richmond, California.* November.

EPA. 1997. *Explanation of Significant Differences, United Heckathorn Co., Richmond, California.*

EPA. 2001. *First Five-Year Review Report for the United Heckathorn Superfund Site, Richmond, California.* September.

EPA. 2011. *Third Five-Year Review Report for the United Heckathorn Superfund Site, Richmond, California.* September.

EPA. 2015. *Climate Change Adaptation Technical Fact Sheet: Contaminated Sediment Remedies.* April.

Pacific Northwest Laboratory. 1994. *Feasibility Study for the United Heckathorn Superfund Site, Richmond, California.* Prepared for EPA Region IX. July.

Richmond City Council. 2012. *Richmond General Plan 2030.* April.

San Francisco Bay Conservation and Development Commission. 2006. *San Francisco Bay Plan.* September.

Sea Engineering, Inc. 2013. *Tier 1 Sediment Transport Study, United Heckathorn Superfund Site, Richmond, California.* Prepared for CH2M Hill under contract to EPA, Region 9. April.

Sea Engineering, Inc. 2014a. *Final DDT Fate and Transport Study, United Heckathorn Superfund Site, Richmond, California.* Prepared for CH2M Hill under contract to EPA, Region 9. May.

Sea Engineering, Inc. 2014b. *Tier 2 Sediment Transport Study, United Heckathorn Superfund Site, Richmond, California.* Prepared for CH2M Hill under contract to EPA, Region 9. February.

Weiss Associates. 2013. *2012-2013 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.* Prepared for Levin Richmond Terminal Corporation. December.

Weiss Associates. 2014. *2013-2014 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.* Prepared for Levin Richmond Terminal Corporation. July.

Weiss Associates. 2015. *2014-2015 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.* Prepared for Levin Richmond Terminal Corporation. September.

Appendix B: ARAR Assessment

ARAR Analysis

Section 121(d)(1)(A) of CERCLA requires that remedial actions at CERCLA sites attain (or justify the waiver of) any federal or state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). Federal ARARs may include requirements promulgated under any federal environmental laws. State ARARs may only include promulgated, enforceable environmental or facility-siting laws of general application that are more stringent or broader in scope than federal requirements and that are identified by the state in a timely manner. ARARs are identified on a site-specific basis from information about the chemicals at the site, the RAs contemplated, the physical characteristics of the site, and other appropriate factors. ARARs include only substantive, not administrative, requirements and pertain only to onsite activities. There are three general categories of ARARs: chemical-specific, location-specific, and action-specific.

Chemical-specific ARARs identified in the selected remedy within the ROD for surface water at this Site and considered for this Five-Year Review are shown in Table B.1. These contaminants have cleanup goals that exceed current water quality criteria.

Table B.1. Summary of Surface Water ARAR Changes

Contaminants of Concern	1994 ROD cleanup goals (µg/L)	Current water quality criteria[2] (µg/L)	Is the cleanup goal above the current water quality criteria?
DDD DDE DDT =Total [1]	0.00059	0.00012 0.000018 0.000030 =0.000168	Yes
Dieldrin	0.00014	0.0000012	Yes

[1]The sum of 4,4'- and 2,4'-isomers of DDT, DDD and DDE

[2] EPA National Recommended Water Quality Criteria (2015)

The cleanup goals for total DDT (sum of 4,4'- and 2,4'- isomers of DDT, DDD and DDE) and dieldrin are above current EPA water quality criteria. The ROD cleanup levels for marine surface water, which were based on the 1994 Ambient Water Quality Criteria, may not be protective for these contaminants.

Federal and state laws and regulations other than chemical-specific ARARs were evaluated to determine whether these requirements have changed in the past five years, or whether new ARARs have been promulgated within the past five years. This evaluation does not include those ARARs identified from the ROD that are no longer pertinent, now that the response action has transitioned from construction to long-term O&M phase work. For example, ARARs related to remedial design and construction are not included in the table if they do not continue into long-term O&M. There have been no changes to ARARs in the past five years other than the changes to chemical-specific ARARs noted in Table B.1. The following ARARs have not changed since the last Five Year Review; and therefore, do not affect protectiveness:

- Federal Clean Water Act (42 USC Section 9621(d)(2)(A)(ii)
- 40 CFR Section 300.430(e)(2)(i)(G)
- Federal Clean Water Act (Section 304(a))
- U.S. Fish and Game Code, Section 5650
- Porter-Cologne Water Quality Control Act

The federal Endangered Species Act (16 U.S.C. § 1531 et seq.) and the California Endangered Species Act (California Fish and Game Code § 2050) are ARARs for the site. The ROD identified the California least tern and California brown pelican as federally listed endangered species. The California brown pelican was delisted due to recovery in 2009 (74 FR 59444); the least tern remains listed. The ROD identified the American peregrine falcon as a state listed endangered species; it was delisted due to recovery in 2009 (California Department of Fish and Game 2011).

"To Be Considered" (TBC) criteria, as defined in 40 CFR 300.400(g)(3), are non-promulgated advisories or guidance issued by federal or state government that are not legally binding but may provide useful information or recommended procedures for remedial action. The following were identified in the 1994 ROD, and are noted as TBC criteria for the United Heckathorn site. These criteria remain unchanged since the 2011 Five-Year Review.

- 55 FR 8745: The NAS saltwater action levels are TBCs, which provide an additional level of protection to fish-eating birds beyond the level that is the basis of the surface water ARARs for aquatic life. The NAS action level for DDT in fish remains at 0.05 milligrams per kilogram.

- 21 CFR 109 and 509: The U. S. Food and Drug Administration (FDA) action levels for the marketability of fish and shellfish are TBCs for protecting human health; these levels are less stringent than the levels that would be achieved by meeting the surface water ARARs. FDA action levels for the contaminants of concern at the Heckathorn site remain as follows: DDT = 5.0 parts per million (ppm); dieldrin = 0.3 ppm.

In May 2011 the California Office of Environmental Health Hazard Assessment (OEHHA) issued revised fish consumption guidelines for San Francisco Bay, which include the recommendation that "because of high concentrations of dieldrin or DDTs or both, OEHHA recommends that no one eat fish from the Lauritzen Channel in Richmond Inner Harbor." This guideline remains unchanged.

References

California Department of Fish and Wildlife. 2015. State and Federally Listed Endangered & Threatened Animals of California. October. Online:
https://www.dfg.ca.gov/wildlife/nongame/t_e_spp/

United States Environmental Protection Agency (USEPA). 1994. *EPA Superfund Record of Decision: United Heckathorn Site, Richmond, CA, 10/26/1994*. EPA/ROD/R09-95/121.
October.

_____. 1996. *EPA Superfund Explanation of Significant Differences: United Heckathorn Co. EPA ID: CAD981436363, OU 01, Richmond, CA, 11/29/1996*. EPA/ESD/R09-97/035. November.

_____. 2011. *Third Five-Year Review Report for United Heckathorn Superfund Site, Richmond, California*. Prepared for USEPA Region 9, San Francisco, CA. September.

_____. 2009. National Recommended Water Quality Criteria.

U.S. Food and Drug Administration. 2002. *Guidance for Industry: Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed.*
http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ChemicalContaminantsMetalsNaturalToxinsPesticides/ucm077969.htm#aldr

Appendix C: Copy of Environmental Covenant

Recording Requested By:
Keith Howard, Cooper White & Cooper
1333 North California Blvd., Suite 450
Walnut Creek, CA 94596

RECORDED AT REQUEST OF
Attorney

AUG 2 1996

AT 3 O'CLOCK P M.
CONTRA COSTA COUNTY RECORDS
STEPHEN L. WEIR
COUNTY RECORDER
FEE: 4900

When Recorded, Mail To:
Keith Howard, Cooper White & Cooper
1333 North California Blvd., Suite 450
Walnut Creek, CA 94596

96 145362

COVENANT

TO RESTRICT USE OF PROPERTY

Levin Enterprises, Inc. - Richmond Site

This Covenant and Agreement ("Covenant") is made on the 24th day of July 1996, by Levin Enterprises, Inc. ("Covenantor"), who is the owner of record of certain Property situated in the City of Richmond, County of Contra Costa, State of California, described in Exhibit "B" attached hereto and incorporated herein by this reference ("the Property"), with reference to the following facts:

A. The Property contains hazardous substances;

B. Portions of the Property have been designated by the United States Environmental Protection Agency as a Superfund site on the National Priorities' List. Potentially responsible parties at the site have been identified by the Environmental Protection Agency, and such parties have entered into a series of four Consent Decrees with the United States providing for the

remediation of the Site in accordance with the United States Environmental Protection Agency's Record of Decision executed on October 26, 1994 (ROD). Covenantor has entered into such a Consent Decree with the United States in an action entitled United States of America, Plaintiff vs. Montrose Chemical Corporation of California, et al., Defendants, No. C 96-2103 MEJ Consolidated with C 84 6273 CW (Consent Decree) in the United States District Court, Northern District of California,. (Hereinafter referred to as Covenantor Consent Decree)..

B.1. Contamination of the Property. Portions of the soil on the Property and adjoining underwater sediments have become contaminated with hazardous substances, including Dichlorodiphenylchloroethane (DDT), Dichlorodiphenyl-dechloroethylene (DDE), and Dieldrin. Remedial activities that have occurred at the Property and that will occur pursuant to the above-referenced Consent Decrees are designed to eliminate any significant risk to human health and/or the environment from the above-referenced contaminants.

B.2. Surrounding Land use and Population Potentially Affected. Land use in the immediate vicinity of the Property is industrial. The nearest residential area is approximately one quarter of a mile to the Northeast of the Property.

C. Covenantor desires and intends that in order to protect the present or future public health and safety, the Property shall be used in such a manner as to avoid potential harm to persons or Property which may result from hazardous substances which have been deposited on portions of the Property.

ARTICLE I

GENERAL PROVISIONS

1.01 Provisions to Run With the Land. This Covenant sets forth protective provisions, covenants, restrictions and conditions (collectively referred to as "Restrictions") upon and subject to which the Property and every portion thereof shall be improved, held, used, occupied, leased, sold, hypothecated, encumbered and/or conveyed. Each and all of the Restrictions shall run with the land, and pass with each and every portion of the Property, and shall apply to, inure to the benefit of and bind the respective successors in interest thereof. Each and all of the Restrictions are imposed upon the entire Property unless expressly stated as applicable to a specific portion of the Property. Each and all of the restrictions are for the benefit of and enforceable by the United States Environmental Protection Agency.

1.02 Concurrence of Owners Presumed. All purchasers, lessees, or possessors of any portion of the Property shall be deemed by their purchase, leasing, or possession of such Property, to

be in accord with the foregoing and to agree for and among themselves, their heirs, successors, and assignees, and the agents, employees, and lessees of such owners, heirs, successors, and assignees, that the Restrictions as herein established must be adhered to for the benefit of future Owners and Occupants and that their interest in the Property Shall be subject to the Restrictions contained herein.

1.03 Notice of Entry of Consent Decree On July 19, 1996 the Covenantor Consent Decree was entered in the United States District Court, Northern District of California. A copy of the Covenantor Consent Decree is available for inspection at the Property subject to this Covenant.

1.04 Incorporation into Deeds and Leases. Covenantor desires and covenants that the Restrictions set out herein and in the Covenantor Consent Decree shall be incorporated by reference in each and all deeds and leases of any portion of the Property.

ARTICLE II

DEVELOPMENT, USE AND CONVEYANCE OF THE PROPERTY

2.01 Restrictions on Development and Use. Covenantor promises to restrict the use of that portion of the Property as described in Exhibit B as follows:

a. Development of the Property shall be restricted to commercial or industrial use.

b. No residence for human habitation shall be permitted on the Property.

c. No hospitals shall be permitted on the Property.

d. No schools for persons under 18 years of age shall be permitted on the Property.

e. No day care centers for children shall be permitted on the Property.

2.02 Conveyance of Property. The Covenantor shall provide a thirty (30) day advance notice to the United States Environmental Agency of any lease of the entire Property or other conveyance of the Property or an interest in the Property to a third person.

2.03 Notice in Agreements. Covenantor shall execute a written instrument which shall accompany all purchase, lease, sublease, or rental agreements relating to the Property. The instrument shall contain the following statement:

"The land described herein contains hazardous substances and therefore is subject to a Covenant to Restrict Use of Property which has been recorded. This statement is not a declaration that a hazard exists."

ARTICLE III

ACCESS

3.01 Notice of Obligation to Provide Access. Beginning on June 1, 1996, the Covenantor agrees to provide access at all reasonable times to the Site and, to the extent access to the Property is controlled by Covenantor, any other Property to which access is required for the implementation of the response actions called for in the ROD. Such access shall be provided to the United States and its representatives, (including EPA and its contractors); the Supervising Contractor and its employees, agents and subcontractors, and

technical representatives of any potentially responsible party performing response actions at the Site pursuant to an EPA order or agreement. Access shall be for the purposes of conducting any activity related to the Consent Decree including, but not limited to:

a. Monitoring the Work;

b. Verifying any data or information submitted to the United States;

c. Conducting investigations relating to contamination at or near the Site;

d. Obtaining samples;

e. Assessing the need for, planning, or implementing additional response actions at or near the Site;

f. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendants or their agents; and

g. Assessing Covenantor's compliance with this Consent Decree, or assessing other potentially responsible parties' compliance with an EPA order or agreement.

IV.

MISCELLANEOUS

4.01 Partial Invalidity. If any potion of the Restriction or terms set forth herein is determined to be involved for any reason, the remaining portion shall remain in full force and effect as if such portion had not been included herein.

4.02 Recordation. This instrument shall be executed by the Covenantor and shall be recorded by the Covenantor in the County

of Contra Costa within ten (10) days of the date of entry of the Covenantor Consent Decree.

IN WITNESS WHEREOF, the parties execute this Covenant as of the date set forth above.

OWNER:

By: William S. Benak

Title: President

Date: July 24, 1996

STATE OF CALIFORNIA)
) ss.
COUNTY OF Santa Clara)

On this the 24th day of July, 1996, before me, the undersigned Notary Public, personally appeared William S. Benak, personally known to me (or proved to me on the basis of satisfactory evidence) to be the person whose name is subscribed to the within instrument and acknowledged that he/she executed the same in his/her authorized capacity, and that by his/her signature on the instrument the person or the entity upon behalf of which the person acted, executed the instrument.

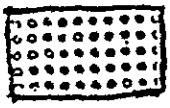
WITNESS my hand and official seal.

Eleanore M. Lewis
Notary's Signature

137313.1

ELEANORE M. LEWIS
COMM. # 984321
Notary Public — California
SANTA CLARA COUNTY
My Comm. Expires FEB 2, 1997

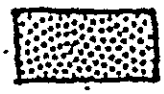
THE LAND REFERRED TO HEREIN IS SITUATED IN THE STATE OF CALIFORNIA, COUNTY OF CONTRA COSTA, CITY OF RICHMOND, DESCRIBED AS FOLLOWS:

PARCEL 1: 

PORTION OF TIDE LAND LOTS 26 AND 27, SECTION 13, PORTION OF TIDE LAND LOTS 6, 7, 10 AND 11, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AND A PORTION OF SWAMP AND OVERFLOW LANDS IN SAID TOWNSHIP AND RANGE, DESCRIBED AS FOLLOWS:

BEGINNING ON THE SOUTH LINE OF THE 3.39 ACRE STRIP OF LAND DESCRIBED IN THE DEED TO THE CITY OF RICHMOND, RECORDED AUGUST 11, 1948, BOOK 1272, OFFICIAL RECORDS, PAGE 161, AT THE NORTHWEST CORNER OF THE 8.938 ACRE PARCEL OF LAND DESCRIBED IN THE DEED TO TIME OIL COMPANY, RECORDED JUNE 23, 1950, BOOK 1580, OFFICIAL RECORDS, PAGE 53; THENCE FROM SAID POINT OF BEGINNING ALONG THE WEST LINES OF SAID 8.938 ACRE PARCEL SOUTH 7° 22' 42" EAST, 755.15 FEET AND SOUTH 39° 35' 54" WEST, 183.99 FEET TO THE SOUTHWEST CORNER THEREOF; THENCE CONTINUING SOUTH 39° 35' 54" WEST, 148.21 FEET TO THE SOUTH LINE OF THE PARCEL OF LAND FIRSTLY DESCRIBED IN THE DEED TO PARR-RICHMOND INDUSTRIAL CORPORATION, RECORDED JUNE 1, 1949, BOOK 1394, OFFICIAL RECORDS, PAGE 370; THENCE ALONG THE EXTERIOR BOUNDARY LINES OF SAID PARCEL (1394 OR 370), AS FOLLOWS:

NORTH 50° 45' 20" WEST, 837.27 FEET; NORTH 0° 08; EAST, 287.09 FEET; NORTH 41° 46' EAST, 94.75 FEET; NORTH 4° 45' EAST, 646.21 FEET; SOUTH 89° 50' 50" EAST, 75.64 FEET; NORTH 12° 47' 24" EAST, 231.34 FEET; NORTH 89° 55' EAST, 39.57 FEET; NORTH 0° 05' WEST, 309.99 FEET; NORTH 16° 00' 31" EAST, 60.11 FEET; NORTH 6° 09' 11" EAST, 121.33 FEET; NORTH 89° 55' EAST, 8.55 FEET AND NORTH 0° 08' EAST, 30.82 FEET; THENCE LEAVING SAID EXTERIOR BOUNDARY LINE SOUTH 89° 35' EAST, 144.10 FEET; THENCE SOUTH 6° 53' EAST, 49.45 FEET; THENCE SOUTH 5° 04' WEST, 833.81 FEET; THENCE SOUTH 84° 56' EAST, 173.95 FEET TO THE WEST LINE OF SAID 3.39 ACRE PARCEL; THENCE ALONG THE WEST AND SOUTH LINES OF SAID 3.39 ACRE PARCEL, SOUTH 0° 31' WEST, 373.95 FEET AND SOUTH 89° 31' EAST, 195.48 FEET TO THE POINT OF BEGINNING.

PARCEL 2: 

PORTION OF BLOCK 50 AND A PORTION OF FOURTH STREET AS SHOWN ON THE REVISED MAP OF SANTA FE, FILED AUGUST 24, 1915, IN BOOK 12 OF MAPS, PAGE 280; PORTION OF LOT 42 AS SHOWN ON THE MAP OF SAN PABLO RANCHO, FILED MARCH 1, 1894; PORTION OF TIDE LOT 27, SECTION 13 AND A PORTION OF TIDE LOT 6, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AS SHOWN ON MAP NO. 1 SALT MARSH AND TIDE

LANDS, FILED JUNE 11, 1917, IN RACK MAP NO. 9, IN THE OFFICE OF THE COUNTY RECORDER OF CONTRA COSTA COUNTY, DESCRIBED AS FOLLOWS:

BEGINNING ON THE MOST WESTERN LINE OF THAT CERTAIN STRIP OF LAND CONTAINING 3.39 ACRE, MORE OR LESS, DESCRIBED IN THE DEED FROM PARR-RICHMOND INDUSTRIAL CORPORATION TO CITY OF RICHMOND, RECORDED AUGUST 11, 1948, IN BOOK 1272 OF OFFICIAL RECORDS, PAGE 161, AT THE EASTERN TERMINUS OF THE LINE GIVEN AS "NORTH 84° 56' WEST, 173.95 FEET" THE BEARING OF SAID LINE BEING TAKEN AS NORTH 83° 58' 39" WEST FOR THE PURPOSE OF THIS DESCRIPTION, IN THE DEED FROM PARR-RICHMOND INDUSTRIAL CORPORATION TO PARR-RICHMOND TERMINAL COMPANY, RECORDED DECEMBER 30, 1955, IN BOOK 2681 OF OFFICIAL RECORDS, PAGE 353; THENCE FROM SAID POINT OF BEGINNING ALONG THE EXTERIOR LINES OF SAID PARCEL (2681 OR 353) AS FOLLOWS:

NORTH 83° 58' 39" WEST, 173.95 FEET; NORTH 6° 01' 21" EAST, 833.81 FEET; NORTH 5° 55' 39" WEST, 49.45 FEET AND NORTH 88° 37' 39" WEST, 18.85 FEET; THENCE NORTH 4° 14' 09" WEST, 44.61 FEET; THENCE NORTHERLY ALONG THE ARC OF A TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 360 FEET AN ARC DISTANCE OF 51.31 FEET; THENCE NORTH 3° 55' 51" EAST, 88.52 FEET TO THE SOUTH LINE OF CUTTING BOULEVARD; THENCE SOUTH 88° 39' 09" EAST ALONG SAID SOUTH LINE 24.79 FEET TO THE SOUTH LINE OF THE PARCEL OF LAND DESCRIBED AS PARCEL ONE IN THE DEED FROM PARR-RICHMOND INDUSTRIAL CORPORATION TO SOUTHERN PACIFIC RAILROAD COMPANY, RECORDED AUGUST 7, 1953, IN BOOK 2172 OF OFFICIAL RECORDS, PAGE 514; THENCE ALONG SAID SOUTH LINE AS FOLLOWS:

SOUTH 83° 58' 13" EAST, 68.37 FEET; EASTERLY ALONG THE ARC OF A TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 291.90 FEET
OF 35.37 FEET AND SOUTH 73° 32' 21" EAST, 7.49 FEET TO THE EXTENSION NORTH 1° 28' 21" EAST AT THE MOST WESTERN LINE OF SAID CITY OF RICHMOND PARCEL (1272 OR 161); THENCE SOUTH 1° 28" 21' WEST ALONG SAID EXTENSION AND ALONG SAID WESTERN LINE 1057.71 FEET TO THE POINT OF BEGINNING.

PARCEL 4: 

A PORTION OF AMENDMENT TO MAP OF ELLIS LANDING, FILED OCTOBER 28, 1913, IN BOOK 11 OF MAPS, PAGE 247; AND A PORTION OF TIDE LOTS 5 AND 12, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AS SHOWN ON MAP NO. 1, SALT MARSH AND TIDE LANDS, FILED JUNE 11, 1917, SAID MAPS BEING FILED IN THE OFFICE OF THE COUNTY RECORDER OF CONTRA COSTA COUNTY AND MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE WESTERN LINE OF EIGHTH STREET AS SAID STREET IS SHOWN ON SAID AMENDMENT TO MAP OF ELLIS LANDING, SAID POINT

BEING ALSO THE SOUTHEAST CORNER OF THE 3.39 ACRE STRIP DESCRIBED IN DEED FROM PARR RICHMOND INDUSTRIAL CORPORATION TO THE CITY OF RICHMOND FOR STREET PURPOSES, (SAID PORTION OF SAID STRIP BEING COMMONLY CALLED WRIGHT AVENUE), RECORDED AUGUST 11, 1948, IN BOOK 1272 OF OFFICIAL RECORDS, PAGE 161; THENCE SOUTH 1° 26' 21" WEST ALONG THE WESTERN LINE OF SAID EIGHTH STREET AND ITS SOUTHERLY PROJECTION 1229.02 FEET TO THE SOUTHERLY LINE OF DOCK AVENUE AS SAID DOCK AVENUE IS SHOWN ON SAID AMENDMENT TO MAP OF ELLIS LANDING; THENCE SOUTH 62° 53' 39" EAST ALONG SAID SOUTHERLY LINE OF DOCK AVENUE, 15.76 FEET TO THE NORTHERN CORNER OF THE TRACT OF LAND DESCRIBED AS PARCEL ONE IN THE DEED FROM ELLIS LANDING AND DOCK CO., A CORPORATION, TO THE CITY OF RICHMOND, DATED FEBRUARY 10, 1926, RECORDED APRIL 22, 1926, IN BOOK 29 OF OFFICIAL RECORDS, PAGE 283; THENCE SOUTH 4° 19' 34" EAST ALONG THE WEST LINE OF SAID LAST MENTIONED PARCEL AND ALONG THE WEST LINE OF PARCEL TWO DESCRIBED IN SAID DEED (29 OR 283), 120.30 FEET TO THE NORTHERLY U.S. PIERHEAD AND BULKHEAD LINE OF SAID RICHMOND INNER HARBOR; THENCE NORTH 71° 04' 25" WEST ALONG SAID NORTHERLY LINE 467.06 FEET TO THE SOUTHERLY EXTENSION OF THE EASTERLY LINE OF THE PARCEL OF LAND DESCRIBED IN DEED FROM PARR RICHMOND INDUSTRIAL CORPORATION TO TIME OIL CO., DATED JUNE 9, 1950 AND RECORDED JUNE 23, 1950, IN BOOK 1580 OF OFFICIAL RECORDS, PAGE 553; THENCE NORTH 2° 38' 09" WEST ALONG SAID SOUTHERLY EXTENSION AND SAID EASTERLY LINE, 1218.26 FEET TO THE SOUTHERLY LINE OF THE SAID 3.39 ACRE STRIP (1272 OR 161); THENCE SOUTH 88° 33' 39" EAST ALONG SAID SOUTHERLY LINE, 505.76 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM:

THE PARCEL OF LAND DESCRIBED IN THE DEED TO TIME OIL CO., RECORDED NOVEMBER 23, 1966, BOOK 5250, OFFICIAL RECORDS, PAGE 411.

PARCEL 6:

BEGINNING AT THE NORTHWESTERN CORNER OF THE LAND DESIGNATED AS PARCEL 2 IN THE QUIT CLAIM DEED TO PARR-RICHMOND INDUSTRIAL CORPORATION, RECORDED JUNE 1, 1949 IN BOOK 1394 OF OFFICIAL RECORDS OF CONTRA COSTA COUNTY, PAGE 370; RUNNING THENCE ALONG THE NORTHERN LINE OF SAID LAND, BEING THE SOUTHERN LINE OF CUTTING BOULEVARD, EASTERLY, 88.61 FEET TO THE EASTERN LINE OF THE LAND SECONDLY DESCRIBED IN THE DEED TO PARR-RICHMOND TERMINAL CORPORATION, RECORDED DECEMBER 30, 1953, IN BOOK 2681 OF OFFICIAL RECORDS OF CONTRA COSTA COUNTY, PAGE 353; THENCE ALONG THE LAST NAMED LINE SOUTH 1° 56' WEST, SAID BEARINGS USED FOR THE PURPOSE OF THIS DESCRIPTION, 139.51 FEET AND SOUTH 6° 53' WEST 38.59 FEET TO THE NORTHERN LINE OF THE LAND FIRSTLY DESCRIBED IN SAID LAST MENTIONED DEED; THENCE ALONG THE LAST NAMED LINE NORTH 89° 34' WEST 144.10 FEET TO THE WESTERN LINE OF SAID LAND FIRST MENTIONED 1394 OR 370; AND THENCE ALONG THE LAST NAMED LINE NORTH 83 FEET AND NORTH 39° 53' EAST 84.13 FEET TO THE POINT OF BEGINNING.

EXCEPTING THEREFROM:

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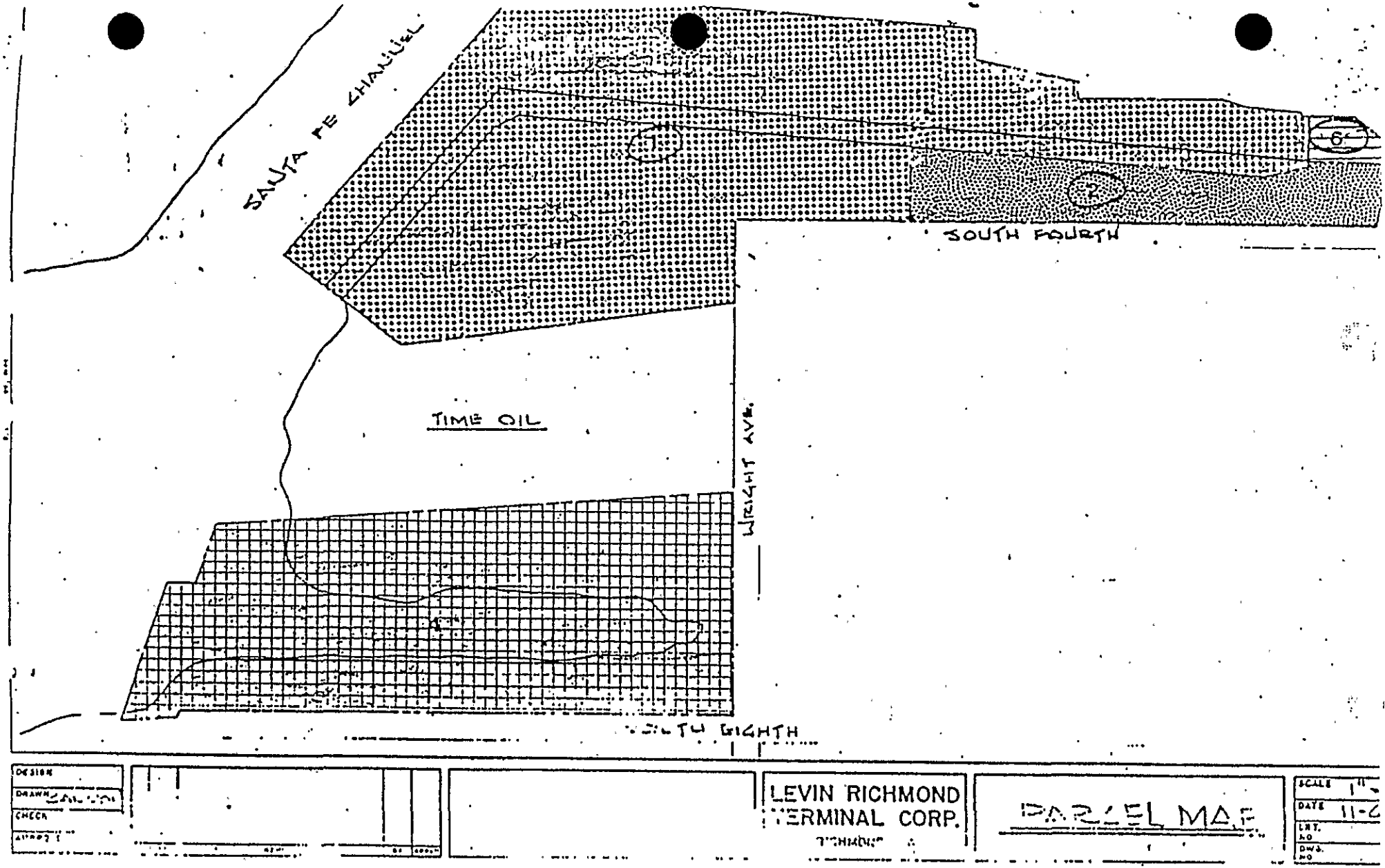
SANTA FE CHANNEL
SOUTH FOURTH
TIME OIL
WRIGHT AVE.
SOUTH EIGHTH
LEVIN RICHMOND
TERMINAL CORP.
PARCEL MAP

EXHIBIT B1

THE LAND REFERRED TO HEREIN IS SITUATED IN THE STATE OF CALIFORNIA, COUNTY OF CONTRA COSTA, CITY OF RICHMOND, DESCRIBED AS FOLLOWS:

PARCEL 1: [redacted]

PORTION OF TIDE LAND LOTS 26 AND 27, SECTION 13, PORTION OF TIDE LAND LOTS 6, 7, 10 AND 11, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AND A PORTION OF SWAMP AND OVERFLOW LANDS IN SAID TOWNSHIP AND RANGE, DESCRIBED AS FOLLOWS:

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PARCEL 2: [redacted]

PORTION OF BLOCK 50 AND A PORTION OF FOURTH STREET AS SHOWN ON THE REVISED MAP OF SANTA FE, FILED AUGUST 24, 1915, IN BOOK 12 OF MAPS, PAGE 280; PORTION OF LOT 42 AS SHOWN ON THE MAP OF SAN PABLO RANCHO, FILED MARCH 1, 1894; PORTION OF TIDE LOT 27, SECTION 13 AND A PORTION OF TIDE LOT 6, SECTION 24, TOWNSHIP 1 NORTH, RANGE 5 WEST, MOUNT DIABLO BASE AND MERIDIAN, AS SHOWN ON MAP NO. 1 SALT MARSH AND TIDE

LANDS; FILED JUNE 11, 1917, IN RACK MAP NO. 9, IN THE OFFICE OF THE COUNTY RECORDER OF CONTRA COSTA COUNTY, DESCRIBED AS FOLLOWS:

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OF 35.37 FEET AND SOUTH 73° 32' 21" EAST, 7.49 FEET TO THE EXTENSION NORTH 1° 28' 21" EAST AT THE MOST WESTERN LINE OF SAID CITY OF RICHMOND PARCEL (1272 OR 161); THENCE SOUTH 1° 28" 21' WEST ALONG SAID EXTENSION AND ALONG SAID WESTERN LINE 1057.71 FEET TO THE POINT OF BEGINNING.

PARCEL 4: 

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EXCEPTING THEREFROM:

THAT PORTION THEREOF LYING WITHIN THE LINES OF THE PARCEL OF LAND DESCRIBED AS PARCEL ONE IN THE DEED TO PARR-RICHMOND TERMINAL COMPANY, RECORDED OCTOBER 4, 1951, BOOK 3955, OFFICIAL RECORDS,

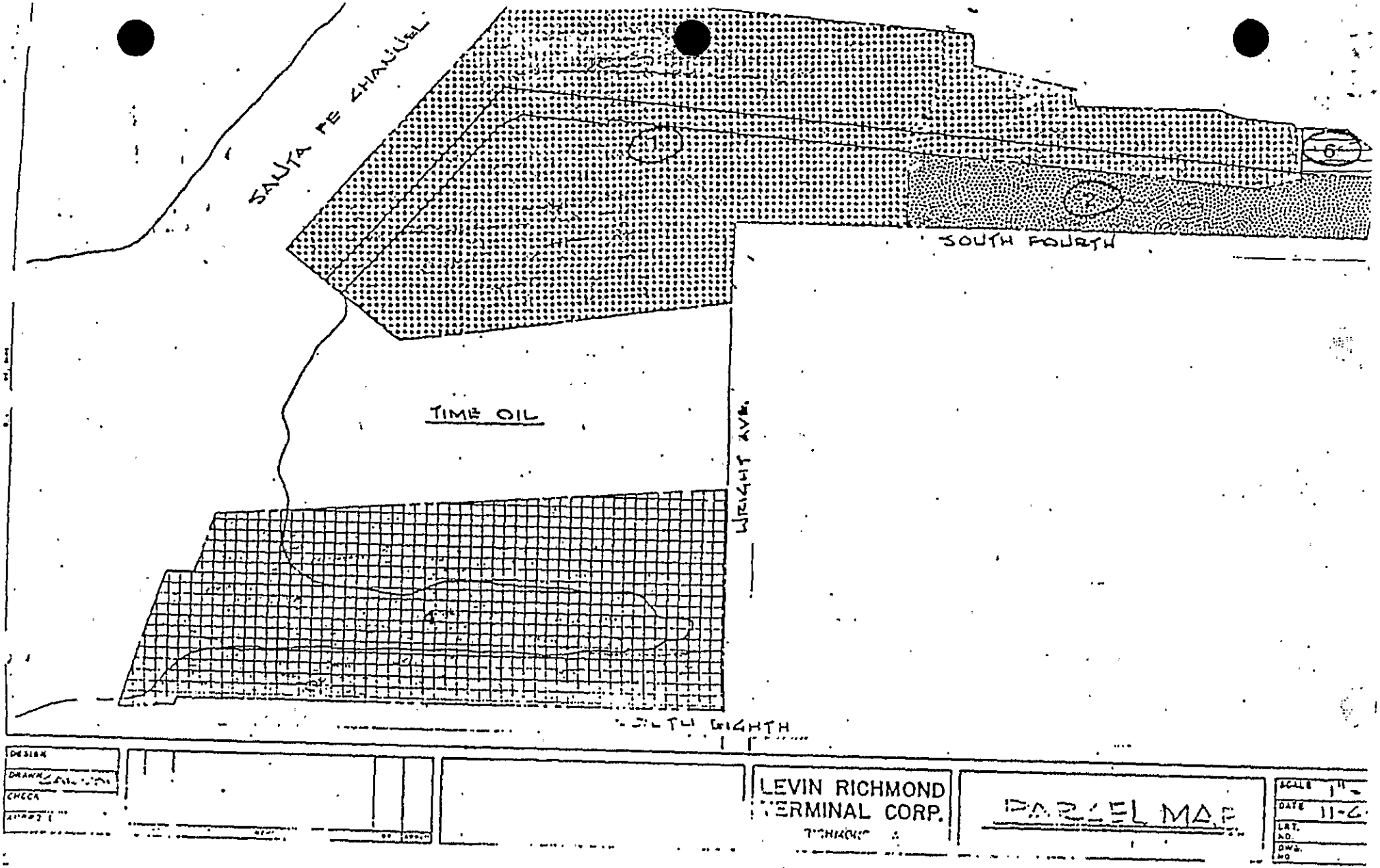
SANTA FE CHANNEL
1
2
6
SOUTH FOURTH
TIME OIL
WRIGHT AVE.
SOUTH EIGHTH
DESIGN
DRAWN
CHECK
LEVIN RICHMOND TERMINAL CORP.
PARCEL MAP
SCALE 1"
DATE 11-6
LRT. NO.
DWG. NO.

EXHIBIT B1

Appendix D: Human Health and the Environment Risk Assessment

Human Health and Environment Risk Assessment Review

1994 Human Health Risk Assessment in the United Heckathorn ROD

A Human Health Risk Assessment for the United Heckathorn Site was performed in 1994. The following were exposure pathways identified as potential concerns at the site:

- Ingestion and dermal adsorption of chemicals in onsite surface soils by workers at the Site;
- Inhalation of fugitive dust from surface soils by onsite workers;
- Ingestion and dermal adsorption of chemicals in onsite surface and subsurface soils by temporary construction workers at the Site;
- Inhalation of fugitive dust from soils by temporary construction workers at the Site;
- Incidental ingestion and dermal adsorption of chemical in offsite soils by nearby residents, and;
- Ingestion of contaminants in fish and shellfish from the Lauritzen, Santa Fe, and Inner Richmond Harbor Channels by fisherman and their families.

Of the six exposure pathways considered, the only exposure pathway considered to be a risk to human health above USEPA's acceptable risk range is the consumption of fish. This potential risk entails harvesting of fish and shellfish from the Lauritzen Channel, Santa Fe Channel, and Richmond Inner Harbor Channel. There is no new information that indicates a new pathway that was not previously considered in this risk assessment.

The risk assessment indicated the lifetime excess cancer risk associated with Site COCs for the exposure pathway of fish consumption is above 10^{-3} for consumption of whole fish, and above 10^{-4} for fillets. The risks to people who consume fish caught in the inner Richmond Harbor were evaluated using information from two sources: fish tissue data generated as part of EPA's ecological assessment of the Site, and community interviews with individuals who fish or are familiar with fishing practices in Richmond Harbor. These community interviews confirmed that fishing occurs regularly in Richmond Harbor, particularly at a site in the Inner Harbor Channel near the Parr Canal that has unrestricted access. Although it could not be determined from the limited interviews performed whether fishing at subsistence rates occurs in the harbor, it is clear that the fishermen are from poor communities, and that the fish are caught for consumption. Fishing in the Lauritzen Channel is restricted because it is surrounded by fenced industrial facilities, and fishing from boats is discouraged by warning signs. New warning signs were posted within the past five years. The risk assessment concluded that institutional controls, such as fences and postings, will be ineffective or not maintained.

Site cleanup standards were set in the 1994 ROD on the basis of the initial human health risk assessment. 1994 cleanup standards and excess lifetime cancer risk (ELCR) levels they are based on are summarized in table D.1.

Table D.1. 1994 ROD Cleanup Standards and TBC Standards

Medium	Chemical	Level	Basis	ELCR
Marine Surface Water*	DDT	0.00059 µg/L	1994 AWQC for the consumption of organisms	$1x10^{-6}$
	Deldrin	0.00014 µg/L	1994 AWQC for the consumption of organisms	$1x10^{-6}$
Marine Sediment*	DDT	590 µg/kg	Site-specific; based on achieving human health 1994 AWQC for consumption of organisms	$1x10^{-6}$
Tissue**	DDT	50 ng/g	National Academy of Sciences (NAS) saltwater action level for total DDTs in fish tissue of 50 ng/g	n/a

Notes:
*1994 ROD Cleanup Standard
**1994 To-Be-Considered (TBC) Standard
µg/L = micrograms per liter
µg/kg = micrograms per kilogram
ng/g = nanograms per gram
AWQC = ambient water quality criteria
ELCR = excess lifetime cancer risk

1994 Ecological Risk Assessment in the United Heckathorn ROD

An ecological Risk Assessment for the United Heckathorn Site was performed in 1994. The goals of this risk assessment were to assess the threats posed to the environment by the contaminants released from United Heckathorn and to determine cleanup levels protective of the beneficial uses of San Francisco Bay.

The major phase of the risk assessment involved a study which consisted of field and laboratory measurements of contaminant concentrations in various media and the performance of standard benthic tests for determining impacts from contaminated sediments. The field samples were taken in 1991 and 1992.

The total DDT levels measured in surface water from Lauritzen, Santa Fe and lower Richmond Inner Harbor Channels were 50 ng/L, 9 ng/L, and 1 ng/L, respectively. The dieldrin concentrations were 18 ng/L, 2 ng/L, and non-detectable, respectively. These results indicate that the water quality criteria are violated in the Lauritzen and Santa Fe Channels, but are achieved (within the uncertainty of the analysis)

or not detectable in the lower Inner Harbor Channel. Analysis of water-to-sediment ratios indicates that the Lauritzen is a source of contamination to the other channels.

Sediment concentrations of total DDT declined from over 50 mg/kg in the Lauritzen Channel to 12 µg/kg near Point Potrero. Dieldrin concentrations declined from 570 µg/kg in the Lauritzen to non-detectable levels in the Inner Harbor Channel. These results are consistent with those of previous researchers.

Various tests of biological organisms, including shiner perch fish, mussels and *Macoma nasuta*, were tested and showed levels of DDT and dieldrin above levels that may cause adverse impacts to the ecological system in the Site. The specifics of these can be found in the 1994 ROD Ecological Risk Assessment.

Overall, the results indicated that the gross contaminant levels in the Lauritzen Channel threaten a variety of ecological receptors at various trophic levels, including benthic and water-column organisms and fish-eating birds. Effects are likely to be much less severe in the Santa Fe Channel, although the contaminant levels in fish are significantly higher than the levels that may threaten sensitive fish-eating birds. In the Richmond Inner Harbor Channel, the DDT levels in fish (100 µg/kg) are between the level that is the basis of EPA's chronic marine water quality criteria intended to protect marine birds (150 µg/kg), and the National Academy of Sciences (NAS) recommendation (50 µg/kg) for protecting marine birds. It is clear from the results above that the most sensitive ecological receptors to sediment organochlorines in Richmond Harbor are likely to be fish-eating marine birds.

Table D.2. Summary of Marine Surface Water ROD and Proposed Cleanup Levels and Current NRWQC

	1994 ROD (µg/L)	Current NRWQC (µg/L)
Total DDTs		
Human Health	0.00059 [2]	0.000168 [3]
Ecological	-	0.001 [4]
Dieldrin		
Human Health	0.00014 [2]	0.0000012 [2]
Ecological	-	0.0019

[1] USEPA AWQC from 2002
[2] based ELCR = $1x10^{-6}$
[3] based on ELCR = $1x10^{-5}$; represents criteria for total DDTs [sum of NRWQC for p,p′-Dichlorodiphenyldichloroethane (DDD), p,p′-Dichlorodiphenyldichloroethylene (DDE), and p,p′-Dichlorodiphenyltrichloroethane (DDT)];
[4] represents the ecological water quality criteria for 4,4'-DDT
NRWQC = National Recommended Water Quality Criteria

Toxicity values: EPA's Integrated Risk Information System (IRIS) has a program to update toxicity values used by the Agency in risk assessment when newer scientific information becomes available. In the past five years, there have been changes to the toxicity values for the COCs at the Site.

To evaluate the protectiveness of the cleanup standards for this FYR, those standards for these COCs were compared to EPA's current National Recommended Water Quality Concentrations (NRWQC) for human health (Table D.2). The NRWQC for cancer risks are chemical-specific concentrations for individual contaminants that correspond to an excess cancer risk level of $1x10^{-6}$ for dieldrin and $1x10^{-5}$ for DDT (DDD, DDE, and DDT). The NRWQC were revised in 2015 for DDT and dieldrin. These concentrations have been developed for various exposure criteria relating to water quality, including fish consumption rates. This comparison provides a good indication of whether actions may be needed to address potential human health exposures. The EPA Risk range is between $1x10^{-6}$ and $1x10^{-4}$. Values that fall within this range were determined to be acceptable from a risk stand point. Any concentration below the cancer value indicates that cancer risk is low, while concentrations significantly above the cancer value may indicate an increase in cancer risk.

For both DDT and dieldrin, human health cleanup parameters are more stringent than ecological cleanup parameters. Because of this, human health carcinogenic levels are the main basis for cleanup levels.

The NRWQC for human health for dieldrin was updated in 2015. The carcinogenic criteria for dieldrin was updated to a level of 0.0000012 µg/L. The 1994 ROD lists the cleanup standard for dieldrin to be 0.00014 µg/L. Recent sampling concentrations (2013) of dieldrin range from 0.000129 µg/L to 0.00306 µg/L. The revised NRWQC for dieldrin is lower than the 1994 ROD remediation goal and lower than the range of recent sampling concentrations. The remediation goal concentration for dieldrin in surface water may need to be lowered to be protective of human health.

In the 1994 ROD, for cleanup purposes DDT was defined as the sum of DDT, DDD and DDE. For that reason, the AWQC levels for those three chemicals were summed to create the AWQC level for DDT. The water quality criteria levels with respect to marine surface water for DDT, DDD and DDE were updated in 2015. After summing the three COCs, the carcinogenic criteria for DDT was updated to a level of 0.00017 µg/L. The 1994 ROD lists the cleanup standard for DDT to be 0.00059 µg/L. The revised NRWQC for DDT is lower than the 1994 ROD remediation goal and lower than the range of recent sampling concentrations. The remediation goal concentration for DDT in surface water may need to be lowered to be protective of human health.

In the 1994 ROD, sediment cleanup levels for both COCs (DDT and dieldrin) were established based on DDT criteria. It was established, in the 1994 ecological assessment, that sediment concentrations below 590 µg/kg DDT (that being DDT, DDD and DDE) were protective to human health and the environment. This sediment cleanup goal was based on achieving the 0.00059 µg/L cleanup level for surface water established in the ROD. Since the risk reassessment in 2010 found the surface water remediation goals were not stringent enough, it follows that the 1994 sediment goals upon which the surface water remediation goals rely, are not stringent enough. The remediation goal concentrations for dieldrin and DDT in sediments may need to be lowered to be protective of human health and ecological risk.

Vapor Intrusion:

There is no potential for vapor intrusion at the United Heckathorn Site. The primary COCs at the Site, DDT and dieldrin, are not vapor-forming chemicals.

Appendix E: Press Notice

West County Times
1050 Marina Way S
Richmond, CA 94804
(510) 262-2740

2003193

CALIF. NEWSPAPER SVC.
BILLING DEPT.
PO BOX 60460
LOS ANGELES, CA 90060

PROOF OF PUBLICATION

FILE NO. 2847108

In the matter of

West County Times

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter.

I am the Principal Legal Clerk of the West County Times, a newspaper of general circulation, printed and published at 2640 Shadelands Drive in the City of Walnut Creek, County of Contra Costa, 94598

And which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Contra Costa, State of California, under the date of August 29, 1978. Case Number 188884.

The notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

02/20/2016

I certify (or declare) under the penalty of perjury that the foregoing is true and correct.

Executed at Walnut Creek, California.
On this 22th day of February, 2016.

Signature

Legal No. **0005674318**

PUBLIC NOTICE
THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY BEGINS FOURTH FIVE-YEAR REVIEW OF CLEANUP AT THE UNITED HECKATHORN SUPERFUND SITE

The U.S. Environmental Protection Agency (EPA) has begun its fourth Five-Year Review (FYR) of cleanup actions at the United Heckathorn Superfund Site (Site) located in Richmond, California. Previous reviews were conducted in 2001, 2006, and 2011.

THE REVIEW PROCESS
The primary purpose of a FYR is to determine whether a site remedy remains protective of human health and the environment. EPA generally conducts FYRs when hazardous substances remain at a site above risk-based levels that prevent unrestricted use and exposure. As part of the review, EPA looks at how well the remedy is achieving EPA's cleanup goals, changes in scientific knowledge about site contaminants, changes in potential exposure, and changes in regulations.

SITE HISTORY
From the mid-1940s to the mid-1960s, the Site was used for processing, packaging, and shipping pesticides, particularly dichlorodiphenyl trichloroethane (DDT) and dieldrin. Pesticide releases to adjacent soil and waterways occurred as a result of poor material management and housekeeping controls during this period of operation. In 1990, the Site was placed on EPA's National Priorities List (NPL). In 1994, EPA selected a cleanup remedy in a document called a Record of Decision. The remedy addressed both the upland area consisting of the former United Heckathorn facility and the adjacent marine sediments. Previous reviews indicated that the marine remedy is no longer protective, and EPA is currently conducting a Feasibility Study to evaluate additional actions.

COMMUNITY INVOLVEMENT
If you have any concerns about the Site, and particularly if you have direct knowledge regarding the operation and maintenance of the remedy, then EPA would like to talk with you. Please contact Jackie Lane, EPA Community Involvement Coordinator, at (415) 972-3236 or lane.jackie@epa.gov. If you have questions about the site you can also contact the project manager Rachelle Thompson at (415) 972-3962 or thompson.rachelle@epa.gov. The FYR is scheduled for completion at the end of September 2016, and the report will be available at the Richmond Public Library and online at www.epa.gov/superfund/unitedheckathorn.

CNS-2847108#

A00000401926 4

Appendix F: Interview Forms

Five-Year Review Interview Record			
Site:	United Heckathorn Superfund Site	**EPA ID No:**	

Interview Type: *Site Visit*
Location of Visit: Richmond, CA
Date: 11 January 2016
Time: 2:00 PM

Interviewers

Name	Title	Organization
Aaron King	Environmental Engineer	USACE

Interviewees

Name	Organization	Title	Telephone	Email
Jim Holland	Levin Richmond Terminal Group	Director of Facilities and Equipment	(510) 232-4422	jimh@levinterminal.com
Scott Bourne	Weiss Associates	Principal Engineer	(510) 450-6191	sab@weiss.com

Summary of Conversation

1) What is your overall impression of the project?

Appears that the upland remedy has worked, but the in-water remedy has not worked; and it's getting worse.

2) Is the remedy functioning as expected? How well is the remedy performing?

See Answer 1.

3) What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

Stormwater monitoring data is erratic; there is no discernable trend at this point.

4) Is there a continuous O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

There is no continuous O&M presence. The stormwater system is inspected monthly. Deficiencies in the cap are identified at that time.

5) Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years? If so, do they affect protectiveness of the remedy? Please describe changes and impacts.

Monitoring points for the stormwater monitoring system were consolidated to just the influent to and effluent from the treatment system.

6) What are the annual operating costs for your organization's involvement with the site?

$30K – $70K

7) Have there been unexpected O&M difficulties or costs at the site in the last five years? If so, please give details.

No.

8) Have there been opportunities to optimize O&M or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

Consolidation of sampling points for stormewater system. There are plans to remove more railroad track and install more cap (more stormwater collection and treatment).

9) Are you aware of any changes in Federal/State/County/Local laws and regulations that may impact the protectiveness of the remedy?

No.

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

No. Extensive comments on the upcoming FFS have been provided to EPA.

Appendix G: Site Inspection Checklist

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: United Heckathorn	**Date of inspection:** January 11, 2016
Location: Richmond, CA	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:** partly cloudy, ~55°F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Surface water collection and treatment (Stormwater collection and treatment)
- ☒ Other: Upland Soils Excavation and Capping; In water Sediment Dredging and Capping

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Jim Holland (Name) Director of Facilities and Equipment (Title) 1/11/2016 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☒ Report attached Interview record provided separately; Mr. Holland and Mr. Bourne interviewed at the same time.

2. **O&M contractor** Scott Bourne (Name) Principal Engineer (Title) 1/11/2016 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☒ Report attached Interview record provided separately; Mr. Holland and Mr. Bourne interviewed at the same time.

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   None.

4. **Other interviews** (optional) ☐ Report attached.

None

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☐ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks O&M Manual is a draft document from 1998 before remedy installation; there is apparently no evidence that it was approved. However, O&M activities are partially based on its contents. Maintenance is summarized in each annual O&M report.

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A
Contingency plan/emergency response plan ☒ Readily available ☒ Up to date ☐ N/A
Remarks Emergency Response Plan is within the Health and Safety Plan

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A
Remarks OSHA training records kept by specific contractors that perform the remedial work

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits_____	☐ Readily available	☐ Up to date	☒ N/A

Remarks

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks

6. **Settlement Monument Records** ☒ Readily available ☒ Up to date ☐ N/A
Remarks Settlement records are documented in the 2013 and 2014 O&M Reports

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☒ Water (effluent)	☒ Readily available	☒ Up to date	☐ N/A

Remarks Effluent from stormwater treatment system is monitored and reported.

10. **Daily Access/Security Logs** ☒ Readily available ☒ Up to date ☐ N/A
Remarks The property is fenced and access is controlled because of Port activities. Visitors must sign in at the security office.

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house	☐ Contractor for State
☒ PRP in-house	☐ Contractor for PRP
☐ Federal Facility in-house	☐ Contractor for Federal Facility
☐ Other	

2. **O&M Cost Records**
☒ Readily available ☒ Up to date
☒ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual costs for the review period range from approximately $30,000 to $70,000

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: None.

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A
   Remarks Fencing intact and in good conditions. Access tightly secured.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A
   Remarks Additional security cameras added in recent years.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
   Site conditions imply ICs not properly implemented ☒ Yes ☐ No ☐ N/A
   Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☐ N/A

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A
   Remarks

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident
   Remarks Trespassing is incredibly unusual (and unlikely) due to security measures. Active police chase once resulted in person entering site.

2. **Land use changes on site** ☒ N/A
   Remarks

3. **Land use changes off site** ☐ N/A
   Remarks IMTT demolished structures across the waterway from the northern portion of the site.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A
   Remarks

B. Other Site Conditions

Remarks Site very secure; Industrial operations have received many safety awards.

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A

B. Surface Water Collection Structures, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. **Collection Structures, Pumps, and Electrical**
   ☒ Good condition ☐ Needs Maintenance
   Remarks

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
☒ Good condition ☐ Needs Maintenance
Remarks

3. **Spare Parts and Equipment**
☒ Readily available ☒ Good condition ☐ Requires upgrade ☐ Needs to be provided
Remarks

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
☐ Air stripping ☐ Carbon adsorbers
☒ Filters Sand filters
☒ Additive (*e.g.*, chelation agent, flocculent) polymer coagulant
☒ Others Settling tanks
☒ Good condition ☐ Needs Maintenance
☐ Sampling ports properly marked and functional
☐ Sampling/maintenance log displayed and up to date
☒ Equipment properly identified
☐ Quantity of groundwater treated annually N/A
☒ Quantity of surface water treated annually erratic, dependent on amount of rainfall
Remarks Influent and effluent of stormwater treatment system are sampled

2. **Electrical Enclosures and Panels** (properly rated and functional)
☐ N/A ☒ Good condition ☐ Needs Maintenance
Remarks

3. **Tanks, Vaults, Storage Vessels**
☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
Remarks Secondary containment not provided

4. **Discharge Structure and Appurtenances**
☐ N/A ☒ Good condition ☐ Needs Maintenance
Remarks

5. **Treatment Building(s)**
☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
☐ Chemicals and equipment properly stored
Remarks

6. **Monitoring Wells** (pump and treatment remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☒ N/A
Remarks

D. Monitoring Data

1. Monitoring Data
☒ Is routinely submitted on time ☒ Is of acceptable quality

2. Monitoring data suggests: N/A
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☒ N/A
Remarks

X. OTHER REMEDIES

Sediment cap remedy was not observed during site visit.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The upland remedy is effective at preventing exposure and capturing stormwater. Stormwater treatment was not a part of the ROD-selected remedy, but it is effective at reducing COC concentrations in stormwater discharged to the waterway. Though it could not be observed, the sediment remedy is apparently not effective or functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Stormwater is monitored monthly, and deficiencies in the cap are monitored at the same time. Annual O&M reports document cap deficiencies/corrections and other maintenance. 100% of the stormwater lines have been inspected in the last few years; two corrections were made. Upland cap settlement has been monitored and will continue to be monitored. These kinds of actions will continue to ensure that the upland remedy is protective.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

An ex situ treatment system had been added to the stormwater collection component to improve treatment of water being discharged. Polymer coagulant was added to that process to improve effectiveness. The sediment remedy has not been effective; an FFS is in progress to evaluate new remedies.

D. Opportunities for Optimization

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

Stormwater monitoring points were consolidated to include only influent and effluent samples rather than samples from each interceptor trench. More railroad tracks are to be removed and replaced with asphalt cap; more stormwater will be captured and treated as a result.

Appendix H: Photographs from Site Inspection Visit

Trip Report
United Heckathorn, Richmond, CA

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1. INTRODUCTION

a. Date of Visit: January 11, 2016

b. Location: United Heckathorn Superfund Site, Richmond, CA

c. Purpose: A site visit was conducted to visually inspect and document the conditions of the remedy, the site, and the surrounding area for inclusion into the Five-Year Review Report.

d. Participants: *List all attendees*

Aaron King	USACE, Environmental Engineer	206-764-6744
Taly Jolish	USEPA, Attorney	<phone number>
Jamie Eby	CH2MHill, Project Manager	<phone number>
Jim Holland	Levin Richmond Terminal Corp., Director of Facilities and Equipment	510-232-4422
Scott Bourne	Weiss Associates, Principal Engineer	510-450-6191

2. SUMMARY

A site visit to the United Heckathorn Superfund Site was conducted on 11 January 2016. The participants toured the uplands area after of overview of the site and the remedial history; the in-water portion of the remedy was not inspected. The upland actions generally seem to be in good condition and operating as intended.

3. DISCUSSION

On 11 January 2016, Mr. King flew to Oakland, California and drove to the Richmond BART station to pick up Ms. Jolish. Mr. King and Ms. Jolish then drove to the site and met the rest of the site visit participants at the site at about 1:00 PM. The weather was partly cloudy and mild (temperature in the mid-50s). The site is located in an industrial area near the Lauritzen Canal in Richmond, California and is accessed from Wright Avenue.

After Mr. King, Ms. Jolish, and Mr. Eby signed in at the security office, Mr. Holland briefly described the site features and the installed remedies. After the overview, the team proceeded outside to inspect the upland cap and the stormwater collection/treatment system. The group walked the capped area from south to north while Mr. Holland and Mr. Bourne provided additional information regarding operations on site. Approximately 10,000 tons of petroleum coke were being stored on a portion of the capped area. The remainder of the area was being used for storing equipment. The cap appeared to be in generally good condition. Some areas of damage were identified, though Mr. Bourne confirmed that these were already slated for future maintenance. The seams between cap segments were also identified as areas that receive frequent maintenance.

Interceptor trenches SW-3 through SW-7 were identified along the way. Stormwater in other interceptor trenches are pumped to SW-5 to form a combined influent to the stormwater treatment system. The treatment system consists of addition of coagulant, settling, sand filtration, and discharge to the Lauritzen Canal. Components of the treatment system were adequately identified, and were in good, almost new condition. The influent and effluent of the treatment system are sampled monthly; stormwater from the individual interceptor trenches are no longer monitored.

Following the inspection of the upland actions, Mr. King conducted a brief interview of Mr. Holland and Mr. Bourne for inclusion in the FYR.

The site visit ended at approximately 1445.

4. ACTIONS

The USACE will incorporate information obtained from the site visit into the Five Year Review report.

Aaron King
Environmental Engineering
CENWS-EN-TS-ET

Site Visit Photos

Photo 1. Interceptor SW-3

Photo 2. Petroleum Coke Stockpile

Photo 3. Damage in Upland Cap slated for Repairs

Photo 4. Seams in the Cap Segments

Photo 5. Gravel Cap Material near Railroad Tracks

Photo 6. Gravel and Asphalt Caps looking north

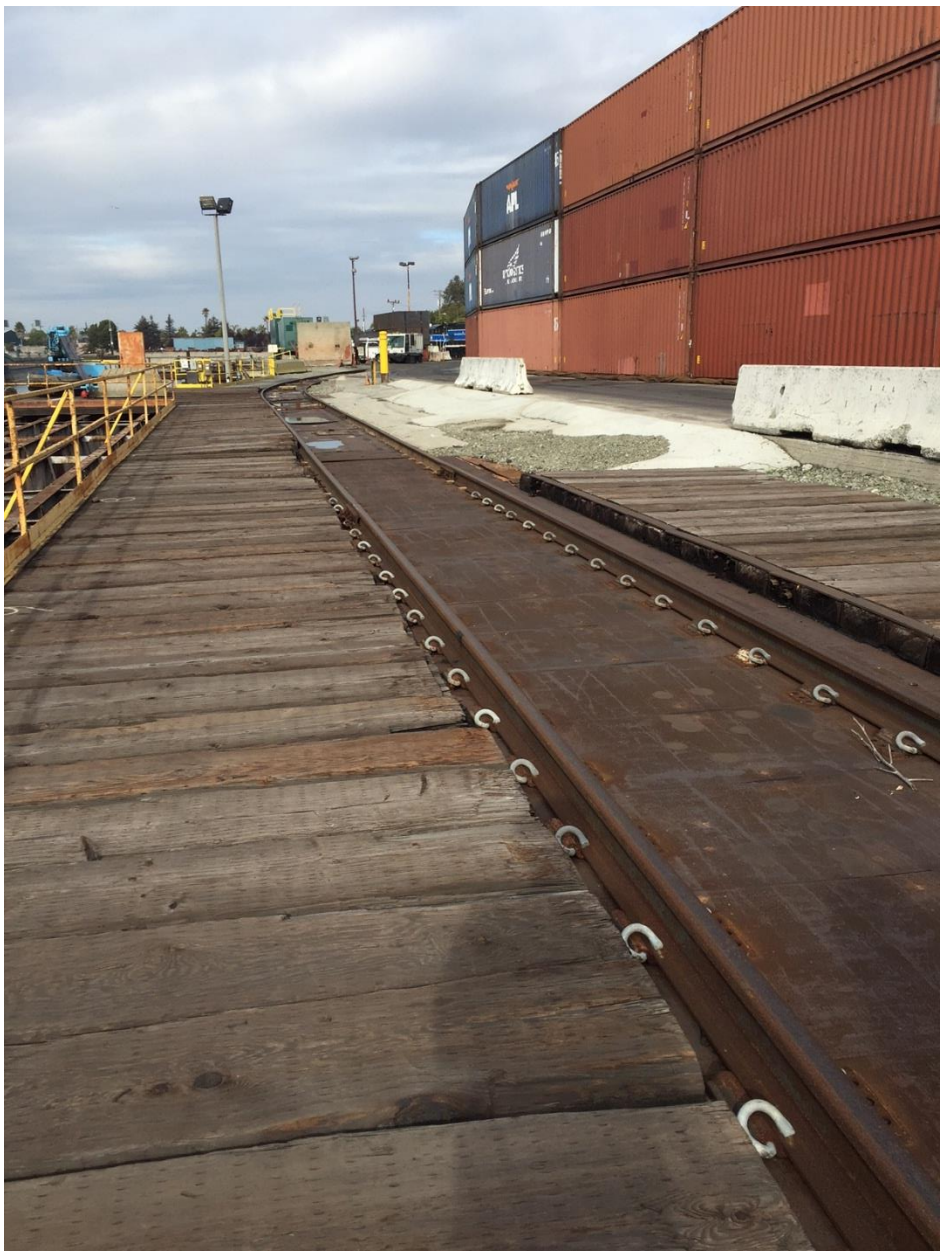

Photo 7. Railroad, Gravel Cap, Asphalt Cap, and Stormwater Treatment system looking north

Photo 8. Interceptor SW-4

Photo 9. Gravel Cap, Stormwater Treatment System looking north

Photo 10. Settling Tank, Influent Piping and Flow Meter

Photo 11. Polymer Tank, Settling Tank, and Sand Filter Container

Photo 12. Sand Filters

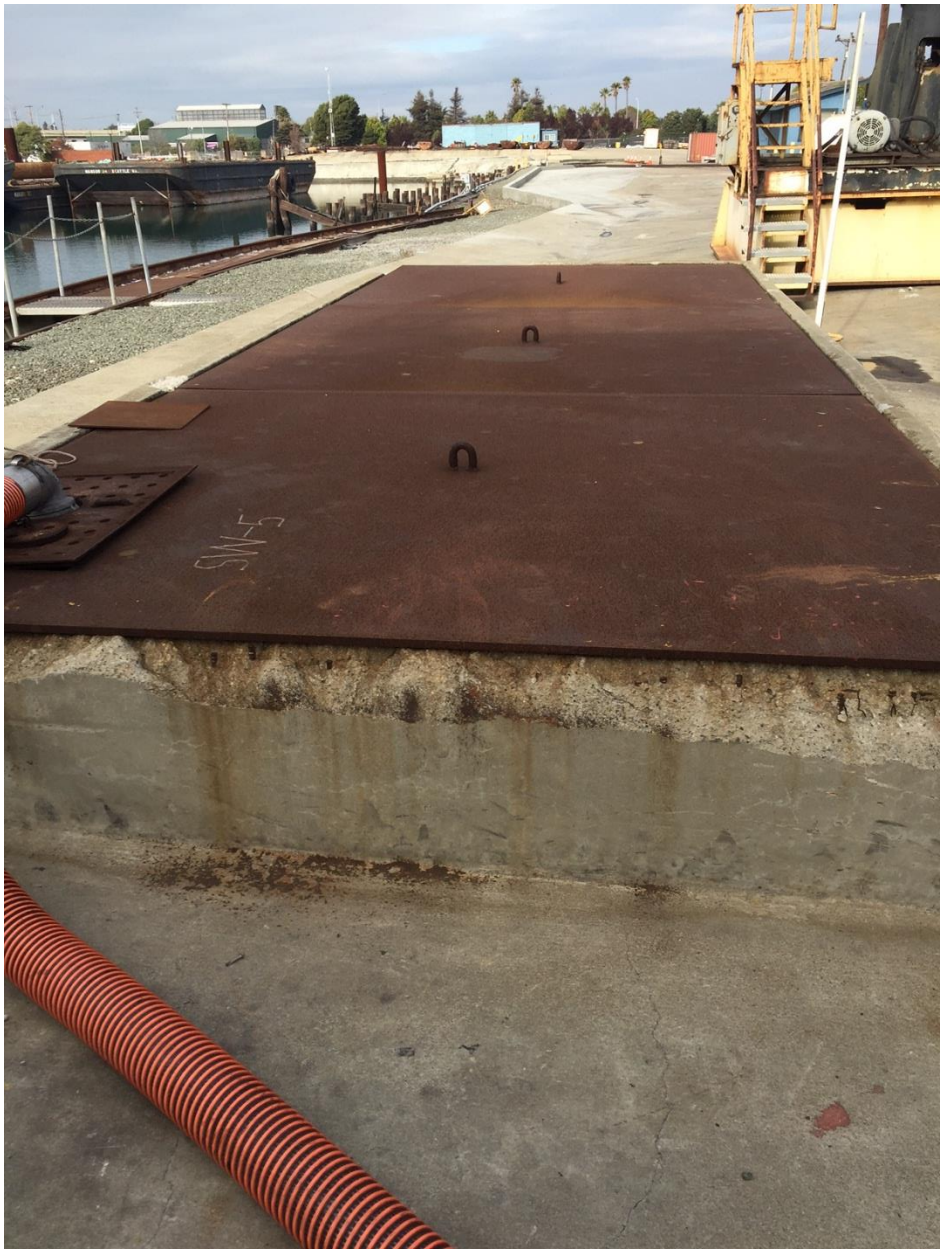

Photo 13. Interceptor SW-5, looking north

Photo 14. Interceptor SW-5 and Stormwater Treatment System, looking south

Photo 15. Area of New Pavement where Railroad Tracks have been Removed, looking north

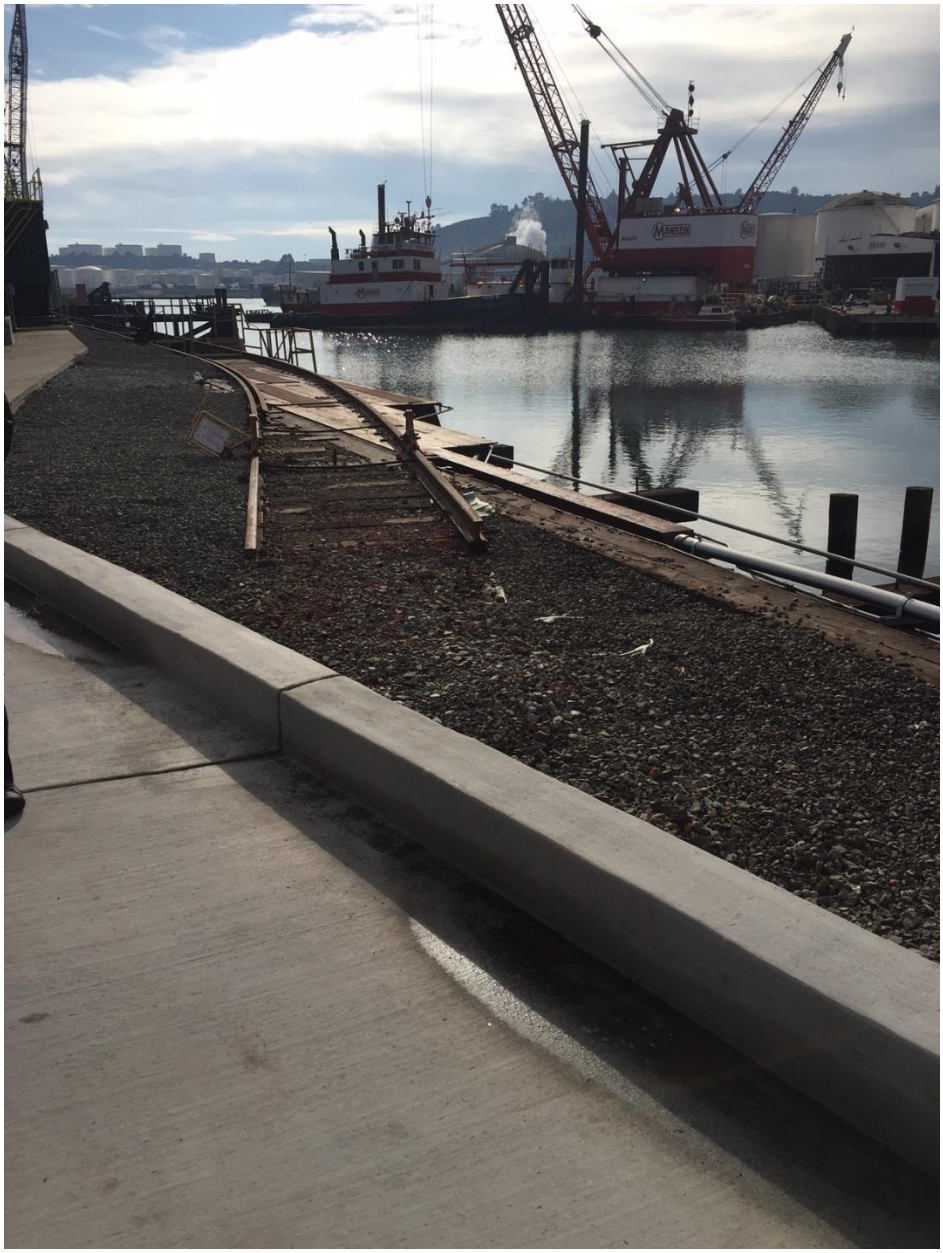

Photo 16. New Cap, Gravel Cap, Railroad Tracks looking south

Photo 17. New Paved Area and Gravel Cap, looking south

Photo 18. Interceptor SW-6 Outfall

Photo 19. Interceptor SW-6

Photo 20. Interceptor SW-7

Photo 21. Stormwater inlet to Interceptor SW-7

Photo 22. Site looking south from Richmond Pacific Railroad space

Photo 23. Cap Thickness (middle portion with multiple lifts)