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

PREPARED BY

U.S Army Corps of Engineers

Seattle District

FOR

U.S. Environmental Protection Agency

Region 9

Approved by:

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Executive Summary

This is the fifth Five-Year Review of the United Heckathorn Superfund Site (Site) located in Richmond, California. The purpose of this Five-Year Review is to determine if the remedy is protective of human health and the environment. The triggering action for this Five-Year Review was the signing of the previous Five-Year Review on August 8, 2016.

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 contaminated 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 dichlorodiphenyl trichloroethane (DDT). During that time, the facility released Site contaminants of concern to upland soils (e.g., DDT, dieldrin, aldrin, endrin, and lead) and sediments (e.g., 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. In 1999, Levin Richmond Terminal, under EPA oversight, capped approximately 5 acres of the upland area.

Operations and maintenance of the upland cap and drainage structures continue to be effective in preventing exposure to contaminated Site soils. The annual upland capping system inspection found that the surface cap is in overall good condition, and it effectively functions to prevent erosion of the underlying soil. 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.

Based on data collected in 2013, EPA water quality criteria and equivalent state objectives for Bay waters are not being met. Sediment concentrations in the Parr Canal indicate, however, that this portion of the Site is within the remediation limits cited in the ROD.

The exposure assumptions, remediation goals and remedial action objectives are still valid. No new contaminants have been identified. Changes to toxicity values have been identified; however, these changes do not affect the protectiveness of the remedy.

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 assure the protectiveness of the upland remedy at the Site. EPA will conduct a site inspection when COVID travel restrictions are lifted.

The remedy at the marine area of the Site is not protective of human health and the environment because concentrations of total DDT and dieldrin in sediment, surface water, and tissue samples in the Lauritzen Channel exceed ROD remediation goals, and a re-evaluation of the risk to human health and ecological receptors in 2010 indicated that sediment in Lauritzen Channel continues to pose a risk. A new remedial action will need to be implemented to ensure protectiveness. In addition, EPA will conduct a site inspection of marine areas of the Site when COVID travel restrictions are lifted.

Contents

List of Figures

List of Tables

List of Abbreviations and Acronyms

ARAR	applicable or relevant and appropriate requirements
DDD	dichlorodiphenyl dichloroethane
DDE	dichlorodiphenyl dichloroethylene
DDT	dichlorodiphenyl trichloroethane
EPA	United States Environmental Protection Agency
mg/kg	milligram per kilogram
ng/g	nanograms per gram
ROD	Record of Decision
µg/L	micrograms per liter
µg/kg	micrograms per kilogram
Site	United Heckathorn Superfund Site
total DDT	sum of 2,4'-DDD, 4,4'-DDD, 2,4'-DDE, 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT
TS-2	advanced stormwater treatment system TS-2
USACE	United States Army Corps of Engineers

1. Introduction

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

The U.S. Environmental Protection Agency (EPA) is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act Section 121, 40 Code of Federal Regulation Section 300.430(f)(4)(ii) of the National Contingency Plan and EPA policy.

This is the fifth Five-Year Review for the United Heckathorn Superfund Site (Site). The triggering action for this statutory review is the completion of the fourth Five-Year Review on August 8, 2016. This Five-Year Review has been prepared because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

The Site consists of two adjacent operable units[1]: (1) the upland area, which is the former United Heckathorn Site, and (2) the marine area, which includes the Lauritzen Channel, Parr Canal, Santa Fe Channel, and Richmond Inner Harbor. This Five-Year Review evaluates protectiveness separately for each area.

The United Heckathorn Superfund Site Five-Year Review was led by Karen Jurist, EPA Region 9 Remedial Project Manager. Participants included Cynthia Wetmore, EPA Region 9 Superfund Five-Year Review Coordinator, and from the U.S. Army Corps of Engineers (USACE): William Gardiner, risk assessor; Travis Kelsay, geologist; and Jake Williams, chemist. The review began on December 1, 2020.

[1] During cleanup, a site can be divided into distinct areas depending on the complexity of the problems associated with the site. These areas, called operable units, may address geographic areas of a site, specific site problems, or areas where a specific action is required.

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		
National Priorities List Status: Final		
Multiple Operable Units? Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Karen Jurist		
Author affiliation: EPA Region 9		
Review period: 12/1/2020 - 8/8/2021		
Date of site inspection: No site inspection due to COVID-19 restrictions.		
Type of review: Statutory		
Review number: 5		
Triggering action date: 8/8/2016		
Due date *(five years after triggering action date)*: 8/8/2021		

1.1. Background

The United Heckathorn Superfund Site is located on the eastern shore of San Francisco Bay at 402 Wright Avenue Richmond, California. It is situated in an industrial area dominated by active petroleum and shipping terminals. The Site consists of two adjacent areas: an approximately 5-acre upland area located at the northern portion of the Levin Richmond Terminal with contaminated soils, and a marine area with contaminated sediments in harbor channels, including Lauritzen Channel, Parr Canal, Santa Fe Channel, and Richmond Inner Harbor (Figure 1). 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 dichlorodiphenyl trichloroethane (DDT). During United Heckathorn operations, equipment containing pesticide residues was routinely washed, and wash water was permitted to infiltrate through the ground surface to discharge via outfall structures or utilities directly to nearby waterways. Site operators later modified the facility, including incorporating settling tanks to recover pesticide residuals; however, leaks from these tanks were believed to have occurred. Additionally, poor housekeeping controls as well as spills, leaks, and releases resulted in direct discharges of DDT and dieldrin to soils and waterways. Releases associated with the operation of the pesticide processing facility at the Site resulted in the following contaminants of concern in upland soils: total DDT (sum of 2,4'-dichlorodiphenyl dichloroethane (DDD), 4,4'-DDD, 2,4'-dichlorodiphenyl dichloroethylene (DDE), 4,4'-DDE, 2,4'-DDT, and 4,4'-DDT), dieldrin, aldrin, endrin, and lead. The contaminants of concerns in aquatic sediments are total DDT and dieldrin.

The EPA listed the Site on the National Priorities List in 1990. EPA conducted extensive environmental investigations on both marine sediments and upland soils during the early 1990s to characterize contaminants, support the development of removal actions for upland soils, and support the initiation of remediation strategies for marine sediment contamination.

1.2. Physical Characteristics

The Site is located immediately adjacent to the Lauritzen Channel in the Richmond Harbor and is situated in an industrial area dominated by active petroleum and shipping terminals.

Upland Area

The upland area consists of the northern 5-acres encompassing the property of the former United Heckathorn facility located on the east side of the Lauritzen Channel. The upland area is level and approximately 7 to 11 feet above mean lower low water[2]. The 5-acre upland area has been covered with an asphalt and concrete cap and is mainly used for cargo stockpiling and railroad operations. The cap is graded to direct surface water runoff via sheet flow or shallow swales to drop inlets (Figure 3). The drop inlets drain to five below-grade interceptors (SW-3 through SW-7) via underground pipe.

[2] Mean Lower Low Water is the average height of the lower low water over a 19-year period referenced to a datum based at the Port of Richmond Terminal 2.

Marine Area

The marine area is a 15-acre in-water area comprised of contaminated sediment within the marine waters of the Lauritzen Channel, Parr Canal, Santa Fe Channel, and Richmond Inner Harbor, adjacent to the upland area, and any associated affected surface water and biota. The marine area is part of the larger San Francisco Bay, a unique and sensitive environment that provides habitat for numerous avian and marine species, including fish caught for consumption.

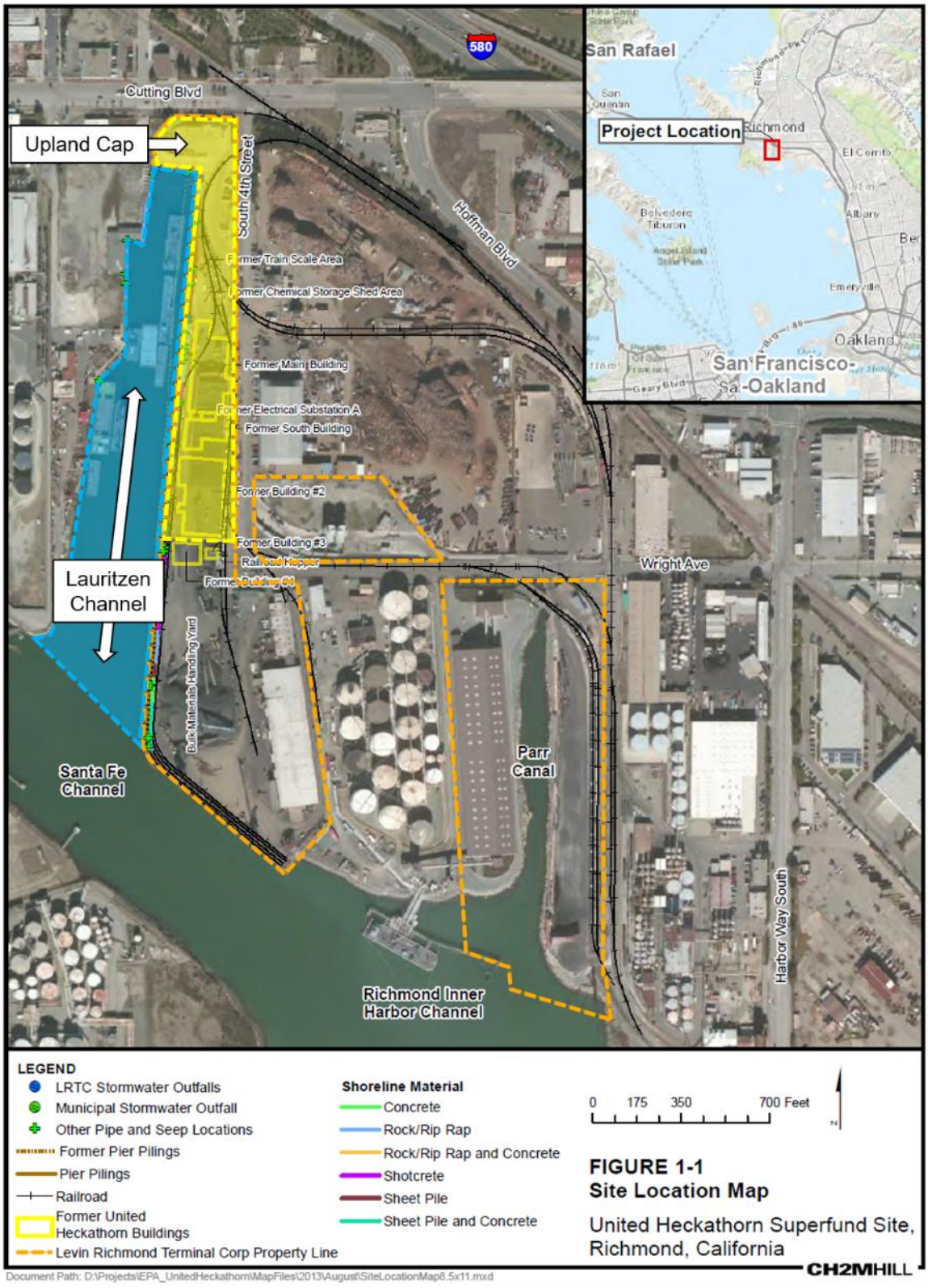
The Lauritzen Channel is a tidal waterway that forms a single spur off the Santa Fe Channel in Richmond Inner Harbor. The tidal range in the harbor is approximately -2 to 7 feet above mean lower low water. The Lauritzen Channel is approximately 1,800 feet long and 120 feet wide at the head widening to over 350 feet at the mouth. The depth of the channel ranges from approximately -10 to -39 feet above mean lower low water. Prior to 2014, the eastern shoreline of the Lauritzen Channel consisted of sheet pile (steel plates supported by railroad ties), concrete, riprap, and/or shotcrete (pneumatically applied concrete). In the summer and early fall of 2014, during extreme low tides, Levin Richmond Terminal Corporation placed additional shotcrete along the eastern shoreline and along the west to east portion of the shoreline along the head of the channel from the negative tide line to the top of the sea wall. The majority of the western shoreline of the Lauritzen Channel consists of rock and riprap (CH2M Hill, 2015).

The Parr Canal lies to the east of the Lauritzen Channel and is not actively used. It is approximately 750 feet long, a maximum of 100 feet wide, and generally less than -10 feet mean lower low water in depth. The shoreline surrounding the Parr Canal is armored with riprap typically derived from concrete construction debris. A City of Richmond stormwater outfall is located at the northern end of the Parr Canal.

The Santa Fe Channel is approximately 4,000 feet long and up to 380 feet wide. Approximately one-half of the Santa Fe Channel is maintained at a depth of -35 feet mean lower low water by the U.S. Army Corps of Engineers (USACE). The head of the channel and its berth areas are maintained by the Port of Richmond or private owners. The Inner Harbor Channel extends south to Point Potrero and is maintained by the USACE at a depth of -37 feet mean lower low water (CH2M Hill, 2015).

Historically, land use at the Site, and in the surrounding area, is primarily industrial and dominated by active petroleum and bulk materials shipping terminals. Land use is consistent with the Industrial – Water Use designation and zoning classifications presented in the San Francisco Bay Plan (San Francisco Bay Conservation and Development Commission, 2008) and the Richmond 2030 General Plan (City of Richmond, 2012). The San Francisco Bay Plan designates the area for port-priority or water-related industrial use and the Richmond General Plan classifies the area as heavy industrial zoning. 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 proximity of the upland portion 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.

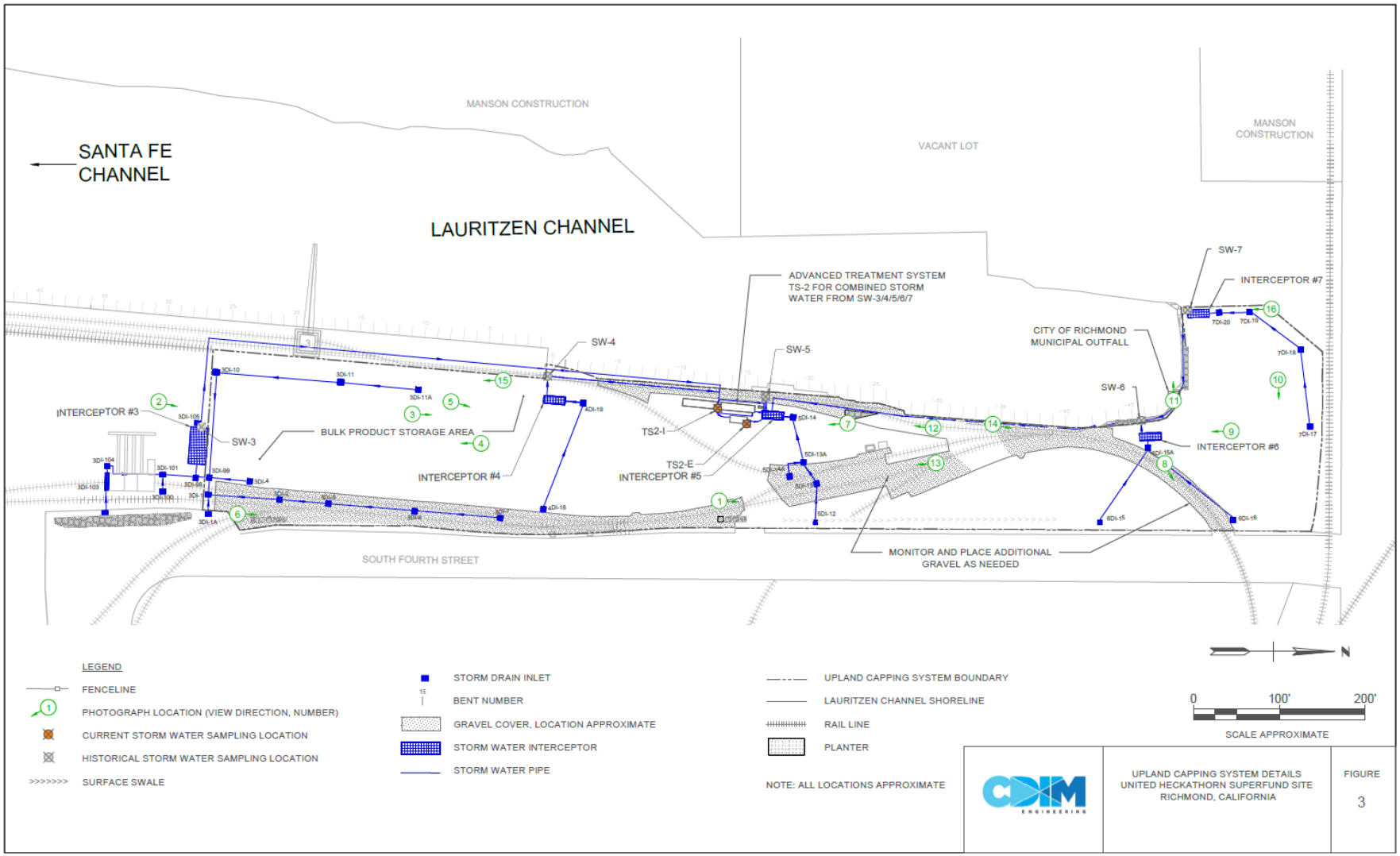


Source: CH2M Hill. March 2014. Source Identification Study Report. United Heckathorn Superfund Site. Report Prepared for U.S. EPA.

Figure 1. Location Map for the United Heckathorn Superfund Site.

Source: CH2M Hill. March 2014. Source Identification Study Report. United Heckathorn Superfund Site. Report Prepared for U.S. EPA.

Figure 2. Detailed Map of the United Heckathorn Superfund Site.



Source: CDIM Engineering, Inc. September 2020. 2019-2020 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.
Note: Photo references do not pertain to this Five-Year Review.

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

1.3. Hydrogeology

The Site is located within a low-lying tidal flats area adjacent to an alluvial plain. This area lies near the western edge of a small northwest-trending structural graben (i.e., a depression between geologic faults) called the Richmond Basin, bounded on the west by the San Pablo Fault and the east by the Hayward Fault Zone. The basin is comprised of Franciscan bedrock between 140 and 400 feet below ground surface, overlain by a thick sequence of younger interfingering alluvial fan and estuary deposits.

The upland area is 7 ft to 11 ft above mean lower low water and is generally level. The upland area of the Site is mostly paved. Underneath the pavement is a layer of fill soil that varies from approximately 5 to 15 feet below ground surface and consists of sandy, gravelly fill over the original intertidal bay mud and marsh.

The marine area includes the Lauritzen Channel and Parr Canal, two naturally occurring saltwater marsh channels historically widened and deepened by dredging, as well as the hydraulically connected Santa Fe and Richmond Inner Harbor Channels. The Richmond Inner Harbor Channel, Santa Fe Channel, and Lauritzen Channel all experience net deposition of sediment. There is also a large amount of sediment movement within the Lauritzen Channel due to ship movement and resuspension due to propwash. Sediment at the Site is generally divided into two distinct geologic units: a softer layer referred to as "younger bay mud," which overlies a relatively more consolidated, stiffer, and laterally continuous "older bay mud." The younger bay mud consists of dark gray to black very soft to soft clay, silt, and fine-grained sand with a high-water content (White et al., 1994). The older bay mud consists of dry, consolidated, firm to hard silts and clays with varying amounts of sand and gravel. The younger bay mud beneath the upland soils is roughly 20 ft thick, and the underlying older bay mud in the Richmond shoreline area is approximately 50 ft thick. The majority of younger bay mud within the Lauritzen Channel was either removed during original channel construction or had subsequently been removed during maintenance dredging and remedial dredging. However, younger bay mud remains in the Lauritzen Channel and Parr Canal, either in undredged areas (such as along embankments or under piers) or in previously dredged areas as dredge residuals. A relatively small amount of the upper older bay mud may have been removed in conjunction with remediation dredging activities in 1996 and 1997. Exposure to chemical contaminants is thought to be limited to the younger bay mud sediments, with little or no contaminant transport into the consolidated, deeper older bay mud.

Shallow groundwater occurs within some parts of the fill soil of the upland area, particularly as interstitial porewater near the shoreline/channel margin where surface water and groundwater mixing occur. The groundwater at the Site is saline and its elevation fluctuates with the tidal cycle. The hydraulics in this mixing zone are complicated and dependent on pore pressure, water density, and hydraulic conductivity. Deeper freshwater aquifers may exist but are below the impermeable older bay mud layer.

2. Remedial Actions Summary

2.1. Basis for Taking Action

Chemical handling and management practices resulted in the release of elevated levels of pesticides, including total DDT and dieldrin, to soils in the approximately 5-acre upland area, as well as marine sediments in Lauritzen Channel, Parr Canal, Santa Fe Channel, and Richmond Inner Harbor.

Both human and ecological receptors are at risk from the contaminants of concern at the United Heckathorn Site. The 1994 human health risk assessment 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

Prior to remedy selection, soil removal actions were conducted at the upland area from 1983 to 1993 that reduced contaminant concentrations in the soils to levels that are acceptable for current and expected future commercial or industrial uses.

On October 26, 1994, EPA selected the remedy for the Site, and signed the 1994 ROD.

2.2.1. Upland Area

The remedy selected in the ROD for the upland area included capping the northern half of the Levin-Richmond terminal (former United Heckathorn facility) to prevent erosion (about 5 acres), maintenance of the constructed cap, monitoring of the cap to demonstrate effectiveness, and placing a deed notice on the property to prevent conversion to other uses, such as residential, without further study and possibly further remediation.

For the Upland Area, the remedial action objective is to prevent contact with DDT and dieldrin in upland soils and to prevent the erosion of upland soil to the adjacent marine area.

2.2.2. Marine Area

The remedy selected for the marine area in the ROD included dredging of all younger bay mud from the Lauritzen Channel and Parr Canal, with offsite disposal of dredged material, followed by placement of clean sediment after dredging. Following dredging, the selected remedy requires annual monitoring of surface water and biota until it is demonstrated that remediation goals have been achieved and could continue for a longer period of time.

For the marine area, the remedial action objective is to reduce concentrations of the contaminants of concern, DDT and dieldrin, in marine sediments and water to levels that would be protective of human health and the environment.

In the 1994 ROD, the remediation goals for DDT and dieldrin in surface water were based on the EPA Ambient Water Quality Criteria. The remediation goal for total DDT in marine sediments 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 saltwater action level for total DDT in fish tissue of 50 nanograms per gram (ng/g) as a "To Be Considered" action level used to determine the necessary level of cleanup. The National Academy of Sciences action level for fish tissue is also used as a point of comparison for tissue monitoring. Table 2 presents a summary of remediation goals for the selected remedy.

Although EPA did not select institutional controls or governmental controls for the Marine layer in the 1994 ROD, EPA acknowledged the existence of a Bay-wide fish advisory issued by California Department of Toxic Substances Control in April 1994. The advisory recommended not to consume any resident bottom fish, such as white croaker, from anywhere in the Inner Richmond Harbor.

Table 2. Summary of Remediation Goals from the 1994 ROD

Media	Constituents	Remediation goal	Basis for Remediation goal
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 remediation goals were set in the 1994 ROD. No remediation goal for dieldrin in sediments was established in the ROD.
µg/L = microgram per liter; µg/kg = microgram per kilogram

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. The cap design and construction activities were performed by the property owner, pursuant to a Consent Decree with EPA, under the oversight of EPA. Over most of the 5-acre cap, the cap is comprised of reinforced concrete, a geotextile fabric, and gravel cap.

Installation of the cap consisted of three steps: (1) Site grading to promote surface water runoff to collection points; (2) installation of a drainage system to collect surface water runoff, including best management practices[3] for stormwater pollution prevention; and (3) construction of a reinforced concrete cap in the majority of the 5-acre area used for material stockpiling and construction of a geotextile fabric and gravel cap in low traffic areas, such as the railroad track area. Reinforced concrete was placed in high traffic and material stockpiling areas. The concrete cap surface was sloped uniformly to direct localized drainage towards designated drop inlets. The surface water collection system consists of a series of drop inlets and catch basins which direct collected water to five below-grade surface water interceptor structures to retain surface water runoff. During grading activities, a 1,100-gallon underground storage tank was found in the central portion of the former United Heckathorn facility. It was removed and all visibly affected soil (approximately 250 cubic yards) was excavated.

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 (Figure 3). 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 during major storm events, typically three to four storm events per year, depending on the year. Drain inlets and inlet filters are cleaned and replaced as needed throughout the year. Accumulated material removed from the inlets, interceptors and clarifier tanks appeared to be bulk product, which Levin Richmond Terminal Corporation returned to the bulk product piles. The stormwater collection system is designed to have sufficient capacity to hold all stormwater runoff generated during the rainy season (October through May) to prevent direct discharge to the Lauritzen Channel. 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.

[3] Best management practices for stormwater pollution prevention incorporated into the Operations and Maintenance Plan for the upland cap include: (1) placing straw wattles or bales around drains; (2) using sweeping equipment and a truck to pump and contain water removed from the surface water interceptors; (3) crack monitoring: perform annual inspections of the cap under the oversight of a registered engineer and document cracks, maintenance, and repairs on a baseline map which is updated annually; (4) settlement monitoring: conduct a periodic topographic survey of the cap surface to document that the cap is not undergoing significant differential settlement which could ultimately impact its integrity. Compare subsequent surveys with a baseline survey to identify areas of differential movement; (5) sediment in storm drain interceptors: collect, quantify, and analyze accumulated sediment (using EPA Method 8081) that is removed from storm drain interceptors within the cap area, and include this information in the annual Operations and Maintenance Plan Report; (6) integrity of underground drainage systems: conduct periodic underground video scoping or other equivalent methods to verify the integrity of the underground stormwater collection and discharge structures that underlie the Site, including the portion of the storm drain structure that underlies the cap.

Pursuant to the ROD, institutional controls were also 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. Summary of Implemented Institutional Controls

Media, Engineered Controls, and Areas That do not Support Unlimited Use and Unrestricted Exposure Based on Current Conditions	Institutional Controls Needed	Institutional Controls Called for in the Decision Documents	Impacted Parcel(s)	Institutional Control Objective	Title of Institutional Control 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 concentrations 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 concentrations in the Lauritzen Channel and Parr Canal were 264 µg/kg and 200 µg/kg, respectively (EPA, 2001).

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

2.4. System Operations/Operations and Maintenance

2.4.1. Operations and Maintenance Requirements

2.4.2. 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 operations and maintenance program includes inspection/maintenance of the concrete cap, inspection and cleaning of the stormwater collection and drainage system, stormwater monitoring, stormwater treatment and operation, and sheet pile seep sampling. 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 perform a formal Site inspection once a year.

2.4.3. 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 remedial actions. The post-remediation marine monitoring program includes: (1) surface water monitoring and (2) biological monitoring. Trends of contaminants of concern concentration levels in surface water and mussel tissue samples are used as indicators of whether the remedy is effective and functioning as intended.

2.4.4. Significant Operations and Maintenance over the Past Five Years

2.4.5. Upland Area

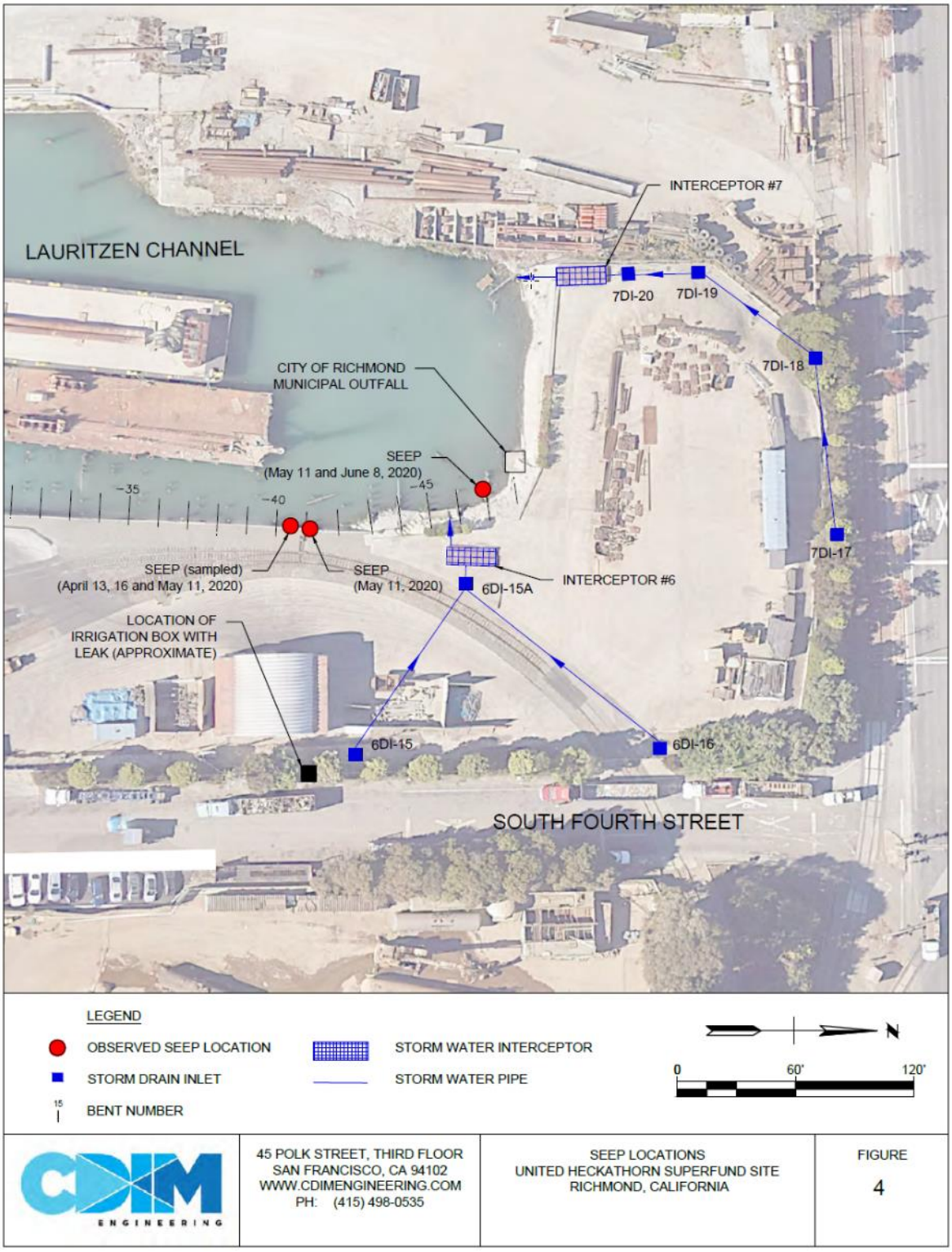
On or around April 13, 2020, Levin Richmond Terminal Corporation onsite personnel observed water seepage to the Lauritzen Channel during low tide. Seepage originated from the sheet pile wall to the south of stormwater interceptor SW-6 (Figure 4). Due to its location, Levin Richmond Terminal Corporation requested that CDIM Engineering, Inc. sample the seepage water for pesticide analysis. The water seepage was visually observed and sampled during low tide on April 16, 2020. At the time of sampling, the seep discharge rate was estimated to be two liters per minute and the electrical conductivity was measured at 0.14 milliSiemens per centimeter (mS/cm) for the seepage water and 35 mS/cm for nearby water in the Lauritzen Channel. After receipt of laboratory results, CDIM Engineering, Inc. revisited the Site on May 11, 2020 during a very low tide event and two additional areas of water seepage were observed in the same vicinity. Additionally, puddling was identified near an irrigation pipe box along Fourth Street directly east of the observed seepage, along the eastern boundary of the upland cap. Water flow at the irrigation box was shut off on May 11, 2020 and repairs were performed. Levin Richmond Terminal Corporation found that tree roots appear to have separated irrigation piping in the box. Once repairs were made, water seepage along the shoreline quickly diminished and ceased on or around May 13, 2020. CDIM Engineering, Inc revisited the Site during low tide on June 8, 2020 and confirmed that the previously identified seeps had ceased.

Total DDT concentrations in the original unfiltered and filtered seep samples were 0.32 µg/L and 0.20 µg/L, respectively. Unfiltered groundwater concentrations at the site -- collected at 12 sampling locations – reported in the 2014 Source Identification Report (CH2M Hill, 2014) range from 0.27 µg/L to 69.6 µg/L, with an average concentration of 12.8 µg/L, and filtered concentrations range from 0.03 µg/L to 14.6 µg/L, with an average concentration of 1.62 µg/L. Based on the measured seep pesticide and electrical conductivity, as well as the observation of the leaking irrigation line, the observed seepage water appears to have been a combination of tidewater, groundwater and irrigation water. An order-of-magnitude estimate of the total pesticide mass discharged from the three observed seeps into the Lauritzen Channel was prepared by CDIM Engineering, Inc. The estimates were calculated using the

observed discharge rate at the seep during sampling on April 16, 2020, a total of three seeps, and a conservatively estimated seep duration of 90 days (Table 4). An order-of-magnitude estimate of 0.000244 pounds of total DDT may have been discharged from the seeps to the Lauritzen. Periodic visual inspections for evidence of seepage along the shoreline are conducted at low tide and routine inspections of irrigation boxes along the Fourth Street and in other locations near the upland cap have been added to the environmental inspection protocol.

Table 4. April 16, 2020 Seep Sample Results and Seep Pesticide Mass Discharge Estimates

Laboratory Measurements			
Total DDT (µg/L)		**Dieldrin (µg/L)**	
Unfiltered	**Filtered**	**Unfiltered**	**Filtered**
0.1422	0.0854	0.841	0.657
Seep Pesticide Mass Discharge Estimate			
Total DDT (µg/L)	**Estimated Mass (lbs.)**	**Dieldrin (µg/L)**	**Estimated Mass (lbs.)**
0.1422	0.000244	0.841	0.001440



Source: CDIM Engineering, Inc. September 2020. 2019-2020 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.

Figure 4. Upland Cap Seep Locations

3. Progress Since the Last Five-Year Review

3.1. Previous Five-Year Review Protectiveness Statement and Issues

The protectiveness statement from the 2016 Five-Year Review for the United Heckathorn Site stated the following:

> *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 assure the protectiveness of the upland remedy at the Site.*
>
> *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.*

The 2016 Five-Year Review included one issue and recommendation. Each recommendation and the current status are discussed below.

Table 5. Status of Recommendations from the 2016 Five-Year Review

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description*	Completion Date (if applicable)
Marine Area	Sediment, surface water, and tissue data in the Lauritzen Channel continue to exceed remediation goals nearly twenty years after remedy implementation.	Select a new remedy that addresses the remaining contamination in the Lauritzen Channel and prevents recontamination from occurring.	Ongoing	EPA is developing a Focused Feasibility Study to evaluate the remaining contamination in the marine area and to evaluate alternatives for a new remedy.	Click here to enter a date

3.2. Work Completed at the Site During this Five-Year Review Period

3.2.1. Upland Area

During the 2016-2017 reporting period, Levin Richmond Terminal Corporation completed two projects in the upland cap area: 1) installation of a roadway across three railroad tracks in the northern portion of the upland cap; and 2) installation of new concrete and fencing along the western edge of the cap in an area previously covered by wood timbers. These construction activities were undertaken to widen the existing roadway and provide additional drainage control. Work was performed during dry-weather conditions and neither activity resulted in the disturbance of underlying soil. Additionally, during this reporting period, Levin Richmond Terminal Corporation placed additional shotcrete along the eastern shoreline near SW-4 (Figure 3) to stabilize the area (CDIM Engineering, Inc, 2017).

During the 2019-2020 reporting period, Levin Richmond Terminal Corporation installed a new drainpipe from existing drain inlet 3DI-105 to facilitate settlement of sediments in the stormwater prior to the stormwater reaching the pumps that transfer water to water treatment plant, TS-2. The drain inlet, which is located immediately west of interceptor SW-3 (Figure 3), previously drained directly into the interceptor. Approximately 30 linear feet of drainpipe was added inside the interceptor to carry the collected water to the inlet end of the interceptor.

3.2.2. Marine Area

In 2016, Anchor QEA, a consultant to Montrose Chemical Corps, conducted sampling in the Lauritzen Channel and adjoining portions of the Santa Fe Channel. The data collected by Anchor QEA was not collected under EPA oversight and has not undergone EPA data validation. However, with these caveats the chemistry results are summarized in this Five-Year Review for the purposes of potentially informing the understanding of the sediment concentrations of total DDT and dieldrin at the Site.

Sediment cores, surface sediment, and embankment sediment samples were collected and analyzed for DDT and pesticides, including dieldrin (Anchor QEA 2020).

4. Five-Year Review Process

4.1. Community Notification and Site Interviews

4.1.1. Five-Year Review Public Notice

A public notice was made available by a newspaper posting in the East Bay Times on February 1, 2021 stating that there was a Five-Year Review and inviting the public to submit any comments to the EPA (Appendix F). No comments were received. 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 94804.

4.1.2. Site Interviews

During the Five-Year Review process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. Questionnaires were sent to state agencies, local entities, and community groups. Responses were received from the California Department of Toxic Substances Control and the Levin Richmond Terminal Corporation.

The remedy in the upland area was considered to be protective, with an effective operations and maintenance program. Both respondents indicated that the remedy in the marine area was not protective of human health and the environment and that this was due to residual contamination that was not removed by previous actions. DTSC remarked that the FFS should consider further removal of pesticide-contaminated sediment, particularly in previously undredged areas, and if activated carbon is part of the remedy, the treated sediments should be removed. They also indicated that the FFS should include

confirmation sampling and monitoring in the remedy. The completed interview forms are included in Appendix G.

4.2. Data Review

4.2.1. Upland Area

Annual monitoring of the upland cap is conducted by representatives of Levin Richmond Terminal Corporation and CDIM Engineering and includes settlement monitoring and storm water collection system inspection. The monitoring program helps alert facility staff to problems with the cap in order to initiate timely repairs and determine compliance with the remedial action objectives of preventing physical contact with, and erosion of, contaminated soil. Monitoring since the previous Five-Year Review indicates that the cap is intact and functioning as intended (CDIM Engineering 2017, 2018, 2019, 2020).

The Operations and Maintenance Plan (Environmental Technical Services, 2006) requires sampling and analysis for pesticides in stormwater discharges originating from the upland area. The analytical results help determine the effectiveness of the cap in preventing transport of contaminated soil from the upland area to the Lauritzen Channel.

Influent to and effluent from the stormwater treatment system are sampled during major storm events, and sampling results are captured in the upland cap annual monitoring reports.

As of September 2020, analysis of the stormwater monitoring data collected for the storm drain system indicates that the system is functioning as designed, with only infrequent direct discharges to the Lauritzen Channel. For total DDT and dieldrin, results during this Five-Year Review period show that TS-2 is effective at reducing concentrations in stormwater effluent (Table 6 – Maximum and Average Concentrations). While there is a relatively high degree of variability in concentrations within a rain year and between years, both influent and effluent concentrations during this review period were consistent with those observed during previous Five-Year Review periods.

Sampling data collected between 2016 and 2020 indicate that the stormwater treatment system reduces the average total DDT concentration in the effluent stormwater by approximately 94% compared to the influent stormwater. The average dieldrin concentration in the effluent stormwater is reduced by approximately 59% compared to the influent stormwater. Mann-Kendall Trend analysis, which is a non-parametric test for identifying trends in time-series data by comparing the relative magnitudes of sample data rather than the data values themselves, was performed to determine if there was a statistical trend in the data over time (see Appendix C). In practical terms, the purpose of the Mann-Kendall analysis is to determine whether contaminant concentrations are increasing, stable, or decreasing over time. A “No Trend” result can be considered as evidence that the dataset (contaminant concentration) shows no distinct linear trend (either increasing or decreasing) over time and the concentrations vary considerably over time. Influent concentrations of both total DDT and dieldrin show a decreasing trend during this review period. The effluent total DDT concentrations show no trend during the review period, whereas the dieldrin concentrations have a decreasing trend.

Table 6. Upland Cap Influent / Effluent Stormwater Sampling Statistics.

Sample	Contaminant	Maximum Concentration (µg/L)	Date of Highest Concentration[1]	Average Concentration (µg/L)	Standard Deviation (µg/L)	Concentration Trend
Influent	Total DDT	0.147	18-Jan-17	0.053	0.040	Decreasing
Effluent	Total DDT	0.018	22-Jan-18	0.003	0.005	No Trend
Influent	Dieldrin	0.008	22-Jan-18	0.004	0.002	Decreasing
Effluent	Dieldrin	0.005	22-Jan-18	0.001	0.001	Decreasing

Notes:[1]Influent/effluent samples evaluated from 14-Oct-16 to 16-Jan-20.

4.2.2. Marine Area

Since 2001, total DDT and dieldrin concentrations in surface waters in the Lauritzen Channel have been above the ROD remediation goals, whereas concentrations in Santa Fe Channel are among the lowest in the area. The average surface water concentrations of total DDT collected from the Lauritzen Channel in 2013 was 14 times higher than the remediation goal (Table 7). The average concentration of dieldrin in surface water was 0.00194 µg/L, which was also 14 times that of the remediation goal of 0.00014 µg/L.

In 1999, 2007, and 2013, EPA conducted sediment investigations to characterize the recontamination potential of sediment in the Lauritzen Channel and to investigate potential sources for recontamination. In data collected by EPA in 2013, the average concentrations of total DDT measured in both surface and subsurface sediments from the Lauritzen Channel were greater than remediation goals in both undredged areas, as well as areas dredged in 1994 (Table 7; Figures 5). The highest concentrations were found near the former plant site and the northern terminus of the channel (Figure 6). The concentrations in the east and west subareas were an order of magnitude lower. Post-remediation monitoring in Parr Canal showed that the sand cap remains in place and that concentrations of total DDT at the surface are below the remediation goals.

Concentrations of total DDT in the tissues of fish (barred surfperch, white surfperch, shiner surfperch, and jacksmelt) and shellfish (mussels) collected in the Lauritzen Channel in 2013 exceeded the National Academy of Sciences action level for fish tissue. The average concentrations of total DDT in mussel tissue show no notable decrease compared to available pre-remedial data.

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 and fish consumption advisory signs were installed at the Site.

Based on the monitoring data, EPA is conducting a Focused Feasibility Study and is currently in the process of evaluating alternatives for addressing the concentrations that exceed the Site remediation goals and finalizing this Study.

Table 7. Average Total DDT Concentrations, United Heckathorn Marine Area in 2013

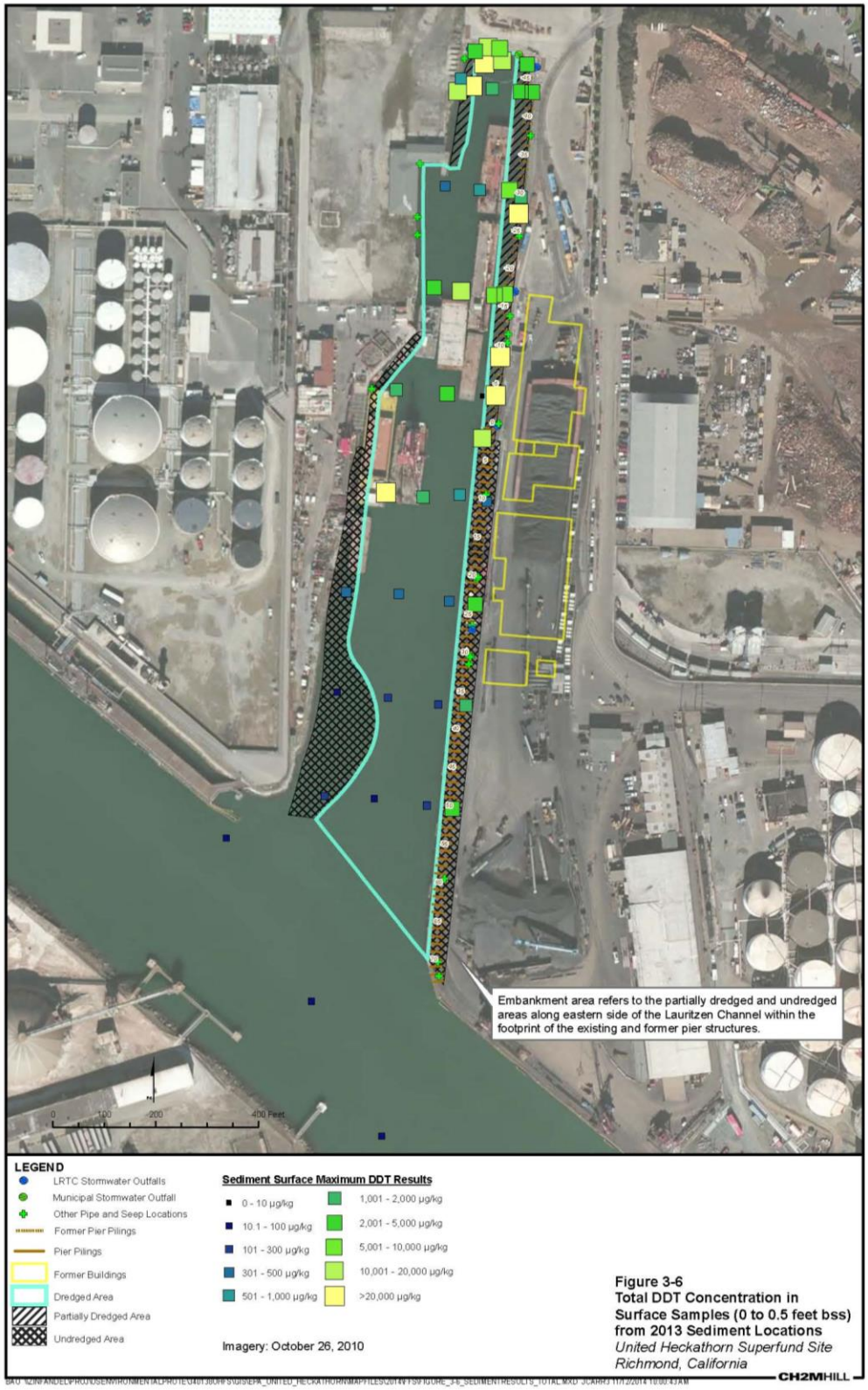
Media	Remediation Goal	Lauritzen Channel	Parr Canal	Santa Fe Channel	Richmond Inner Harbor
Surface Water (µg/L)	0.00059	0.0084	0.005	0.002	0.00045
Surface Sediment (µg/kg)	590	45,228	86[a]	152[a]	NA
Sediment Cores[b]	590	5,946	654	49	NA
Mussel Tissue (ng/g)[c]	50	1,544	178	195	22.9
Fish Tissue (ng/g)[c]	50	287	NA	NA	NA

Note:

a: Based on the surface interval in cores collected in 2007

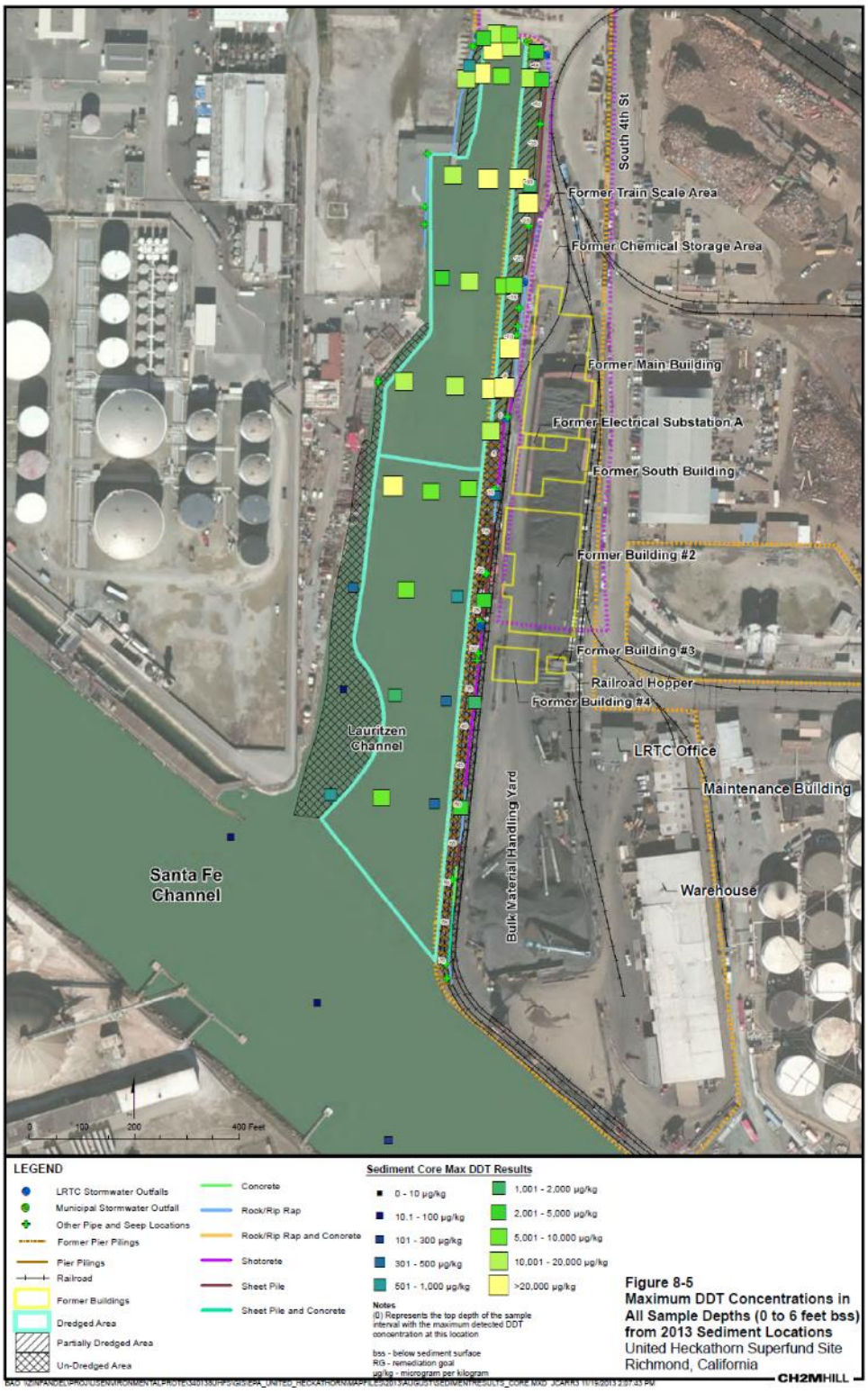
b: Includes both younger bay mud and older bay mud samples

c: To-Be-Considered (TBC) Standard based on National Academy of Sciences action levels for fish tissue.



Source: CH2M Hill. March 2014. Source Identification Study Report. United Heckathorn Superfund Site. Report Prepared for U.S. EPA.

Figure 5. Total DDT Concentration in Surface Samples in 2013.



Source: CH2M Hill. March 2014. Source Identification Study Report. United Heckathorn Superfund Site. Report Prepared for U.S. EPA.

Figure 6. Maximum Total DDT Concentrations in All Sample Depths in 2013

In 2016, Anchor QEA collected surface sediments, sediment cores, and embankment sediment samples from the Lauritzen Channel and adjoining portions of the Santa Fe Channel (Anchor QEA 2020). The data collected by Anchor QEA was not collected under EPA oversight and has not undergone EPA data validation. However, with these caveats the chemistry results are summarized here for the purposes of potentially informing the understanding of the sediment concentrations of total DDT and dieldrin at the Site.

Surface Sediment

Aquatic organisms are most likely to interact with surface sediments, and those contaminants in the upper 10 to 15 centimeters of sediment are the most likely to enter the food chain and potentially impact human health. Anchor QEA collected samples with concentrations of total DDT in surface sediments from the north and central portions of the Lauritzen Channel that were above the remediation goal of 590 µg/kg. Concentrations decrease to below the remediation goal at the southern portion of the channel, near the confluence with the Santa Fe Channel (Figure 7). The samples located in the central portion of the Lauritzen Channel, offshore of the former Main Building and storage areas (Station SC7) and at the edge of the dredged area offshore of Former Building 2 (Station SC10) contained the highest surface sediment concentrations. With the exception of sediment from SC16 at the confluence of Lauritzen Channel and Santa Fe Channel, surface sediment concentrations in the Santa Fe Channel were below the remediation goal.

Sediment Cores

Anchor QEA evaluated the vertical extent of total DDT in bottom sediments by collecting core samples and measuring concentrations in 15 cm intervals. The core samples provided information on the amount of contamination that remains in the Lauritzen Channel and the potential for contaminants in underlying sediments to enter the food chain either through resuspension, bioturbation, or movement up through the sediment column.

Concentrations of total DDT in the subsurface Younger Bay Mud were above the remediation goal for all Lauritzen Channel locations including formerly dredged and undredged areas (Figure 8). The highest concentrations observed in the sediment cores were generally found near the former facility as well as in the central portion of the channel, with concentrations ranging from 40,300 to 2,246,700 µg/kg from sediment cores SC6 through SC10. As with the surface sediment samples, concentrations decreased nearer to the Santa Fe Channel. In samples EPA collected in 2013, concentrations of total DDT were higher at deeper depths in some sample locations, were higher at the surface in some locations, and several locations showed no discernible trend with depth. It is important to note that sampling locations differed between the 2013 survey conducted by EPA and the 2016 survey by Anchor QEA, and that the 2013 sediment cores were divided into fewer increments.

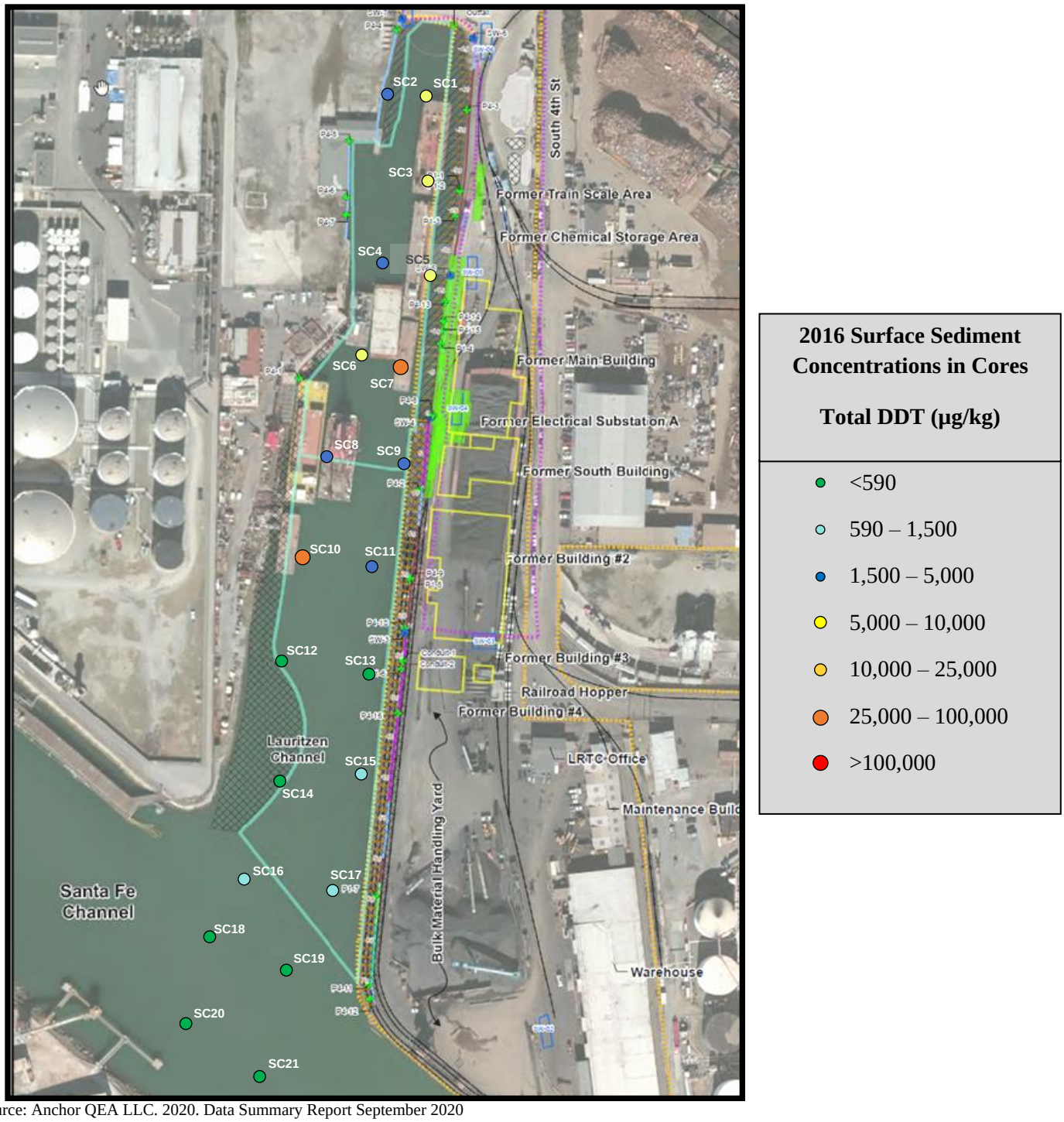
The concentrations of total DDT collected by Anchor QEA in 2016 were higher than previous post-remedial sediment samples events (Table 8). In 2016, the average concentration of total DDT was 57,325 µg/kg, whereas in the previous sampling effort (2013), the average concentration was 11,742 µg/kg. This was likely due very high concentrations at a small number of stations in the central portion of the Lauritzen Channel (Stations SC6 through SC10) and differences in sampling locations between the 2013

and 2016 events, particularly in portions of the Channel where concentrations may vary considerably over small areas.

The average dieldrin[4] concentrations of all vertical increments from cores collected by Anchor QEA in 2016 in the Lauritzen Channel ranged from 13 µg/kg to 367 µg/kg, with a much higher concentration at one location (Station SC10; 41,693 µg/kg). With the exception of Station SC10, the range of concentrations were similar to those collected by EPA in 2013. The vertical distribution of dieldrin in these core samples was similar to that of total DDT.

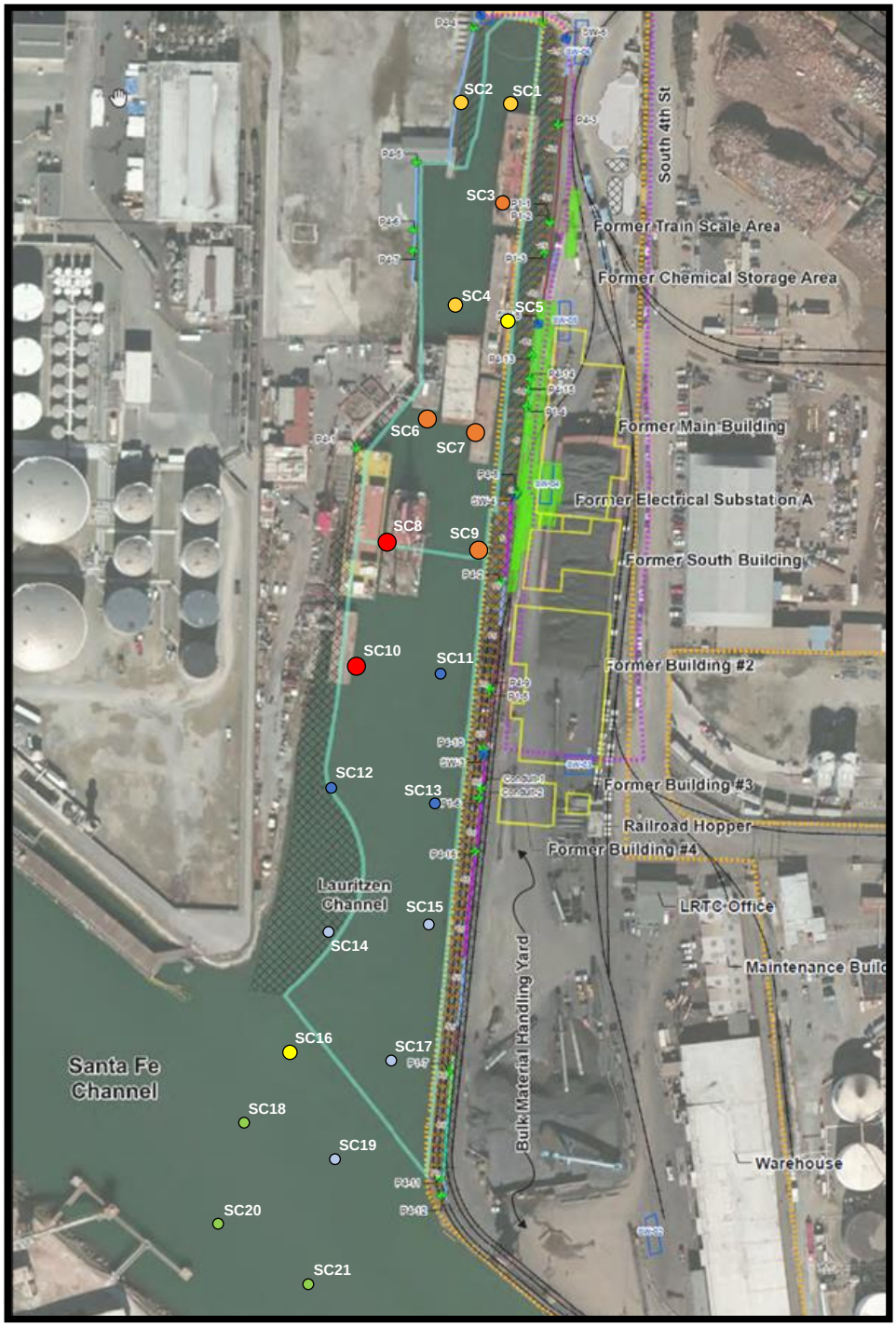
Based on the surface sediment samples and sediment cores collected by EPA in 2013 and by Anchor QEA in 2016 from formerly dredged and undredged areas of the Lauritzen Channel, total DDT concentrations remain elevated above the remediation goal (590 µg/kg). Concentrations in the north and central portions of the Site are 10 to 500 times that of the remedial level, with sediment from the central portion of the Lauritzen Channel up to 3,800 times that of the remediation goal. Total DDT concentrations are lower in the southern portion of the channel near the confluence with the Santa Fe Channel. Total DDT concentrations in the Santa Fe Channel are generally below or near the remediation goal.

[4] EPA did not select a cleanup value for dieldrin in sediments in the 1994 ROD. EPA re-evaluated the risks and hazards from fish consumption in 2010. 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.



Source: Anchor QEA LLC. 2020. Data Summary Report September 2020

Figure 7. Total DDT Concentrations in Surface Intervals of 2016 Sediment Cores



Source: Anchor QEA LLC. 2020. Data Summary Report September 2020

Figure 8. Maximum Concentrations in 2016 Sediment Cores

Table 8. Summary of Core Sediment Data for 1999, 2007, 2013, and 2016 for Lauritzen and Santa Fe Channels

Sampling Event		Number of samples	Number exceeding remediation goal	Average total DDT µg/kg	Highest value total DDT µg/kg	Lowest value total DDT µg/kg
Lauritzen Channel Core sediments	1999	23	21	**31,603**	**180,840**	26
	2007	70	45	**6,021**	**88,830**	3
	2013	98	55	**11,742**	**298,920**	Non-detect
	2016	17	17	**57,325**	**2,246,700**	Non-detect
Santa Fe Channel Core sediments	1999	1	0	582	582	582
	2007	7	1	236	**913**	36
	2013	12	0	49	191	Non-detect
	2016	4	2	278	**1,275**	Non-detect

Notes:

- ROD remediation goal for sediment: 590 µg/kg
- Exceedances of remediation goals 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

4.3. Site Inspection

A formal site inspection was not completed for this Five-Year Review due to travel restrictions resulting from the COVID-19 pandemic. On April 25, 2019, Karen Jurist, along with other EPA staff visited the Site. EPA staff took a pontoon boat from the Richmond Marina out to the Richmond Inner Harbor, Santa Fe Channel, and into the Lauritzen Channel. EPA also observed the Parr Canal at that time.

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 implemented at the upland area of the Site is functioning as intended by the decision documents. The 5-acre cap area has achieved the remedial action objective for the upland area by eliminating human exposure to contaminated soils and the potential for erosion of contaminated soils from the upland capping area.

Operations and maintenance of the upland cap and drainage structures continue to be effective in preventing exposure to contaminated Site soils. The annual upland capping system inspection found that

the surface cap is in overall good condition, and it effectively functions to prevent erosion of the underlying soil.

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, the remedy implemented in the marine area of the Site is not functioning as intended by the decision documents. Monitoring results since 1999 indicate that total DDT and dieldrin concentrations in sediment, marine surface water, and mussel and fish tissues exceed remediation goals and action limits in the Lauritzen Channel. Sediment concentrations in the Parr Canal indicate that this portion of the Site is within the remediation limits cited in the ROD. However, samples collected in 2013 surface water and mussel tissue results from the Parr Canal remain above the remediation goals.

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, remediation goals 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.

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.

No major changes in the Site conditions of the marine area that might affect the exposure pathways were identified. Fish consumption advisory signs that were installed at the Site indicating that fish caught in the Lauritzen Channel should not be consumed, 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).

No new contaminants have been identified. There were no changes in toxicity during this review period.

The primary remedial action objective identified for the marine area is the attainment of the EPA water quality criteria and equivalent state objectives for Bay waters. Based on data collected in 2013, EPA water quality criteria and equivalent state objectives for Bay waters are not being met. A Focused Feasibility Study to evaluate remedy revisions to address contamination remaining in the Lauritzen Channel, including revised remedial action objectives, is being finalized. A remedial action objective for the upland area is to prevent the erosion and transport of upland soils into the Lauritzen Channel. No erosion has been observed in the area of the upland cap. This remedial action objective 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?

The GAO Superfund Climate Change report indicates the United Heckathorn is in an area potentially impacted by: (1) highest flood hazard and (2) flooding at high tide with no additional sea level rise. EPA published a technical fact sheet in April 2015 addressing climate change adaptation at contaminated sediment remedies (EPA, 2015). When coastal storms coincide with high tides, the depth and extent of coastal flooding can increase dramatically. Even relatively weak winds blowing toward land during high-tide events can push large volumes of water inland. Rainfall can also add a substantial volume of water to high-tide floods.

Future climate change could mean increased frequency of intense storms and drainage affecting the rates of sediment erosion of the upland cap causing resuspension of contaminated sediment, overwhelming storm drains, and compromising infrastructure, all of 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 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 9. Issues and Recommendations Identified in the Five-Year Review

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): Marine Area	**Issue Category**: Remedy Performance			
	Issue: Concentrations of contaminants in sediment, surface water, and tissue samples in the Lauritzen Channel continue to exceed remediation goals more than twenty years after remedy implementation.			
	Recommendation: Complete the Focused Feasibility Study for the Marine Area to support the selection of a new remedy.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
Yes	Yes	EPA	EPA	8/6/2025
OU(s): Sitewide	Issue Category: Other			
	Issue: Due to COVID travel restrictions, EPA was not able to conduct a site inspection during the five-year review period.			
	Recommendation: EPA will conduct a site inspection once EPA's travel restrictions are lifted.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/30/2022

6.1. *Other Findings*

In addition, the following are recommendations that improve performance of the remedy but do not affect current and/or future protectiveness and were identified during the Five-Year Review:

- Surface sediment in the Parr Canal is below the remediation goal, however, surface water and fish tissue samples collected in the Parr Canal remain above their respective remediation goals. Samples were last collected in 2013 and currently there is no monitoring program to track progress in the Parr Canal. The ROD amendment should consider a long-term monitoring component that includes the waters and tissues of Parr Canal.

- Conduct a climate-change exposure assessment and a climate-change sensitivity assessment to estimate the likelihood for potential climate change hazards to reduce the effectiveness of the remedy.

- The ROD does not include a monitoring component for the seeps along the embankment at Lauritzen Channel. The ROD amendment should consider a long-term monitoring component that includes sampling of these seeps.

7. Protectiveness Statement

Table 10. Protectiveness Statement

Protectiveness Statement(s)		
Operable Unit: Upland Area (OU1)	*Protectiveness Determination:* Protective	Click here to enter a date
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 assure the protectiveness of the upland remedy at the Site. EPA will conduct a site inspection when COVID travel restrictions are lifted.		

Protectiveness Statement(s)		
Operable Unit: Marine Area	*Protectiveness Determination:* Not Protective	*Planned Addendum Completion Date:* Click here to enter a date
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 exceed ROD remediation goals; and a re-evaluation of the risk to human health and ecological receptors in 2010 indicates that sediment in Lauritzen Channel continues to pose a risk. A new remedial action will need to be implemented to ensure protectiveness. EPA will conduct a site inspection when COVID travel restrictions are lifted.		

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.

Appendix A: List of Documents Reviewed

Anchor QEA LLC. 2020. Data Summary Report September 2020 Former United Heckathorn Site. Prepared for Montrose Chemical Corporation of California. Prepared by Anchor QEA, San Francisco, California. 69 pp.

CDIM Engineering, Inc. August 2017. 2016-2017 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.

CDIM Engineering, Inc. August 2018. 2017-2018 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.

CDIM Engineering, Inc. September 2019. 2018-2019 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.

CDIM Engineering, Inc. September 2020. 2019-2020 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.

CH2M Hill. March 2014. Source Identification Study Report. United Heckathorn Superfund Site. Report Prepared for U.S. EPA.

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

EPA. August 2016. Fourth Five-Year Review Report for United Heckathorn Superfund Site, Richmond, California.

State Water Resources Control Board, April 2014. General Permit for Storm Water Discharges Associated with Industrial Activities, Order No. 2014-0057-DWQ, National Pollutant Discharge Elimination System General Permit No. CAS000001.

Appendix B: Site Chronology

Event	Date
Pre-remediation	
Site used to formulate and package pesticides, particularly dichlorodiphenyl trichloroethane (DDT).	1947-1966
The Regional Water Quality Control Board inspected and cited the facility for the release of DDT-laden wastewater into the Lauritzen Channel.	1960
California Department of Fish and Game identified a discharge of wastewater overflow into the Lauritzen Channel and leakage from the pesticide settling tanks.	1965
California Department of Health Services investigated the Site as part of its Abandoned Site Project.	1980
California Department of Health Services designated the Site as a State Superfund Site.	March 1982
Interim Removal Actions occurred at the upland portion of the Site.	1982-1993
Last recorded maintenance dredging performed to Lauritzen Channel prior to remediation.	1985
The 1984-1985 California State Mussel Watch (SMW) survey, for the first time, included Richmond Harbor and found levels of DDT and dieldrin "highest ever measured in mussels by the SMW program."	1986
Site listed on USEPA National Priorities List.	March 1990
Pursuant to USEPA Removal Order 90-22, approximately 1,500 cubic yards of soil and visible pesticide residue containing up to 100% DDT were excavated by several potentially responsible parties.	November 1990
Approximately 1,800 cubic yards of residue and contaminated soil were excavated from Site.	1991
Final soil removal action completed.	May 1993
Battelle completed remedial investigation on marine sediment.	February 1994
California Department of Toxic Substances Control issued advisory against consuming any bottom fish from the Richmond Inner Harbor.	April 1994
Battelle completed feasibility study.	July 1994
Record of Decision (ROD) signed.	October 1994
Sediment Remediation	
Remedial Design/Remedial Action Work Plan for sediment dredging submitted.	May 1996
Consent Decree approved by U.S. District Court.	July 1996
Remedial action at Parr Canal and Lauritzen Channel began.	August 1996
Remedial action at Parr Canal and Lauritzen Channel ended.	April 1997
Post-remediation biomonitoring began.	July 1997
Post-sediment Remediation	
Remedial Design/Remedial Action Work Plan for upland cap submitted.	April 1998
Construction of upland area cap began.	July 1998
Construction of upland area cap ended.	July 1999
Post-remediation Biomonitoring of Pesticides in Marine Waters Near the United Heckathorn Superfund Site, Year 1 Report prepared.	September 1998, revised July 2000
Post-remediation Biomonitoring, Year 2 Report prepared.	October 1999, revised July 2000
Post-remediation Biomonitoring, Year 3 Report prepared.	October 2000

Event	Date
Post-remediation Biomonitoring, Year 4 Report prepared.	June 2001
First Five-Year Review Report prepared.	September 2001
Post-remediation Biomonitoring, Year 5 Report prepared.	August 2002
Phase I Source Investigation completed.	March and July 2002
Phase I Source Investigation Report prepared.	December 2002
Phase II Source Investigation completed.	May 2003
Site conceptual model updated.	December 2003
Post-remediation Biomonitoring, Year 6 and Phase II Source Investigation Report prepared.	March 2004
Phase III Source Investigation completed.	July 2004
Phase III Fluid Mud and 2004 Water Quality Investigation Report completed.	December 2004
Second Five-Year Review Report prepared.	September 2006
Focused Feasibility Study Data Gaps Sampling and Analysis Plan prepared.	August 2007
Summary of Mussel, Water, and Sediment Sampling submitted.	January 2008
Fish sampling performed.	May 2008
Phase 1 of MIT Passive Sampler Investigation completed.	October 2009
Human Health and Ecological Risk Assessment Update submitted.	February 2010
Fish Advisory for Lauritzen Channel and San Francisco Bay Issued.	May 2011
Third Five-Year Review Report prepared.	September 2011
Tier 1 Sediment Transport Study completed.	April 2013
Post-remediation biomonitoring, Phase 2 MIT Passive Sampler Investigation completed.	October 2013
Fish tissue sampling in areas adjacent to Lauritzen Channel.	November 2013
Tier 2 Sediment Transport Study (Sea Engineering, Inc., 2014a) completed.	February 2014
Source Identification Study (CH2M HILL, 2014) completed.	March 2014
DDT Fate and Transport Study completed (Sea Engineering, Inc., 2014b).	May 2014
Draft Focused Feasibility Study prepared.	February 2015
Fourth Five-Year Review Report prepared.	September 2016
Anchor QEA, LLC United Heckathorn Data Summary Report	September 2020[a]

[a]The data collected by Anchor QEA was not collected under EPA oversight and has not undergone EPA data validation. However, with these caveats the chemistry results are summarized in this Five-Year Review for the purposes of potentially informing the understanding of the sediment concentrations of total DDT and dieldrin at the Site.

Appendix C: Data Review

The USACE reviewed Annual Upland Cap Reports, submitted on behalf of Levin Richmond Terminal Corporation from 2016 to 2020, which contain information related to the inspection/maintenance of the concrete cap, inspection and cleaning of the stormwater collection and drainage system, stormwater treatment and operation, as well as stormwater monitoring and sheet pile seep sampling.

USACE also reviewed the 2020 Data Summary Report of sediment sampling and analysis conducted by Anchor QEA, LLC in 2016. The data collected by Anchor QEA was not collected under EPA oversight and has not undergone EPA data validation. However, with these caveats the chemistry results are summarized here for the purposes of potentially informing the understanding of the sediment concentrations of total DDT and dieldrin at the Site. Sediment cores, sediment traps, and embankment sediment samples collected from the Lauritzen Channel and adjoining portions of the Santa Fe Channel were reviewed for the current Five-Year Review period to evaluate the effectiveness of the remedy.

C.1. Upland Soils

The USACE review of the annual monitoring of the upland cap reports indicates that the cap is intact and functioning as intended (CDIM Engineering, Inc, 2017, 2018, 2019 and 2020). The monitoring program helps alert facility staff to problems with the cap in order to initiate timely repairs and to determine compliance with the remedial action objectives preventing physical contact and erosion of contaminated soil. Annual monitoring reports also document whether the storm drain system is functioning as designed. The analytical results from sampling and analysis for pesticides in stormwater discharges originating from the upland area help determine the cap's effectiveness in preventing transport of contaminated soil from the upland area to Lauritzen Channel.

The current operations and maintenance plan stipulates that stormwater samples be analyzed using EPA Method 8080; however, in previous years stormwater samples were analyzed for Method 8080 analytes using standard and low-level EPA Method 8081A to achieve lower method detection limits. The EPA recommended in the previous Five-Year Review that analytical methods with detection limits lower than the marine surface water remediation goals be used to allow for more meaningful evaluation of analytical data (EPA, August 2016). In an October 5, 2016 email, EPA requested that samples from advanced stormwater treatment system TS-2 (TS-2) be analyzed using EPA Method 1699 to achieve ultra-low detection limits (Email from Karen Jurist of EPA to Scott Bourne of CDIM Engineering). CDIM Engineering implemented the use of EPA Method 1699 in the stormwater sampling program starting with the 2016-2017 annual sampling.

Prior to 2015, CDIM Engineering, on behalf of Levin Richmond Terminal, collected stormwater discharge samples from interceptors SW-3 through SW-7 (Figure C-1). Since installing TS-2, Levin Richmond Terminal Corporation now collects stormwater samples from the TS-2 influent and effluent, however, in the event that elevated pesticides are detected in the TS-2 influent or effluent, interceptors SW-3 through SW-7 are also sampled.

Levin Richmond Terminal sampled stormwater from the combined TS-2 influent and effluent during major storm events, which consisted of three to four storm events per year, depending on the year. Analysis of the stormwater monitoring data collected for the storm drain system indicates that the system is functioning as designed, with only infrequent direct discharges to the Lauritzen Channel.

Influent Sample Results

CDIM measured samples of combined influent to TS-2, which are a composite of the SW-3 and SW-4 influent mixed with the combined SW-5/6/7 influent feeds; volume from each feed was calculated based on estimated runoff contribution to TS-2 discharge. Total DDT was detected at concentrations ranging from 0.0065 to 0.1470 micrograms per liter (µg/L) during this review period; dieldrin was detected at concentrations from 0.0009 to 0.0076 µg/L (Table C-1).

Table C-1. Influent Stormwater Sampling Data for Total DDT and Dieldrin.

Reporting Year	Influent / Effluent	Stormwater Sample Date	Total DDT (µg/L)	Dieldrin (µg/L)
2016-2017	Influent	14-Oct-16	0.0355	0.0040
	Influent	8-Dec-16	0.1307	0.0073
	Influent	3-Jan-17	0.0719	0.0032
	Influent	18-Jan-17	0.1470	0.0038
2017-2018	Influent	4-Jan-18	0.0580	0.0070
	Influent	8-Jan-18	0.0715	0.0031
	Influent	22-Jan-18	0.0810	0.0076
	Influent	1-Mar-18	0.0298	0.0017
2018-2019	Influent	27-Nov-18	0.0065	0.0034
	Influent	5-Dec-18	0.0125	0.0009
	Influent	11-Jan-19	0.0406	0.0037
	Influent	31-Jan-19	0.0140	0.0018
2019-2020	Influent	7-Dec-19	0.0277	0.0016
	Influent	18-Dec-19	0.0211	0.0011
	Influent	16-Jan-20	0.0507	0.0029

Effluent Sample Results

Samples from the treated stormwater effluent detected total DDT at concentrations ranging from 0.0001 to 0.0189 µg/L during this review period; dieldrin was detected at concentrations from 0.0005 to 0.0054 µg/L (Table C-2). Iron was detected in the January 3, 2017 TS-2 discharge sample above the California stormwater Industrial General Permit numeric action levels (State Water Resources Control Board, 2014) of 1,000 µg/L. TS-2 discharge results for all other pollutants (metals, oil and grease, pH, and TSS) were below the numeric action levels (Table C-3).

Table C-2. Effluent Stormwater Sampling Data for Total DDT and Dieldrin.

Reporting Year	Influent / Effluent	Stormwater Sample Date	Total DDT (µg/L)	Dieldrin (µg/L)
2016-2017	Effluent	14-Oct-16	0.0021	0.0016
	Effluent	8-Dec-16	0.0022	0.0015
	Effluent	3-Jan-17	0.0025	0.0013
	Effluent	18-Jan-17	0.0022	0.0028
2017-2018	Effluent	4-Jan-18	0.0007	0.0010
	Effluent	8-Jan-18	0.0004	0.0010
	Effluent	22-Jan-18	0.0189	0.0054
	Effluent	1-Mar-18	0.0001	0.0005
2018-2019	Effluent	27-Nov-18	0.0003	0.0008
	Effluent	5-Dec-18	0.0004	0.0011
	Effluent	11-Jan-19	0.0112	0.0015
	Effluent	31-Jan-19	0.0006	0.0011
2019-2020	Effluent	7-Dec-19	0.0003	0.0006
	Effluent	18-Dec-19	0.0007	0.0006
	Effluent	16-Jan-20	0.0064	0.0008

Table C-3. Influent and Effluent Stormwater Sampling Data for General Parameters and Metals.

Reporting Year	Influent / Effluent	Stormwater Sample Date	pH	Oil and grease (hexane extractable) (mg/L)	Total suspended solids (mg/L)	Aluminum (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Zinc (µg/L)
2016-2017	Influent	14-Oct-16	8.00	1.90	160.0	703.0	20.50	1,260.0	18.40	432.00
	Influent	8-Dec-16	6.95	2.10	175.0	584.0	21.50	2,070.0	72.90	255.00
	Influent	3-Jan-17	7.90	<1.0	27.0	293.0	10.90	1,050.0	9.12	169.00
	Influent	18-Jan-17	7.76	1.00	131.0	721.0	13.50	1,870.0	89.80	250.00
	Effluent	14-Oct-16	8.00	<5.26	10.0	57.0	7.80	<100	<5.0	47.00
	Effluent	8-Dec-16	7.37	<1.0	3.8	19.5	12.20	74.9	4.05	118.00
	Effluent	3-Jan-17	8.04	<1.0	1.4	16.4	13.40	1,800.0	5.34	119.00
	Effluent	18-Jan-17	7.55	<1.0	1.7	13.3	3.11	25.3	2.14	114.00
2017-2018	Influent	4-Jan-18	7.44	1.30	332.0	1250.0	70.80	7,690.0	118.00	360.00
	Influent	8-Jan-18	7.30	1.60	172.0	767.0	23.40	2,550.0	72.70	271.00
	Influent	22-Jan-18	7.24	1.60	196.0	530.0	14.30	1,650.0	29.20	195.00
	Influent	1-Mar-18	7.77	2.00	214.0	1180.0	11.60	2,230.0	23.70	313.00
	Effluent	4-Jan-18	7.66	<1.0	5.3	16.5	3.09	135.0	2.60	102.00
	Effluent	8-Jan-18	7.64	<1.0	<1.0	16.0	2.04	21.7	0.81	56.80
	Effluent	22-Jan-18	7.58	<1.0	<1.0	17.0	2.35	32.6	1.00	57.20
	Effluent	1-Mar-18	7.94	<1.0	1.9	16.4	10.20	17.1	1.49	84.00
2018-2019	Influent	27-Nov-18	7.66	<5.49	7.2	54.0	28.70	703.0	1.66	38.90
	Influent	5-Dec-18	7.87	<5.49	56.0	592.0	9.42	1,160.0	9.87	85.40
	Influent	11-Jan-19	7.69	<5.32	77.0	904.0	---	1,990.0	21.30	110.00
	Influent	31-Jan-19	7.65	<5.56	55.0	318.0	---	969.0	8.89	87.10
	Effluent	27-Nov-18	7.61	<5.44	0.7	30.0	7.65	271.0	2.07	77.60
	Effluent	5-Dec-18	7.97	<5.26	0.4	26.1	7.39	31.0	0.56	29.40
	Effluent	11-Jan-19	7.95	<5.68	4.8	95.7	---	169.0	2.17	36.90
	Effluent	31-Jan-19	7.86	1.01	0.8	41.3	---	242.0	0.97	61.70

2019-2020	Influent	7-Dec-19	7.64	<5.26	16.0	208.0	--	361.0	9.24	95.30
	Influent	18-Dec-19	7.58	<5.44	790.0	144.0	--	342.0	4.63	65.60
	Influent	16-Jan-20	7.36	<5.44	136.0	685.0		2,050.0	19.00	149.00
	Effluent	7-Dec-19	7.56	<5.56	0.5	<100	--	39.3	0.76	50.30
	Effluent	18-Dec-19	7.42	<5.26	4.5	<100	--	20.4	0.57	24.80
	Effluent	16-Jan-20	7.52	<5.49	28.8	103.0	--	300.0	2.88	44.10

Mann-Kendall Analysis for Influent and Effluent Stormwater Sampling Data

USACE reviewed the stormwater sample data collected by CDIM Engineering, Inc from 2016 to 2020 for pesticides in stormwater discharges originating from the upland area to evaluate the cap's effectiveness in preventing transport of contaminated soil from the upland area to Lauritzen Channel. Following a review of the data presented in the Annual Upland Cap Reports, USACE conducted Mann-Kendall statistical trend analysis for stormwater influent and effluent for total DDT and dieldrin. The Mann-Kendall test is a non-parametric test for identifying trends in time-series data. The test compares the relative magnitudes of sample data rather than the data values themselves. In practical terms, the purpose of the Mann-Kendall analysis is to determine whether the contaminant concentration is increasing, stable, or decreasing over time. Table C-4 presents a summary of the Mann-Kendall statistical trend analysis. Figures C-2 and C-3 provide detailed results of the analysis.

A review of sample results during this Five-Year Review period indicates that influent concentrations, for both total DDT and dieldrin, have been decreasing (Figures C-2 and C-3). Effluent sampling data indicates that total DDT concentrations show no trend (Figure C-2), with some sample concentrations above the marine surface water remediation goal (0.00059 µg/L) and some below. A "No Trend" result can be considered as evidence that the dataset (contaminant concentration) shows no distinct linear trend (increasing/decreasing) over time with sufficient statistical confidence. Effluent dieldrin concentrations have a decreasing trend (Figure C-3), however, all measured samples are above the marine surface water remediation goal (0.00014 µg/L). While concentrations show a relatively high degree of variability within a rain year and between years, both influent and effluent concentrations during the review period were generally consistent with concentrations from previous years.

As mentioned above, total DDT and dieldrin were detected in all treated stormwater effluent samples, however, effluent sampling data indicate that the stormwater treatment system reduces the concentrations of total DDT and dieldrin in the stormwater. The stormwater treatment system reduces the average total DDT concentration in the effluent stormwater by approximately 16.3 times compared to the influent stormwater, which represents a 93.9% decrease, and reduces the average dieldrin concentration in the effluent stormwater by approximately 2.5 times compared to the influent stormwater, which represents a 59.3% decrease (Table C-4).

Additionally, the 2014 Source Identification Study determined that detections of low concentrations of pesticides, detected in the relatively low volume stormwater samples collected from the stormwater interceptors, are not the primary contributor to the elevated levels of pesticides observed in in the Lauritzen Channel sediments (Source Identification Study (CH2M Hill, 2014)). Analysis of the stormwater monitoring data collected for the storm drain system indicates that the system is functioning as designed, with only infrequent direct discharges to the Lauritzen Channel. With one exception (noted above in Effluent Sample Results), TS-2 discharge results for all other pollutants (metals, oil and grease, pH, and total suspended solvents) were below the numeric action levels (State Water Resources Control Board, 2014) from 2016-2020.

Table C-4. Mann-Kendall Trend Analysis for Upland Cap Influent / Effluent Stormwater Sampling.

Sample	Contaminant	Maximum Concentration (µg/L)	Date of Highest Concentration[1]	Average Concentration (µg/L)	Standard Deviation (µg/L)	Mann-Kendall Statistics (S)[2]	Coefficient of Variation (COV)[3]	Confidence in Trend[4]	Concentration Trend
Influent	Total DDT	0.1470	18-Jan-17	0.0532	0.0403	-39	0.78	97.1%	Decreasing
Effluent	Total DDT	0.0189	22-Jan-18	0.0033	0.0051	-7	1.61	61.5%	No Trend
Influent	Dieldrin	0.0076	22-Jan-18	0.0035	0.0021	-49	0.62	99.2	Decreasing
Effluent	Dieldrin	0.0054	22-Jan-18	0.0014	0.0012	-43	0.86	98.2%	Decreasing

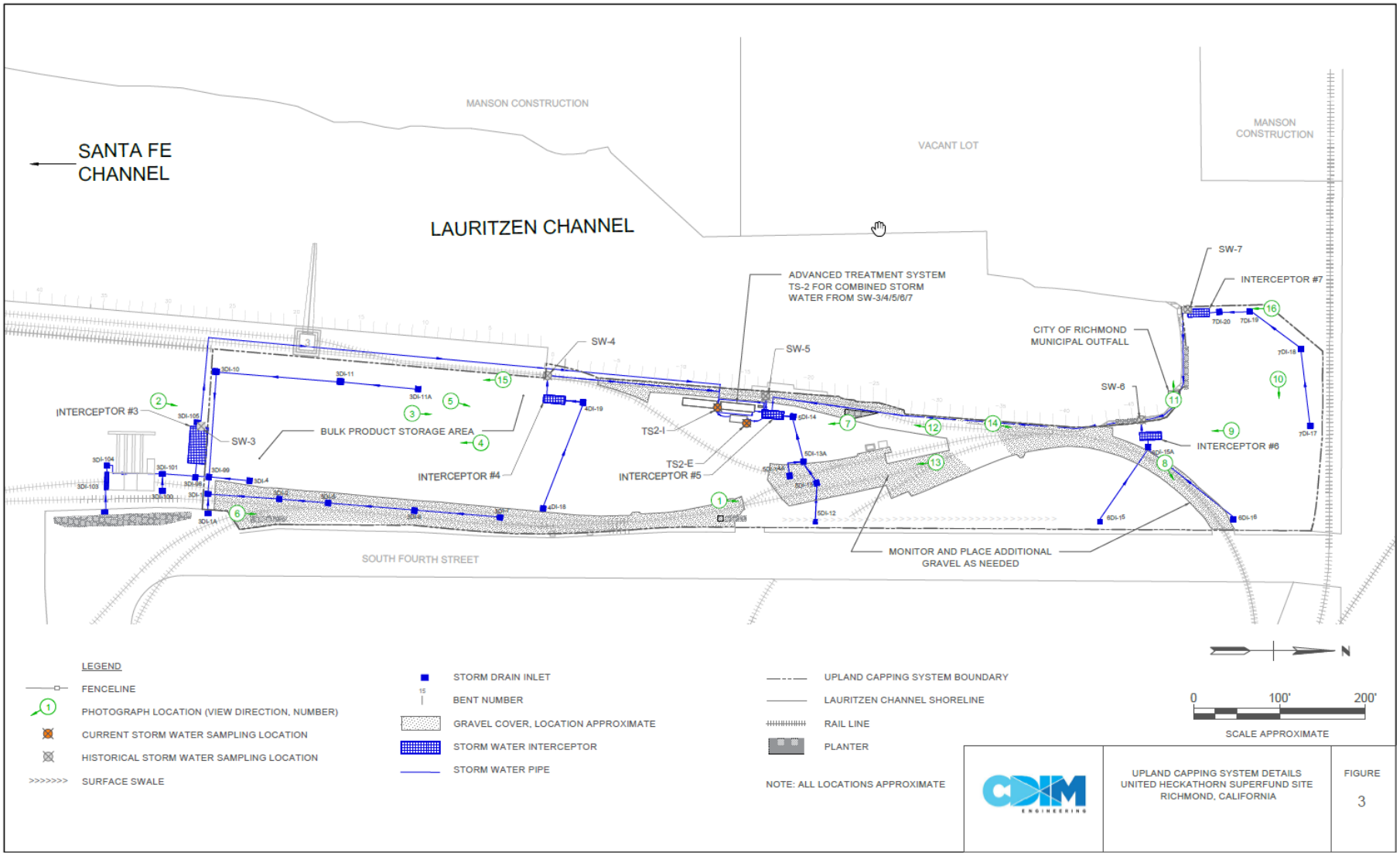
Notes:

[1]Mann-Kendall Statistical analysis for influent/effluent samples evaluated from 14-Oct-16 to 16-Jan-20.

[2]The Mann-Kendall Statistic (S) measures the trend of the data. Positive values indicate an increase of concentration over time, whereas negative values indicate a decrease in concentration over time.

[3]The Coefficient of Variation (COV) is a statistical measure of how the individual data points vary about the mean value. The coefficient of variation, defined as the standard deviation divided by the average. Values near 1 indicate that the data form a relatively close group about the mean value. Values larger or smaller than 1.0 indicate that the data show a greater degree of scatter about the mean.

[4]The Confidence in Trend is the statistical confidence that the constituent concentration is increasing (S-0).



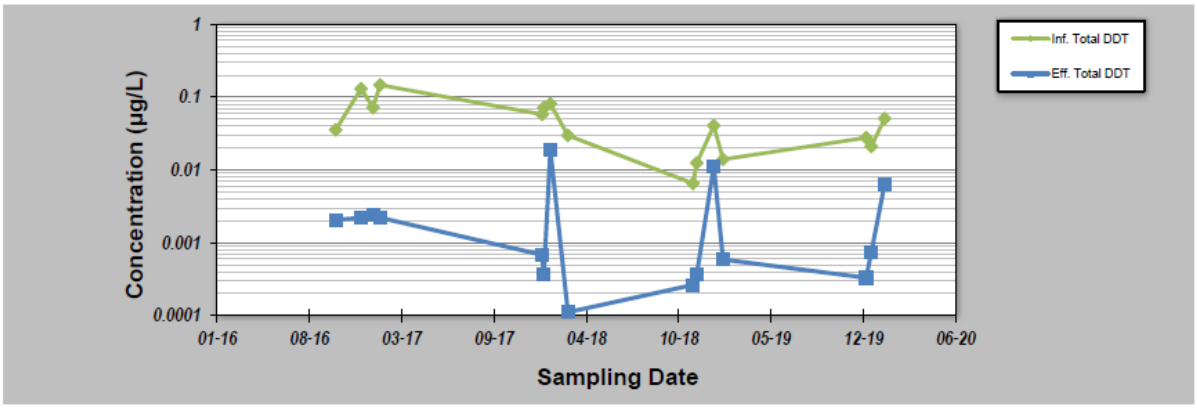
Source: CDIM Engineering, Inc. September 2020. 2019-2020 Annual Report for United Heckathorn Superfund Site, Upland Capping System, Richmond, California.

Figure C-1. Stormwater Interceptors and Treatment System at Levin Richmond Terminal.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Jun-21	Job ID:	United Heckathorn 2021 FYR - Influent / Effluent
Facility Name:	United Heckathorn	Constituent:	Total DDT
Conducted By:	Travis Kelsay	Concentration Units:	µg/L

Sampling Point ID:	Inf. Total DDT	Eff. Total DDT					
Sampling Event	Sampling Date	TOTAL DDT CONCENTRATION (µg/L)						
1	14-10-16	0.035469	0.002063					
2	08-12-16	0.130670	0.002195					
3	03-01-17	0.071890	0.002457					
4	18-01-17	0.147040	0.002209					
5	04-01-18	0.057953	0.000681					
6	08-01-18	0.071511	0.000363					
7	22-01-18	0.081010	0.018893					
8	01-03-18	0.029807	0.000111					
9	27-11-18	0.006516	0.000263					
10	05-12-18	0.012453	0.000368					
11	11-01-19	0.040573	0.011234					
12	31-01-19	0.013989	0.000588					
13	07-12-19	0.027736	0.000330					
14	18-12-19	0.021052	0.000731					
15	16-01-20	0.050659	0.006409					
16								
17								
18								
19								
20								
Coefficient of Variation:		0.78	1.61					
Mann-Kendall Statistic (S):		-39	-7					
Confidence Factor:		97.1%	61.5%					
Concentration Trend:		Decreasing	No Trend					



Notes:

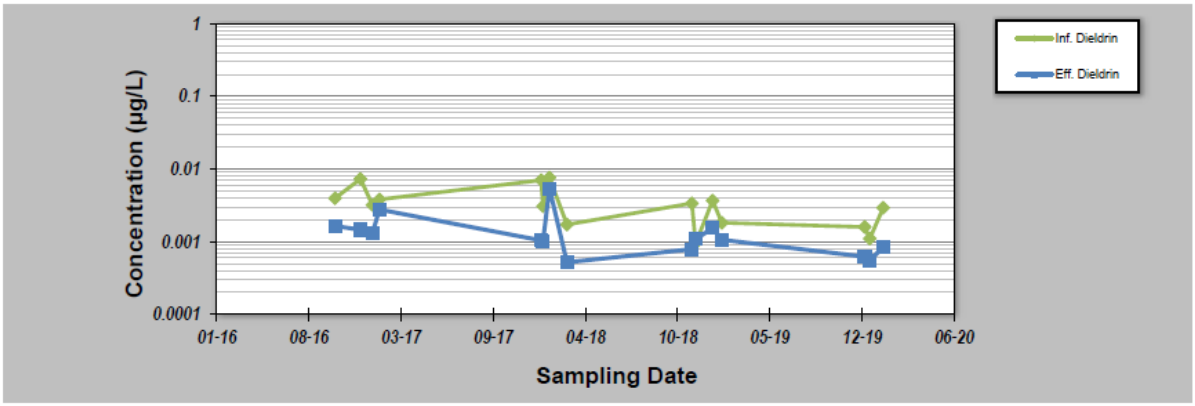
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Figure C-2. Mann-Kendall Statistics for Stormwater Total DDT Concentration.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	11-Jun-21	Job ID:	United Heckathorn 2021 FYR - Influent / Effluent
Facility Name:	United Heckathorn	Constituent:	Dieldrin
Conducted By:	Travis Kelsay	Concentration Units:	µg/L

Sampling Point ID:	Inf. Dieldrin	Eff. Dieldrin					
Sampling Event	Sampling Date	DIELDRIN CONCENTRATION (µg/L)						
1	14-10-16	0.003960	0.001640					
2	08-12-16	0.007310	0.001460					
3	03-01-17	0.003190	0.001300					
4	18-01-17	0.003810	0.002770					
5	04-01-18	0.007020	0.001040					
6	08-01-18	0.003070	0.001010					
7	22-01-18	0.007610	0.005410					
8	01-03-18	0.001720	0.000519					
9	27-11-18	0.003370	0.000787					
10	05-12-18	0.000945	0.001080					
11	11-01-19	0.003670	0.001540					
12	31-01-19	0.001820	0.001060					
13	07-12-19	0.001590	0.000621					
14	18-12-19	0.001100	0.000556					
15	16-01-20	0.002930	0.000835					
16								
17								
18								
19								
20								
Coefficient of Variation:		0.62	0.86					
Mann-Kendall Statistic (S):		-49	-43					
Confidence Factor:		99.2%	98.2%					
Concentration Trend:		Decreasing	Decreasing					



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

Figure C-3. Mann-Kendall Statistics for Stormwater Dieldrin Concentration.

C.2. Marine Sediment

In October and November 2016, Anchor QEA collected sediment cores, sediment traps, and embankment sediment samples from the Lauritzen Channel and adjoining portions of the Santa Fe Channel (Anchor QEA 2020). The data collected by Anchor QEA was not collected under EPA oversight and has not undergone EPA data validation. However, with these caveats the chemistry results are summarized here for the purposes of potentially informing the understanding of the sediment concentrations of total DDT and dieldrin at the Site, relative to the remediation goal.

Dieldrin is also a contaminant of concern for sediments in the ROD based on unacceptable human health risk for the seafood ingestion pathway and unacceptable bioaccumulation potential for marine organisms. Dieldrin did not have a remediation goal in the ROD since it co-occurs with total DDT and DDT concentrations are notably higher in sediments. Anchor QEA measured concentrations of dieldrin in sediment which are also summarized in this section.

Surface Sediment

Aquatic organisms are most likely to interact with surface sediments, and those contaminants in the upper 10 to 15 centimeters of sediment are the most likely to enter the food chain and potentially impact human health. In 2016, Anchor QEA collected surface sediment grab samples (to 10 cm depth) at 12 locations in the middle and upper portions of the Lauritzen Channel (Figure C-4 and Table C-5). Total DDT concentrations exceeded the sediment remediation goal (590 µg/kg total DDT) in each of the samples from the northern (Stations SG1 through SG4) and western (SG5 through SG8) portions of the Channel, with average concentrations ranging from 1,014 to 3,300 µg/kg total DDT. Concentrations in the eastern portion of the Lauritzen Channel (SG9 through SG12) were generally lower, with concentrations below the remediation goal in the two southernmost stations (SG11 and SG 12).

To better understand the surface sediment concentrations over a larger portion of the Site, the surface increments of sediment cores (0-15 cm depth) collected in the Lauritzen and Santa Fe Channels by Anchor QEA in 2016 were also compared to the remediation goal (core locations shown on Figure C-5). As with the grab samples, the highest total DDT concentrations were observed in the northern and central portions of the Channel, with concentrations decreasing nearer to the Santa Fe Channel (Table C-5 and Figure C-6). Total DDT concentrations in the northern portion of the Channel (Stations SC 1 through SC5) were all above the remediation goal and ranged from 2,921 to 5,450 µg/kg. Surface sediment concentrations in the western portion of the Channel (Stations SC6, 8, 10, 14, and 16) were generally similar to the eastern portion of the Site (Stations 7, 9, 11, 13, and 15). Total DDT concentrations for most stations were between 162 and 6,410 µg/kg, with the exception of two stations, SC7 and SC10, located in the central portion of the channel. Total DDT in these stations was an order of magnitude higher, with surface sediment concentrations of 31,346 and 91,860 µg/kg total DDT, respectively. While the surface sediment total DDT concentrations decreased in the southern portion of the channel, there were similar concentrations in the eastern and western portions. Most of the surface sediment samples collected in 2016 by Anchor QEA were from within the historically dredged footprint. None of the 2016 samples were collected in the northernmost portion of the Lauritzen Channel, where some of the highest concentrations were observed by EPA in 2013. All of the surface sediments collected in cores from the Santa Fe Channel were below the remediation goal.

Based on the surface sediment samples collected by Anchor QEA in 2016, total DDT concentrations remain elevated at concentrations above the risk-based remediation goal in those sediments most likely to be exposed to aquatic life and most available for uptake into the food chain.

Average dieldrin concentrations in surface grab samples collected by Anchor QEA in 2016 ranged from 1.8 µg/kg at the southern end of the Lauritzen Channel (Station SG12) to 40.8 µg/kg in the central portion of the Channel (Station SC06; Table C-5). In the surface interval of the sediment cores, dieldrin concentrations generally ranged from non-detect to 140 µg/kg with the exception of Station SC10, which had a concentration of 2,300 µg/kg (Table C-6). Concentrations were more variable across the Channel and did not show as clear a north to south gradient as the samples of total DDT collected by Anchor QEA. Dieldrin concentrations were lower in the Santa Fe Channel, ranging from non-detect to 6 µg/kg.

Sediment Cores: Sediment cores for chemistry analyses were collected by Anchor QEA in 2016 from 21 locations to a depth of approximately 4 feet below the sediment surface (Figure C-5). Anchor QEA divided cores into 15-cm increments to evaluate concentrations of total DDT at different depth intervals below the sediment surface.

As with the surface sediment samples, total DDT concentrations decreased nearer to the Santa Fe channel (Figure C-6); however, all cores collected by Anchor QEA in the Lauritzen Channel contained sediment contamination above the remediation goal of 590 µg/kg. The highest concentrations in the sediment column were collected in the central portion of the channel in Stations SC6 through SC10, with maximum concentrations ranging from 40,030 to 2,246,700 µg/kg total DDT at Station SC08.

The maximum concentrations of total DDT collected by Anchor QEA in 2016 were among the highest observed following the remedial dredging in 1996 and 1997 (Table C-8, Figure C-7). This may be due in part to different station locations being sampled by Anchor QEA in 2016, than by EPA in 2013. The horizontal distribution of DDT in sediment appears to be heterogenous with the concentrations varying considerably over small areas. In the 2016 Anchor QEA sampling effort, the average concentration of total DDT was 57,325 µg/kg, whereas in the previous sampling effort collected by EPA in 2013, the average concentration was 11,742 µg/kg. While the 2016 average concentration collected by Anchor QEA was influenced by the very high concentrations observed in central portion of the Lauritzen Channel (Stations SC6 through SC10), the maximum concentrations observed in all cores from the north and central portions of the channel also were above the 2013 average concentration collected by EPA. Maximum concentrations in the 2013 samples collected by EPA were lower (298,920 µg/kg and 105,150 µg/kg).

As with the surface sediment samples, the maximum concentrations of total DDT were notably lower in the Santa Fe Channel, compared to the Lauritzen Channel, with the average concentration of 278 µg/kg, below the remediation goal of 590 µg/kg. Although the average 2016 concentration in samples collected by Anchor QEA in Santa Fe Channel was higher in 2016 (278 µg/kg) than the samples collected by EPA in 2013 (49 µg/kg total DDT), it was similar to concentrations observed in 1999 and 2007.

The average dieldrin concentrations of all vertical increments from cores collected in the Lauritzen Channel by Anchor QEA in 2016 ranged from 13 µg/kg to 367 µg/kg (Table C-7), with a much higher concentration at one location (Station SC10; 41,693 µg/kg). With the exception of Station SC10, the range of concentrations were similar to those collected by EPA in 2013. The vertical distribution of dieldrin in these core samples was similar to that of total DDT.

Embankment Samples

Embankment samples represent locations along the edges of the Lauritzen Channel that are difficult to access. They are defined as the slope from the upland portion of the site down to the area where the sediment surface begins to flatten out at the edge of the channel. Sediments in these areas were not dredged as part of the 1996-1997 remedy and may be an ongoing source to the waterway.

Embankment sediments were collected by Anchor QEA in 2016, from 14 locations along the eastern and western portions of the Lauritzen Channel (Stations ES1 through ES14 and ESN1 through ESN3 as shown on Figure C-5). Concentrations of total DDT were higher than those of the adjacent surface sediments in the main channel (Table C-9). Concentrations ranged from below the remediation goal near the southern end of the channel to 63,850 µg/kg near the northern end of the Lauritzen Channel (Station ES-01). The highest concentrations were in samples Anchor QEA collected at Stations ES01, ES04, ES05, and ESN1, all located in the undredged portions of the northern end of the channel.

Table C-5. Total DDT and Dieldrin Concentrations (µg/kg) in Surface Grabs Collected in 2016 (AnchorQEA 2020).

Replicate	Station											
	SG01	SG02	SG03	SG04	SG05	SG06	SG07	SG08	SG09	SG10	SG11	SG12
Total DDT (µg/kg)												
1	3311	1408	1334	1990	3866	2462	1210	837	709	605	553	430
2	1634	1197	1968	3161	3929	2922	1191	964	624	455	311	596
3	2201	1190	1193	4748	1694	-	1086	1242	1199	1228	298	449
Mean	2382	1265	1498	3300	3163	2692	1162	1014	844	763	387	492
Dieldrin (µg/kg)												
1	29	12.4	10.5	23.6	26.2	32.8	10.2	14.3	9.7	4.1	6.2	1.5
2	21	9.5	17	20.1	42.4	48.7	10.5	18.4	10.1	3.5	1.9	2.5
3	31.9	9.7	11.6	14.2	31.7		10.7	16.1	6	13.1	2.1	1.5
Mean	27.3	10.5	13.0	19.3	33.4	40.8	10.5	16.3	8.6	6.9	3.4	1.8

Figure C-4. Total DDT Concentrations in 2016 Surface Grabs (AnchorQEA 2020)

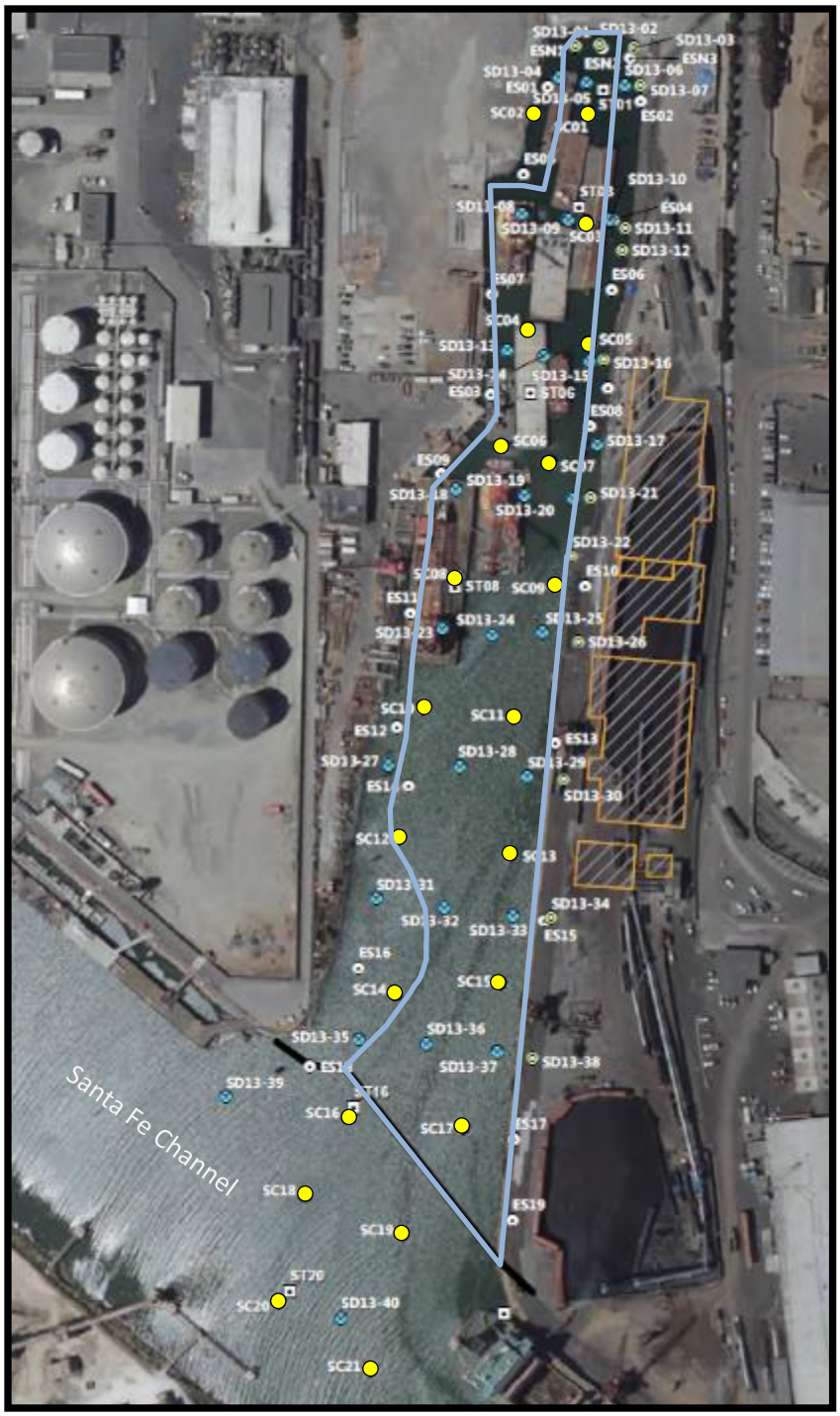


Figure C-5. 2016 Sediment Core (SC) and Embankment Sample (ES) Station Locations (AnchorQEA 2020)

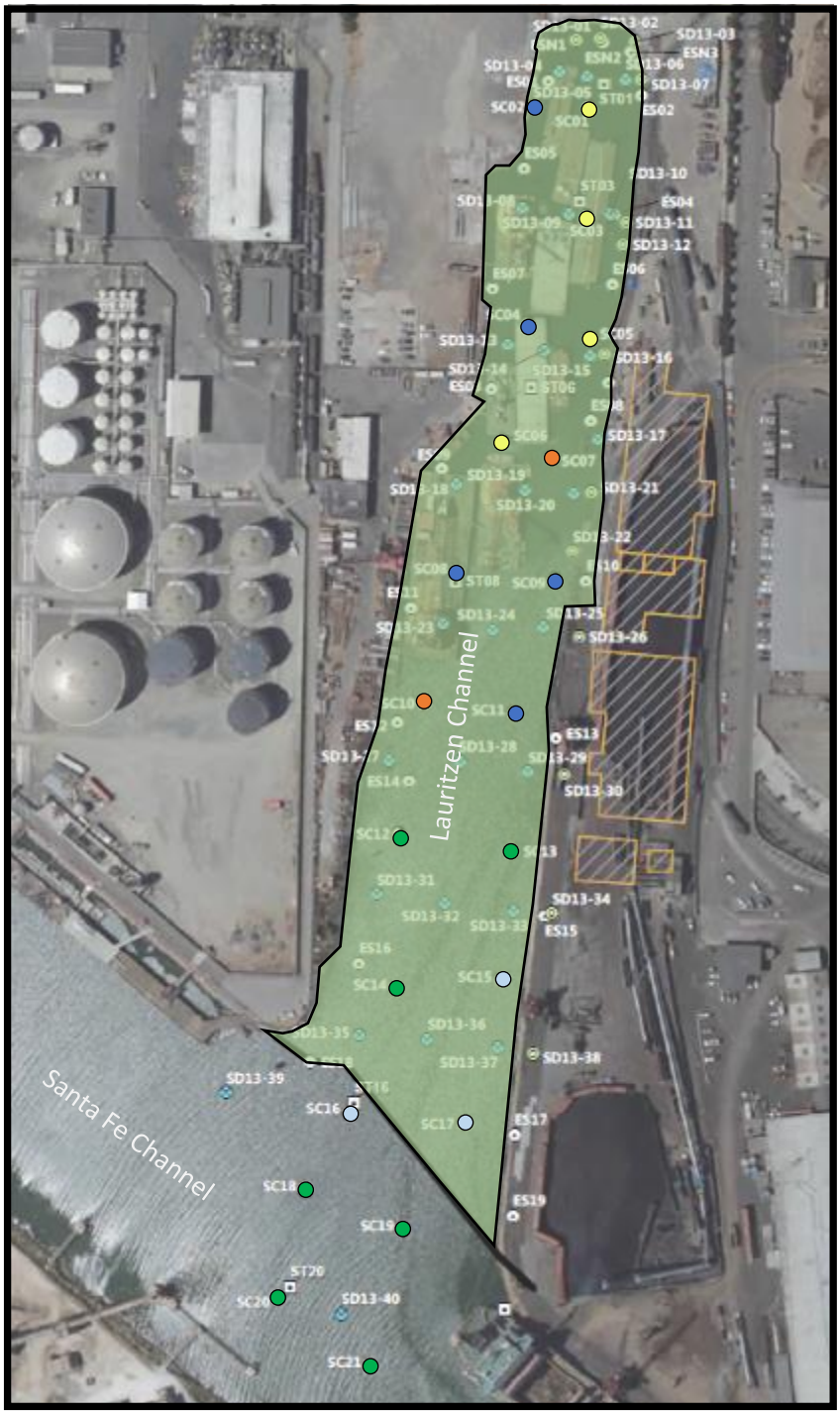
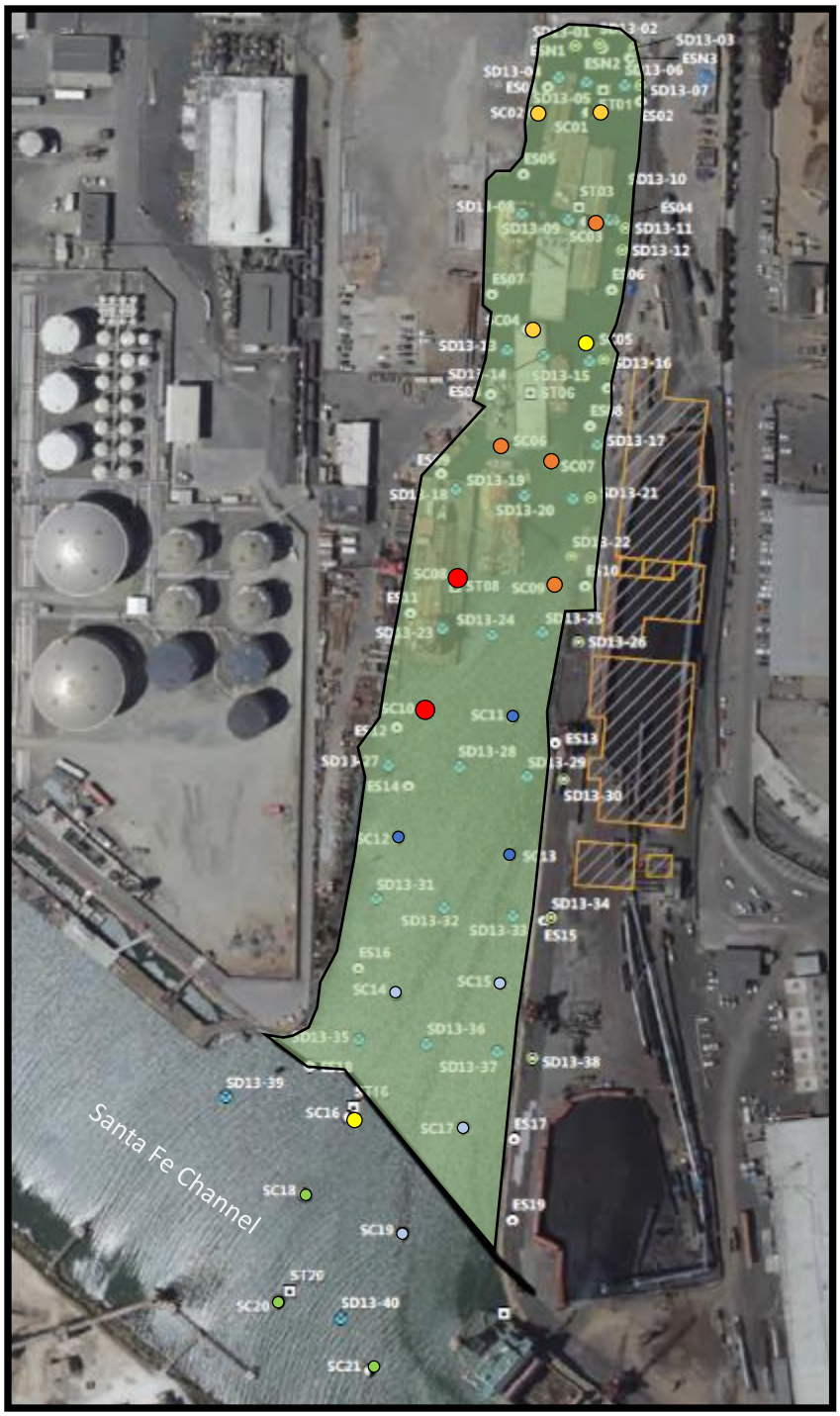


Figure C-6. Total DDT Concentrations in Surface Intervals of 2016 Sediment Cores (AnchorQEA 2020)



2016 Maximum Concentration in Top 120 cm of Sediment in Cores Collected by Anchor QEA in 2016

- <590
- 590 – 1,500
- 1,500 – 5,000
- 5,000 – 10,000
- 10,000 – 25,000
- 25,000 – 100,000
- >100,000

Figure C-7. Maximum Concentrations in 2016 Sediment Cores (AnchorQEA 2020)

Table C-6. Total DDT Concentrations (µg/kg Total DDT) in Sediment Cores from 2016 (Anchor QEA 2020).

Depth (cm)	2016 Sediment Core Station																				
	SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19	SC20	SC21
0-15	6247	2921	6215	3275	5450	6410	31346	2800	3572	91860	1644	162	545	334	1447	1365	1071	138	131	154	157
15-30	9647	1526	8944	3757	5000	38220	4047	3119	4080	107000	742	3325	518	753	1464	331	253	235	312	158	145
30-45	12081	2877	7570	10103	6330	75900	75200	2572	13370	50670	913	74	617	431	582	380	255	143	249	172	186
45-60	12577	3644	9830	8398	6130	16090	24560	3906	19240	1653	2578	0	1774	1062	792	498	269	337	176	202	988
60-75	8490	2740	9150	17350	6830	51430	23140	4024	16700	117750	1887	0	880	8	834	782	454	301	276	244	188
75-90	12616	5058	15300	17300	1851	23800	6060	14600	15560	1922100	3447	0	2009	536	884	668	469	230	240	301	--
90-105	9415	21600	29850	21490	1429	3459	13710	24010	10410	1912700	4080	1.1	1249	1029	874	1646	349	231	270	110	--
105-120	17760	10880	19860	--	--	--	24510	100100	40030	2246700	4239	--	1379	1025	838	5110	266	230	1275	--	--
Mean	11104	6406	13340	11668	4717	30758	25322	19391	15370	806304	2441	509	1121	647	964	1348	423	231	366	192	333
Max	17760	21600	29850	21490	6830	75900	75200	100100	40030	2246700	4239	3325	2009	1062	1464	5110	1071	337	1275	301	988

Shaded area indicates maximum concentration

--: Not measured

Table C-7. Dieldrin Concentrations (µg/kg) in Sediment Cores from 2016 (Anchor QEA 2020).

Depth (cm)	2016 Sediment Core Station																				
	SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19	SC20	SC21
0-15	93	29	ND	36	80	41	140	23	0	2300	35	3.5	19	ND	120	18	29	6	4.3	4	ND
15-30	170	25	120	53	110	110	69	40	17	3600	26	73	17	ND	56	ND	ND	6	ND	3	ND
30-45	280	60	120	130	280	1000	380	39	75	1100	21	ND	16	11	33	11	ND	6	ND	3	ND
45-60	570	63	180	85	190	170	450	75	130	41	44	ND	39	18	38	12	ND	6	ND	10	ND
60-75	350	75	53	180	160	100	150	--	120	2500	42	--	25	20	17	16	16	8	ND	4	ND
75-90	700	82	160	250	140	ND	140	130	140	14000	43	ND	61	21	22	10	3	6	ND	--	--
90-105	300	180	250	380	26	66	180	280	110	120000	69	ND	39	20	14	17	17	8	11	--	--
105-120	470	150	59	--	51	--	370	0	140	190000	59	--	63	17	8.3	63	ND	8	--	--	--
Mean	367	83	118	159	130	212	235	84	92	41693	42	13	35	13	39	18	8	7	2	5	ND
Max	700	180	250	380	280	1000	450	280	140	190000	69	73	63	21	120	63	29	8	11	10	ND

Shaded area indicates maximum concentration

ND: Not detected

--: Not measured

Table C-8. Summary of Core Sediment Data for 1999, 2007, 2013, and 2016 for Lauritzen and Santa Fe Channels

Sampling Event		Number of samples	Number exceeding remediation goal	Average total DDT µg/kg	Highest value total DDT µg/kg	Lowest value total DDT µg/kg
Lauritzen Channel Core sediments	1999	23	21	**31,603**	**180,840**	26
	2007	70	45	**6,021**	**88,830**	3
	2013	100	55	**11,742**	**298,920**	Non-detect
	2016[5]	17	17	**57,325**	**2,246,700**	Non-detect
Santa Fe Channel Core sediments	1999	1	0	582	582	582
	2007	7	1	236	**913**	36
	2013	9	0	66	191	Non-detect
	2016[5]	4	2	278	**1,275**	Non-detect

Notes:

- ROD remediation goal for total DDT in sediment: 590 µg/kg
- Includes both Young Bay Mud
- Exceedances of remediation goals 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 C-9. Concentrations of Total DDT and Dieldrin in Embankment Samples Collected in 2016 (AnchorQEA 2020).

	ES01	ES02	ES03	ES04	ES05	ES06	ES07	ES08	ES09	ES10	ES11	ES12	ES13	ES14	ESN1
Total DDT (µg/kg)	63850	5150	1590	15896	21248	40020	10143	4582	1852	5399	3957	442	1640	88	30650
Dieldrin (µg/kg)	3200	110	38	250	290	670	120	130	31	110	51	13	120	3	320

[5] The data collected by Anchor QEA was not collected under EPA oversight and has not undergone EPA data validation. However, with these caveats the chemistry results are summarized in this Five-Year Review for the purposes of potentially informing the understanding of the sediment concentrations of total DDT and dieldrin at the Site.

Appendix D: ARAR Assessment

Section 121 (d)(2)(A) of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) specifies that Superfund remedial actions must meet any Federal standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate requirements (ARARs). ARARs are those standards, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site.

Changes (if any) in ARARs are evaluated to determine if the changes affect the protectiveness of the remedy. Each ARAR and any change to the applicable standard or criterion are discussed below.

Chemical-specific ARARs identified in the selected remedy within the ROD for surface water and sediment at this Site and considered for this Five-Year Review are shown in Table D-1. The water quality criteria were revised in 2015, with more stringent (lower) criteria for both total DDT and dieldrin. The remediation goals in the 1994 ROD 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. Although remediation goals are based on less stringent criteria, surface water concentrations of DDT and dieldrin are above both the1994 and the 2015 criteria, so this change does not affect the determinations regarding non-protectiveness.

Table D-1. Summary of Surface Water ARAR Changes

Contaminants of Concern	1994 ROD Remediation Goals (µg/L)	Current water quality criteria[2] (µg/L)	ARARs More or Less Stringent than Remediation Goals?
DDD DDE DDT =Total [1]	0.00059	0.00012 0.000018 0.000030 =0.000168	More stringent
Dieldrin	0.00014	0.0000012	More stringent

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

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

The following ARARs have not changed since the last Five-Year Review or have had revisions that do not affect protectiveness determinations:

- 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 – last amended in 2008
- 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 affected by the Site; however, 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.

- 55 FR 8745: The National Academy of Sciences 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 National Academy of Sciences 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.

Appendix E. Toxicity Assessment

A Human Health Risk Assessment for the United Heckathorn Site was performed in 1994 and included direct exposures from dermal adsorption or incidental ingestions of Site soils by workers on site or nearby residents offsite, inhalation of fugitive dust by workers on site, and indirect exposure from seafood ingestion by fishermen and their families. Of the six exposure pathways considered, the only one considered to be a risk to human health above EPA's acceptable risk range is the consumption 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 1994 remediation goals and the excess lifetime cancer risk levels they are based on are summarized in table E-1. For surface water, the remediation goals were based on the Ambient Water Quality Criteria for human health for DDT and dieldrin. For sediment, the ROD indicated that the ambient water quality criteria for human health would be 0.59 ng/L in surface water if the average sediment concentration was below 590 µg/kg.

Table E-1. 1994 ROD Remediation Goals and TBC Standards

Medium	Chemical	Remediation Goal	Basis	Excess Lifetime Cancer Risk
Marine Surface Water*	Total DDT	0.00059 µg/L	1994 Ambient Water Quality Criteria for the consumption of organisms	$1x10^{-6}$
	Dieldrin	0.00014 µg/L	1994 Ambient Water Quality Criteria for the consumption of organisms	$1x10^{-6}$
Marine Sediment*	Total DDT	590 µg/kg	Site-specific; based on achieving human health 1994 Ambient Water Quality Criteria for consumption of organisms	$1x10^{-6}$
Tissue**	Total DDT	50 ng/g	National Academy of Sciences saltwater action level for total DDTs in fish tissue of 50 ng/g	n/a

Notes:
*1994 ROD Remediation Goals
**1994 To-Be-Considered (TBC) Standard
µg/L = micrograms per liter
µg/kg = micrograms per kilogram
ng/g = nanograms per gram

An ecological risk assessment for the United Heckathorn Site was performed in 1994 to assess the threats posed to the environment by the contaminants released from United Heckathorn and to determine remediation goals protective of the beneficial uses of San Francisco Bay. The ecological risk assessment included benthic toxicity and bioaccumulation tests, as well as estimates of risks to fish and wildlife. Risks were estimated for sediments in the Lauritzen Channel, Parr Canal, Santa Fe Channel, and Inner Richmond Harbor.

Concentrations of total DDT and dieldrin that were measured in surface water from the Lauritzen, and Santa Fe Channels and Inner Harbor Channel were compared to the Ambient Water Quality Criteria for aquatic life in marine waters of 1 ng/L for DDT (EPA 1980) and 1.9 ng/L for dieldrin (EPA 1989). The current Ambient Water Quality Criteria for the protection of aquatic life are unchanged.

For sediment, various tests of biological organisms, including benthic and water-column invertebrates and fish were tested to determine site-specific risk levels. There have not been additional toxicity testing programs since the risk assessment. Based on the risk assessment, the minimum ecological effects concentration for benthic organisms was 1,900 µg/kg dry weight. There have not been changes in the sediment toxicity data or the toxicity-based effects thresholds for the Site. The ROD also found that the EPA marine chronic water quality criteria for the protection of marine life of 1 ng/L DDT would be achieved if the average channel sediment concentration is below 1,000 µg/kg dry weight.

Fish tissue levels in the ROD were based on the National Academy of Sciences recommendation (50 µg/kg) for protection of marine birds.

Toxicity values: To evaluate the protectiveness of the remediation goals for this Five-Year Review, those standards for these contaminants of concern were compared to EPA's current National Recommended Water Quality Concentrations for human health (Table E-2).

Surface Water: The National Recommended Water Quality Criteria for human health for dieldrin was updated in 2015. The carcinogenic criterion for dieldrin was updated to a level of 0.0000012 µg/L. The 1994 ROD lists the remediation goals for dieldrin to be 0.00014 µg/L. The revised National Recommended Water Quality Concentrations for dieldrin is lower than the 1994 ROD remediation goal, indicating that the new criteria are more stringent than those used in the 1994 ROD.

The water quality criteria levels with respect to marine surface water for DDT, DDD and DDE were updated in 2015. After summing the three contaminants of concern, the carcinogenic criteria for DDT was updated to a level of 0.17 ng/L. The 1994 ROD lists the remediation goals for DDT to be 0.59 ng/L. The revised National Recommended Water Quality Concentrations for DDT is lower than the 1994 ROD remediation, indicating that the new criteria are more stringent than those used in the 1994 ROD.

Sediment: In the 1994 ROD, sediment remediation goals for total DDT were established based on total DDT water quality criteria. It was established in the 1994 ecological assessment that sediment concentrations below 590 µg/kg total DDT were protective to human health based on achieving the 0.59 ng/L remediation goal for surface water established in the ROD. Since the revised surface water quality criteria on which the sediment remediation goal was based has become more stringent, the sediment remediation goal in the 1994 ROD would also be less stringent.

Table E-2. Summary of Toxicity Value Changes

Chemical	Toxicity Value used in 1994 ROD (ng/L)	Basis for Remediation Goal	Current Toxicity Value[a] (ng/L)	More or Less Stringent than 1994 Remediation Goal?
Total DDT	0.59	Human Health Based on National Recommended Water Quality Criteria for Human Health	0.168	More stringent
	1	Ecological Based on Ambient Water Quality Criteria for Aquatic Life	1	No change
Dieldrin	0.14	Human Health Based on National Recommended Water Quality Criteria for Human Health	0.0012	More stringent
	1.9	Ecological Based on Ambient Water Quality Criteria for Aquatic Life	1.9	No change

[a]: from EPA National Recommended Water Quality Concentrations for human health.

Appendix F: Public Notice

B2 BAY AREA NEWS GROUP 000 MONDAY, FEBRUARY 1, 2021

Gaps

FROM PAGE 1

reach and engagement is that we know historically that there are communities that have been left behind," county health director Anna Roth said at the meeting.

The issue was first raised by Supervisor John Gioia, whose district includes Richmond, El Cerrito and San Pablo. Although San Pablo leads the county in virus cases per 100,000 residents, only 8% of its residents had received their first doses as of Thursday.

"Some of the communities that are lower-income communities of color are half the rate of these other communities," Gioia said. "I just want to say, this is concerning for me to see."

The rollout of COVID-19 vaccine doses in Contra Costa County, which began in December, focused first on front-line health care workers and then on employees and residents of long-term care facilities. In January, the county expanded its distribution to all residents 65 and older, as well as other front-line essential workers who operate in congregate settings.

Among those who have actually received doses, about a third are senior citizens, which county health officer Dr. Chris Farnitano said at Tuesday's meeting could explain part of the disparities.

"Our senior population does skew more White than the overall population, and there's a higher concentration in central and south county," Farnitano said.

He added later that about a fourth of the county's vaccine inventory has gone to distribution partners like Kaiser Permanente, Sutter Health and CVS Pharmacy. Health officials are trying to get doses to distribution sites in harder-hit communities, he said.

In November, the Board of Supervisors unanimously declared racism a public health crisis, in part because the Latino community has been disproportionately impacted by COVID-19 due to a lack of access to health care resources.

That same month, Contra Costa Health Services hired Gilbert Salinas to serve as the department's first chief equity officer. Salinas could not be reached for comment on Thursday.

Roth said the new hire has been tasked with showing health officials how to reach out to "long-standing marginalized communities."

"It shouldn't be seen as an extra side job or afterthought," Roth said. "It's been a deliberate investment."

PITTSBURG

Video to be released after officer shoots, wounds man

By Julia Prodis Sulek
jsulek@bayareanewsgroup.com

The incident began Saturday afternoon when police were called to a business on the 3700 block of Harbor Street about a man on top of the roof. When police arrived, the man had moved and was standing next to a car in the parking lot, Pittsburg police said in a statement.

"Officers asked the man to stay where he was, but he ignored their commands," the statement said. "That's when the man reached on top of the car's rear tire and picked up a handgun. The man then ran in the opposite direction."

Another arriving officer caught up with him and asked him "several times" to stay on the ground, police said.

"He ignored his commands as well. The man then ran behind another vehicle and pointed the handgun at the officer," the police statement says. "The officer then used his service weapon once, striking the man in the arm. The man immediately dropped the handgun and fell to the ground."

Police placed the man in handcuffs and "immediately started lifesaving measures" until paramedics arrived. He was taken to the hospital "and thankfully, the man is expected to survive," the statement said.

Police did not immediately release the man's name. A loaded gun was retrieved from the scene, police said.

The Contra Costa County "officer involved incident protocol" has been activated and the district attorney's office will conduct an independent investigation, police say. The Pittsburg Police Department's independent outside investigator will also investigate.

Contact Julia Prodis Sulek at 408-278-3403.

Cove

FROM PAGE 1

ing were ground zero of a ballot measure in April 2019, when Alameda voters were asked whether they supported rezoning a bordering federal building complex made up of offices just across the street from the visitor's center as open space.

Supporters of the measure said it would clear the way to expand Crab Cove and nearby Robert W. Crown Memorial State Beach even more.

Voters rejected the idea.

The East Bay park district was not interested in acquiring the offices, it said, and city of Alameda representatives said at the time that no money was available to tear down the 11 buildings at the complex across the street from Crab Cove and create a new public park.

The projected cost for that option was then $11.7 million.

The rezoning effort followed the federal government in September 2018 selecting the Alameda Point Collaborative, a nonprofit group that provides services to people who were once homeless, to take over the former federal offices and turn them into a wellness center.

The Crab Cove Visitors Center is currently closed due to the COVID-19 pandemic. The aquisition of more than 3 acres of land behind the center will allow for expansion, and the public is being asked for input on the project.

KNDI CHU – STAFF PHOTOGRAPHER

The ongoing plans include creating a place where people who have been discharged from a hospital with lingering medical issues can convalesce and recover.

The approximately 90-office complex was originally part of a 100-acre facility developed in 1942 as a U.S. Maritime Officer Training School and which the land for the current Crab Cove expansion was also part of.

Along with the future wellness center, the neighborhood near Alameda's Webster Street business district includes buildings with condominiums and apartments on the west and north side of the center. San Francisco Bay borders the southern part of Crab Cove.

City Councilman Tony Daysog, who grew up in the neighborhood, welcomed the news that Crab Cove was getting a bigger footprint.

The center officially opened on July 4, 1980.

"Wow, if the (park district) can include at the site for the current Crab Cove expansion was also part of programs and facilities that complement if not expand on the Crab Cove center already there, this will be a great attraction for Alameda's west end, which could benefit nearby Webster Street businesses as well," Daysog said via an email.

The master plan, which people can comment on, will be used as a guide to raise money for construction and what various options might cost, plus to develop a schedule for when the work would be carried out, according to park district officials.

The district purchased the spot behind Crab Cove for $2,182,500, according to Dave Mason, a district spokesman. Funds were available through Measure WW.

Voters in Alameda and Contra Costa counties approved Measure WW in November 2008. It provides $500 million in bonds to expand regional parks, as well as to preserve and protect open space.

The park district operates Crab Cove via agreements with California State Parks and the city of Alameda, and the size of Crab Cove, before the acquisition, was about 388 acres, Mason said. The East Bay district considers Crab Cove part of the overall Crown Beach parcel.

More information can be found at www.ebparks.org/McKayMaster Plan. People also can call 1-888-327-2757.

Contact Peter Hegarty at 510-748-1656.

Vacancy

FROM PAGE 1

tion, which would cost the district $1 million, money that could be spent to help students and for other services, they noted.

Reynoso was sworn in as a Hayward trustee Dec. 14 and the next day as a trustee with the college district. State law says that if someone is sworn in to a second seat, the individual forfeits the first seat, which prompted the unanimous action by Hayward trustees.

Reynoso was first elected to the Hayward board in 2008.

In the community college district election, Reynoso captured about 56% of the vote, beating Robert Carlson, who secured about 43% of ballots cast.

Reynoso, who came in third in the Hayward school district election to fill three seats, was trailed by Maria Del Carmen Espinoza by less than 200 votes.

Espinoza is among those applying for his seat, as well as Eufemia Maynard, who got about 12% of the vote in November.

"Although all of the applicants have my complete, 110% support, I just think that as a person who did district election to fill three grassroots, why didn't (the others) campaign to be in that seat so bad?" Espinoza told trustees.

Reynoso received about 34% of the vote in the Hayward school board contest. The leading vote-getters were newcomers Sara Prada and Simon Peter Gutierrez Bufete. Eight people ran.

People can comment on the applicants via email at maddinhayward@husd.us.

The candidates and their applications can be viewed at http://simbli.eboardsolutions.com/SB_Meetings/ViewMeeting.aspx?S=36030212&MID=6282.

FPPC

FROM PAGE 1

settlement the commission settled with the Los Angeles County Board of Supervisors. The commission approved a $1.35 million settlement — one of its largest ever — with the county over using public funds in support of two tax measures and not complying with the state's filing, disclosure and advertisement disclaimer requirements.

Other penalties levied by the commission are typically much smaller.

For instance, local committee Jumpstart Vallejo was fined a total of $16,600 for failing to file multiple campaign contribution and expenditure statements from 2016 to 2019, and a state general-purpose committee, Transparent Silicon Valley was fined $9,000 for not filing multiple pre-election campaign statements.

Others penalized in the Bay Area this year included San Francisco Bay Area Renters Political Action Committee, a state general-purpose committee, which was fined $9,600 for failing to maintain adequate records for expenditures, not disclosing correct expenditures and commingling contributions to the committee with the personal funds of its treasurer.

In 2019, a major FPPC enforcement case made waves locally in Contra Costa County when the commission fined former Contra Costa County elections chief Joe Canciamilla $150,000 — one of its largest penalties of that year — for illegally spending more than $130,000 of campaign funds on a vacation in Asia, a remodel of his Hawaii home and other personal expenses in the past several years.

The case was referred to the Contra Costa District Attorney's Office, which charged Canciamilla with 30 counts of perjury involving campaign disclosure statements and four counts of personal grand theft of campaign funds. That criminal case is still ongoing.

EPA WANTS TO HEAR FROM YOU ABOUT THE
UNITED HECKATHORN SUPERFUND SITE CLEANUP (RICHMOND, CALIF.)

The U.S. Environmental Protection Agency (EPA) has started the fifth Five-Year Review (FYR) of the cleanup plan for the United Heckathorn Superfund site. The legally mandated Review will evaluate whether the cleanup is working as EPA planned.

Federal law requires EPA to review its cleanup plans every five years:

- if a cleanup takes more than five years to complete; or
- if hazardous waste is still on-site.

EPA completed the last FYR for this cleanup in 2016.

What is Included in the Review?
The 2021 Five-Year Review includes:

- an inspection of the site and the technologies used in the cleanup;
- a review of site data and maintenance records; and
- a review of any new cleanup laws or requirements.

EPA Would Like to Hear from You!
We would like to interview community members and stakeholders about how you think the site cleanup is going. If you want to learn more about the site and/or be interviewed, please contact the site's project manager below before May 21, 2021:

- Karen Jurist, Superfund Project Manager at (415) 972-3219 or jurist.karen@epa.gov

Where Can I Learn More?
Visit EPA's webpage at www.epa.gov/superfund/united-heckathorn for more information. EPA has set up an information repository with paper copies of the site's Administrative Record (i.e., key documents and reports used in the cleanup) in locations below:

Richmond Public Library
325 Civic Center Plaza
Richmond, CA 94804
(510) 620-6561
Open Monday - Friday from 10:00 a.m. to 4:00 p.m.*
*Please contact library for current hours of operation

EPA will complete the Five-Year Review report no later than September 30, 2021. When complete, EPA will post a copy on its site webpage and send a copy to the site information repository listed above.

Background
The site sits in the Richmond (Calif.) Harbor area and includes five acres of land and 15 acres of marine sediments in the Lauritzen and Parr Channels. From the mid-1940s through the mid-1960s, solvent companies made, packaged, and shipped pesticides on site. These operations polluted the site. In March 14, 1990, EPA added the site to its Superfund cleanup program. Since then, EPA has done various cleanup activities, including dredging, and covering (also called "capping") pollution.

The 2016 FYR found cleanup work in the upland area of the site had successfully followed the cleanup plan. It also found the portion of the cleanup that covered ("capped") polluted soil effectively followed the plan and protected human health and the environment. However, the review also found cleanup work in the Lauritzen Channel area of the site did not work as intended to protect human health and the environment. This is because the amount of the chemicals DDT and dieldrin present in sediment, surface water and fish tissue samples in the channel had not met Superfund cleanup standards since 1998. In response, EPA is doing a Focused Feasibility Study to see what will effectively clean up DDT and dieldrin. Once the study is complete, EPA will design a new plan to clean up the site. While the Lauritzen Channel's cleanup did not meet EPA's standards, steps have been taken to prevent people from contacting pollution on the site. To deter public fishing on the Lauritzen Channel, the State of California posted fish advisory signs on the property. Post-2011 guidance directs active terminals to direct all vessels to the area except for workers. This action also prevents boaters and people access.

Appendix G: Interview Forms

Five-Year Review Interview Record	
Site:	United Heckathorn

Interview Type: Questionnaire

Date: June 23, 2021

Interviewees

Name	Organization	Title	Telephone	Email
Jim Holland	Levin Richmond Terminal Corporation	Vice President	510-307-4076	JimH@Levinterminal.com
Scott Bourne, PE	CDIM Engineering	Engineer	415-498-0535	sab@cdimengineering.com

Summary of Conversation

1) What is your overall impression of the United Heckathorn project?

Levin Richmond Terminal Corporation (LRTC) concurs with the United States Environmental Protection Agency (EPA) findings[1] that the upland remedial action for the United Heckathorn Superfund Site (the Site) is functioning as intended, is protective of human health and the environment, and has met the remedial action objective for the upland area by capping of contaminated soils, which has eliminated human exposure pathways and has prevented erosion. The upland cap has been and remains effective at preventing the erosion and transport of upland soils into the Lauritzen Channel (Channel).

LRTC also concurs with EPA findings related to the marine remedial area of the Site. Specifically, that "[d]redging residuals appear to be the primary source of the DDT mass currently found in the Lauritzen Channel,"[2] not an ongoing dissolved upland source, and that "vessel activity is the primary source of [sediment] resuspension and redistribution in the Lauritzen Channel."[3]

LRTC also concurs with EPA finding that, to the extent erosion of embankments is a contributing source, such 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." (EPA 2016).

LRTC reiterates the importance of selecting a remedy that is consistent with the ongoing vessel operation and the need for periodic maintenance dredging in the Lauritzen Channel.

2) In addition to the activities provided in the annual O&M reports, are there any O&M activities that have occurred in the last five years that EPA should be aware of?

All significant operations and maintenance (O&M) activities related to the Site, both routine and non-routine, have been documented in LRTC's annual O&M reports.

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[1] EPA, 2016. Fourth Five-Year Review Report for United Heckathorn Superfund Site, Richmond, Contra Costa County, California. August 8.

[2] CH2M Hill, 2014. Source Identification Study Report, United Heckathorn Superfund Site. Prepared for United States Environmental Protection Agency, Region 9. March.

[3] SEI, 2014. Tier 2 Sediment Transport Study, United Heckathorn Superfund Site. Prepared for United States Environmental Protection Agency, Region 9. February.

3) 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.

Modifications to the O&M requirements in the last five years are related to stormwater sampling. Stormwater sampling at the Site is subject to both the original O&M Plan for the Site[4] and the State Water Resource Control Board's industrial stormwater permit (IGP).[5] The O&M Plan specifies that storm water samples be analyzed for pesticides twice per wet season using EPA Method 8080. In the fourth Five Year Review and a subsequent communication with EPA,[6] it was recommended that LRTC utilize EPA Method 1699 to achieve pesticide detection limits below the marine surface water cleanup levels to allow for more meaningful evaluation of analytical data. LRTC has analyzed stormwater samples using EPA 1699 since October 2016.

The IGP specifies that storm water samples be collected four times per wet season, twice between July and December and twice between January and June. If, after four consecutive qualified sampling events no IGP numeric action level is exceeded, a discharger is eligible for a Sampling Frequency Reduction. LRTC was eligible and elected to implement a Sampling Frequency Reduction in January 2020, as documented in the 2019-2020 Annual Report, and is currently collecting storm water samples twice per wet season.

The modifications to stormwater sampling methods and frequency described above do not affect the protectiveness of the remedy. LRTC continues to collect twice annual stormwater samples in accordance with the O&M Plan, and implementation of EPA Method 1699 only improves the quality of data generated.

4) Have there been unexpected O&M difficulties at the site in the last five years (e.g. unusual repairs, trespassing)? If so, please give details.

No unexpected O&M difficulties have been noted. Monthly visual inspections of the facility, and comprehensive annual cap inspection are conducted. General maintenance of the cap, *e.g.*, concrete repair and installation of new rock in gravel areas, is occasionally required, as documented in LRTC's Annual Reports. Due to the maritime operations, the Levin Richmond Terminal operates within a United States Coast Guard Maritime Security zone. The property is surrounded by fencing and is monitored by security 24 hours a day, 7 days a week. Attempted acts of trespassing and vandalism are infrequent due to the enhanced Site security.

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

LRTC has no additional comments, suggestions or recommendations at this time.

Additional Site-Specific Questions

[4] PES Environmental, Inc. 1999. Revised Draft Operations and Maintenance Plan, Upland Capping System, Former United Heckathorn Site, March.

[5] SWRCB, 2014. Order No.2014-0057-DWQ for National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000001, General Permit for Storm Water Discharges Associated with Industrial Activities.

[6] Email from Karen Jurist, EPA to Scott Bourne, CDIM Engineering, dated October 5, 2016.

Five-Year Review Interview Record	
Site:	United Heckathorn

Interview Type: Questionnaire

Date: 7/8/2021

Interviewees

Name	Organization	Title	Telephone	Email
Allan Fone	DTSC	Senior Environmental Scientist, Project Manager	707-742-3236 (telework); 510-540-3836 (office)	allan.fone@dtsc.ca.gov

Summary of Conversation

1) What is your overall impression of the United Heckathorn project?

The site poses a threat to public health and environmental receptors, but progress toward a decision on the preferred remedy has been slow. This situation appears to be due to the slow pace of the negotiation/facilitation process among USEPA and the Responsible Parties toward reaching agreement or consensus on the preferred remedy.

2) Are you aware that post construction monitoring shows that contamination persists in the Lauritzen Channel?

Yes

3) Are you aware that the EPA is in the process of preparing a Focused Feasibility Study in support of remedy selection at United Heckathorn? Is there anything specific you would like EPA to consider as EPA finalizes the FFS?

Yes. The following issues should be considered in the FFS, as applicable: 1) removing as much pesticide-contaminated sediments as possible, especially in areas that were not dredged during the original remedial action due to physical obstacles or accessibility; 2) if caps are part of the remedy, they should be designed to be both effective and low maintenance, since much of the capped area would be underwater; 3) if treatment with activated carbon is part of the remedy, the treated sediments should be removed, especially but not only in areas where caps are planned (carbon particles with adsorbed pesticides may still be taken up by filter feeders and other aquatic organisms); 4) confirmation sampling for all media needs to be robust so there is a representative data set for the post-remedial risk assessments; 5) operations and maintenance of the remedy should be funded and performed by the Responsible Parties, including monitoring pesticide levels in surface water and, if needed, sediments; and 6) effect of sea level rise on potential remedy components.

4) Are you aware of any changes to the site conditions or site use that have occurred in the last five years that EPA should consider? *No* 5) Do you have any comments, suggestions, or recommendations regarding the project? *No*
Additional Site-Specific Questions
[If needed]