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U.S. Environmental Protection Agency • Pacific Southwest Region • Region 9 • September 2026

U.S. EPA Superfund and Emergency Management Division United Heckathorn Superfund Site

Operable Unit 2 – Lauritzen Channel Proposed Plan

Richmond, California

Inside this Proposed Plan:

1. Introduction

The U.S. Environmental Protection Agency (EPA) is proposing additional remedial action to clean up the Lauritzen Channel of the United Heckathorn Superfund Site (Site) in Richmond, California (Figure 1). EPA determined the remedy selected in the 1994 **Record of Decision**[1] (EPA, 1994) for the Lauritzen Channel marine sediments located in **Operable Unit** 2 of the Site is no longer protective of human health and the environment (EPA, 2001a). This **Proposed Plan** details the **Preferred Alternative**, EPA's recommended cleanup strategy for the additional remedial action needed in the Lauritzen Channel and:

- Summarizes Site background information and the findings of the 2026 *Focused Feasibility Study, United Heckathorn Superfund Site, Lauritzen Channel Sediments in OU2* (the "2026 Focused Feasibility Study") (EPA, 2026),
- Describes the **remedial alternatives**, or cleanup strategies, evaluated to clean up the marine sediments in the Lauritzen Channel,
- Identifies key factors that led to the selection of the **Preferred Alternative,**
- Describes an interim measure for surface water within the Lauritzen Channel and the invocation of an interim waiver of applicable or relevant and appropriate requirements (ARARs) for surface water,
- Solicits public comments on the remedial alternatives, including EPA's Preferred Alternative, and
- Describes how the public can become involved in the remedy selection process during the comment period because public participation is critical to successful cleanup.

What to know

Comment Period

September 30, 2026 to December 29, 2026

Meeting Details

October 21, 2026, 5:00 to 8:00 p.m.
Richmond Recreation Complex, Social Hall
3230 MacDonald Avenue
Richmond, CA 94804

Where to review the Proposed Plan

Richmond Main Library Temporary Location
403 Civic Center Plaza (enter on Nevin Avenue)
Richmond, CA 94804

Or online at
epa.gov/superfund/unitedheckathorn

Project Managers

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[1] **Bolded** words appear in the Glossary beginning on page 49.

As the lead agency, EPA is publishing this Proposed Plan to invite public review and comment on EPA's Preferred Alternative, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Section 117(a), as amended, 42 U.S.C. Section 9617, commonly known as "Superfund," and 40 C.F.R Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). EPA consulted with the State of California Department of Toxic Substances Control, the support agency, and received concurrence from the support agency on the Preferred Alternative for the Lauritzen Channel; however, the support agency may elect to provide comments regarding the Proposed Plan and supporting documents during the public comment period. EPA will review and respond to all public comments in the process of selecting the final remedy.

Site documents, including the 2026 Focused Feasibility Study, are available for public review in the **Administrative Record** either online or at the location listed in the "What to Know" box on page 1 of this document. After considering state and community input, EPA will publish the selected remedy in a **Record of Decision Amendment** addressing sediment contamination within the Lauritzen Channel.

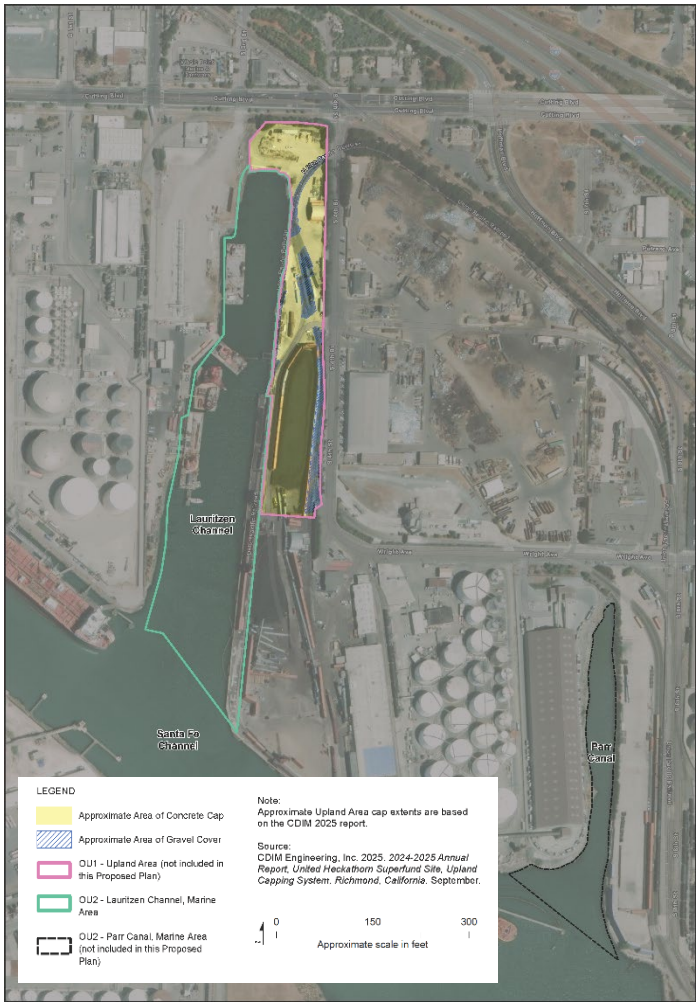


Figure 1. Site Map

How the Superfund Process Works

EPA's **Superfund** program investigates and cleans up hazardous sites across the country. The process typically includes the following steps, as depicted in Figure 2:

- Investigating contamination and risks in a **Remedial Investigation,**
- Developing and evaluating cleanup options in a **Feasibility Study,**
- Publishing a Proposed Plan and receiving public comment,
- Selecting a final cleanup remedy in a Record of Decision,
- Designing and implementing the cleanup, and
- Monitoring the site over time to ensure the implemented cleanup remedy remains protective.

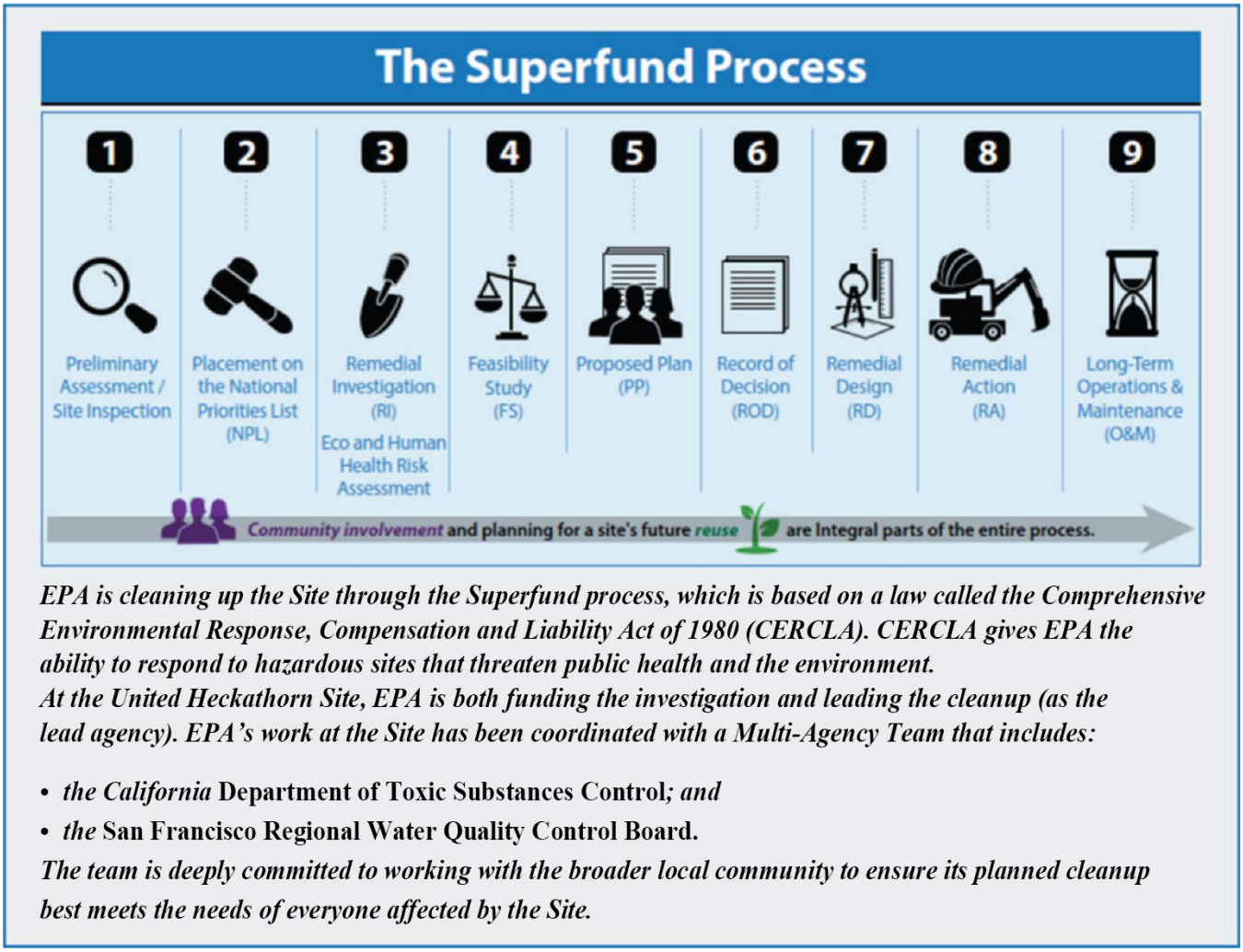


Figure 2. Overview of Superfund Process

The Site has been working through the Superfund process since the 1980s:

- Steps 1-2: Preliminary assessments at the Site were conducted in the 1980s, leading to its addition to the National Priorities List in 1990.
- Steps 3-9: A Remedial Investigation, Feasibility Report, Proposed Plan, and Record of Decision for both operable units were completed in the 1990s.

However, identification of existing contamination in the Lauritzen Channel (part of Operable Unit 2) following the 1990s remedy required the Superfund process to return to Step 4, focusing only on contamination in the channel:

- Steps 4-5: A Focused Feasibility Study for the Lauritzen Channel was published concurrent with this Proposed Plan in September 2026.
- Step 6: A Record of Decision Amendment finalizing the cleanup decision for sediments in the Lauritzen Channel will be published after reviewing public comments. Another decision document will also be published addressing surface water in the channel following completion of a background study.

More detailed information, including site history, investigation results, and cleanup alternatives, is available in the Administrative Record.

Summary of EPA's Preferred Alternative

EPA's **Preferred Alternative** (Alternative 9) includes the following features:

- Dredging to fully remove contaminated **Younger Bay Mud** from the east side, west side, and northern area of the Lauritzen Channel and offsite disposal of the **dewatered** and **solidified/stabilized** sediment.
- Application of an amended **residual management layer** (mixture of activated carbon and sand) on the post-dredge surface that will reduce potential exposure to low level residual contamination after dredging.
- Installation of an **active cap** (activated carbon, geotextile fabric, and stone) at the north end and shoreline segment that will physically isolate contaminated sediments. The areas would first be graded by dredging followed by placement of activated carbon and sand to reduce contaminant **bioavailability**. Geotextile fabric and stone will hold the activated carbon in place and provide erosion control.
- **Source control measures to remove** old pilings and piping, clean the onsite portion of the City of Richmond storm drain system, and install an engineered barrier (i.e., a sheet pile wall) along the shoreline segment. Specifically, an engineered barrier will act in tandem with the active cap; the barrier will direct contaminated groundwater (including seeps) through the permeable active cap, acting as passive treatment, before entering the channel. The barrier will prevent sloughing of embankment soil from the upland area into the channel and providing physical support for an active cap in the north end and shoreline segments of the Lauritzen Channel.
- Completion of a surface water background study within the Lauritzen Channel and its adjoining channels and harbors to develop **background concentrations** of DDT and dieldrin. This data will later be used to determine the **preliminary remediation goals** for surface water in the Lauritzen Channel.
- **Institutional controls** to limit anchoring, mooring, future dredging and construction within the active cap area of the channel to minimize potential damage to the cap and engineered barrier.
- Long-term monitoring and annual operations and maintenance will be conducted to promote the integrity and performance of the remedy. Specifics for this post-remedy monitoring and maintenance will be determined in the Record of Decision Amendment.

Alternative 9 significantly outperforms the other alternatives by removing all contaminated Younger Bay Mud in the active channel areas (east side, west side and northern area). It is the most expensive alternative ($93.4 million), but ranks higher than the second-most costly alternative (Alternative 12, $88.9 million) for the following criteria:

- Long-term effectiveness;
- Reducing human health and ecological risks;
- Improving surface water quality; and
- Reducing dependence on institutional controls.

Details of all evaluated remedial alternatives are included in Section 7 of this document.

How to Get Involved

EPA will hold a public meeting during the comment period on October 21, 2026, to explain the Proposed Plan and answer questions. Community members may submit comments in writing, online or at the public meeting. EPA will consider all public comments before selecting the final remedy; responses to comments will be included in the Record of Decision Amendment.

Your participation helps ensure the cleanup reflects the needs and priorities of the community. Additional details on how to submit comments and how to participate in the public meeting are provided in Section 10, Community Participation.

2. Site Background

This section summarizes the Site's background and environmental conditions, specifically detailing how past industrial activities led to the identified Site contamination, the initial cleanup and the extent of existing contamination in the Lauritzen Channel. This section also describes the results of more recent investigations, enforcement history and previous cleanup efforts.

Site History and Contamination Origins

A marshy area along the Richmond shoreline was dredged in the 1940s, perpendicular to the Santa Fe Channel, to create the Lauritzen Channel for shipbuilding activities during World War II. A shipyard operated between the Lauritzen Channel and Parr Canal and was later demolished at the conclusion of the war. From 1947 to 1966, numerous companies, including R.J. Prentiss, Heckathorn and Company, United Heckathorn, United Chemetrics and Chemwest Inc. (collectively referred to as "United Heckathorn"), used what is now the upland area (Operable Unit 1) of the Site to formulate, package and ship pesticides, specifically dichlorodiphenyltrichloroethane (DDT) and dieldrin. These operations did not include chemical manufacturing onsite.

Equipment containing pesticide residues was routinely washed during site operations, and wash water infiltrated through the ground surface or was discharged directly to nearby waterways. Later facility modifications incorporated settling tanks to recover pesticide residuals; however, these tanks likely leaked contamination into the surrounding area. Additionally, poor housekeeping practices, spills and other releases resulted in the direct discharge of DDT to soil and waterways. These historical releases led to the Site contamination that remains the focus of this Proposed Plan.

Current and Future Land Uses

The problems at the United Heckathorn Superfund Site are complex. To manage and investigate the Site efficiently, EPA has organized it into two operable units:

- **Operable Unit 1, Upland Area:** Approximately 5 acres of the land-based portion of the Site, formerly occupied by the United Heckathorn facility
- **Operable Unit 2, Marine Area:** 15 acres of in-water area including the Lauritzen Channel, Parr Canal and limited parts of the Santa Fe Channel and Richmond Inner City Harbor. The proposed cleanup in this Proposed Plan addresses the remaining sediment contamination in the Lauritzen Channel.

Levin-Richmond Terminal Corporation currently occupies the upland area (Operable Unit 1) as an active coal, petroleum coke and bulk material shipping terminal. They also use two berths in the Lauritzen Channel (Operable Unit 2) for docking large, industrial vessels along the eastern shoreline. The Manson Construction Co. (Manson) presently occupies the western shoreline of the channel and adjoining uplands for operations including materials storage. Multiple floating vessels are staged, loaded and moved in and out of the Lauritzen Channel by Manson using smaller assist vessels like tugboats.

Site land use is consistent with designations and zoning classifications for the San Francisco Bay and City of Richmond. Land use is also consistent with a 1996 covenant restricting property use to commercial or industrial use; development of residences, hospitals, schools, or day cares are specifically prohibited.

Contaminants of Concern

DDT[2] and dieldrin are the contaminants that pose the greatest risk to human health and the environment; for this reason, they are the primary **contaminants of concern** at the Site.

DDT- and dieldrin-contaminated sediment found in the Lauritzen Channel is composed primarily of residuals that have remained in the channel since the initial remedial action in the 1990s. Two types of residual sediment have been identified: (1) undredged residuals, which refers to sediment that was not dredged during the 1990s remedial action because of obstructions (for example, abandoned pilings or sediment beneath the pier) or because it was impractical to remove (for example, sediment along the embankment); and (2) generated residuals, which refers to residuals created from sloughing near dredge cuts or sediment that was resuspended during dredging. EPA's evaluation of additional ongoing sources of contamination to the channel is described in more detail in Section 3.

Enforcement History

Regulators observed bulk storage of pesticides and solvents in the upland area (Operable Unit 1) of the Site as well as leaking pipelines and releases of pesticide-laden wastewater to the Lauritzen Channel in the 1960s. By 1980, the State of California confirmed the presence of chlorinated pesticides and metals in soil; the area was subsequently designated as a state superfund site in 1982.

Levin Metals Corporation, the facility owner at that time, conducted several soil removal actions in the upland area (Operable Unit 1) during the 1980s and early 1990s. By 1990, EPA completed an assessment under CERCLA and formalized the Site listing on the National Priorities List (NPL), assuming authority as lead regulatory agency. A CERCLA remedial action was selected for the Site in the 1994 Record of Decision.

Remediation Overview

Cleanup of Operable Unit 1 (Upland Area)

The remedy for Operable Unit 1 (upland area) was completed in 1999 and required capping the United Heckathorn facility with concrete, asphalt or gravel with geotextile fabric to prevent erosion and exposure to contamination. Post-remediation monitoring data has consistently found the remedy to be protective of human health and the environment.

[2] In this plan, DDT generally refers to the sum of DDT and its breakdown products dichlorodiphenyldichloroethane (DDD) and dichlorodiphenyldichloroethene (DDE), except where stated otherwise. Total DDT concentrations are the sum of the 4,4'- and 2,4'-isomers of DDT, DDD, and DDE.

Cleanup of Operable Unit 2 (Marine Area; Lauritzen Channel & Parr Canal)

In accordance with the 1994 Record of Decision, contaminated sediment was dredged from the Lauritzen Channel and Parr Canal in 1997 to address contamination in Operable Unit 2; remedial actions were not needed in other portions of the marine area (Santa Fe Channel and Richmond Inner Harbor) based on sampling data. The remedy also called for placement of clean sand/sediment after dredging, a deed restriction limiting land use to industrial purposes and future marine monitoring to determine the effectiveness of the remedy.

Post-remediation monitoring data found that DDT concentrations in the Lauritzen Channel remained above cleanup levels, indicating that additional action is needed (EPA, 2001a). Since then, EPA has conducted further investigations to determine the extent and sources of the remaining contamination and to evaluate updated cleanup options, including reviewing studies conducted by potentially responsible parties (PRPs).

Figure 3. United Heckathorn Timeline

Potentially Responsible Parties (PRPs)

The initial remedy completed in the 1990s was implemented and funded by a number of PRPs through four 1996 consent decrees (CDs). One group of PRPs, known as the Montrose Group, performed the marine remedy for Operable Unit 2 (the Lauritzen Channel and Parr Canal). This group comprised Montrose Chemical Corporation of California, Inc., Rhone Poulenc, Inc. Stauffer Management Company and Christ-Craft Industries, Inc. A second group of PRPs, comprising Levin Enterprises, Inc. and Levin-Richmond Terminal, Inc., performed the remedy for Operable Unit 1 (upland area). The remaining PRPs in two CDs contributed funding toward reimbursing EPA's response costs and to an escrow account used by the other PRPs to pay for the remedial work.

The 2026 Focused Feasibility Study and this Proposed Plan for the Lauritzen Channel were prepared by EPA. EPA will seek to negotiate a new CD with the PRPs to implement a new remedy for the Lauritzen Channel to be selected in a Record of Decision Amendment. The CD would be a legally binding agreement that details the specific cleanup work to be performed, including design and implementation of the remedy.

Prior Public Participation

EPA, in collaboration with the State of California Department of Toxic Substances Control and local community organizations, has held several public meetings over the past two years to share information about the Site, present investigation results, discuss potential cleanup technologies and hear directly from community members. Presentation materials and notes from these meetings are available on the United Heckathorn Superfund Site webpage.[3]

EPA has also coordinated with the national Technical Assistance Services for Communities (TASC) program to provide a community advisor who can explain technical findings and answer community questions. At the time of publication, the TASC advisor has coordinated one public meeting with the community to prepare for the release of this Proposed Plan. Subsequent meetings will be coordinated with the community to discuss EPA's Preferred Alternative and assist the community in preparing comments. Please contact EPA's community involvement coordinator to learn more.

EPA will continue to engage with the community throughout the remedy selection and implementation process.

[3] https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.scs&id=0902440&doc=Y&colid=43307&region=09&type=SC

3. Site Characteristics

This section describes the environmental features of the Lauritzen Channel and how the known contamination is distributed. It also discusses potential ongoing sources of contamination that will require mitigation to avoid recontamination of the area following remediation. Prior remediation completed at the Site is summarized in Section 2.

Lauritzen Channel Operational Areas

The Lauritzen Channel is commonly divided into the following operational areas (Figure 4):

- **East side:** Located along the eastern shoreline and adjacent to the Levin-Richmond Terminal Corporation facility, this area has historically been dredged to allow for access to the berthing area along the pier. This area experiences a high level of boat and barge traffic.
- **West side:** Located along the western shoreline and occupied by the Manson Construction Company, this area experiences a high level of boat and barge traffic and has shallower water depths than the east side area.
- **Northern area:** The northern area is characterized by shallower water depths, which limits the use of deeper draft vessels.

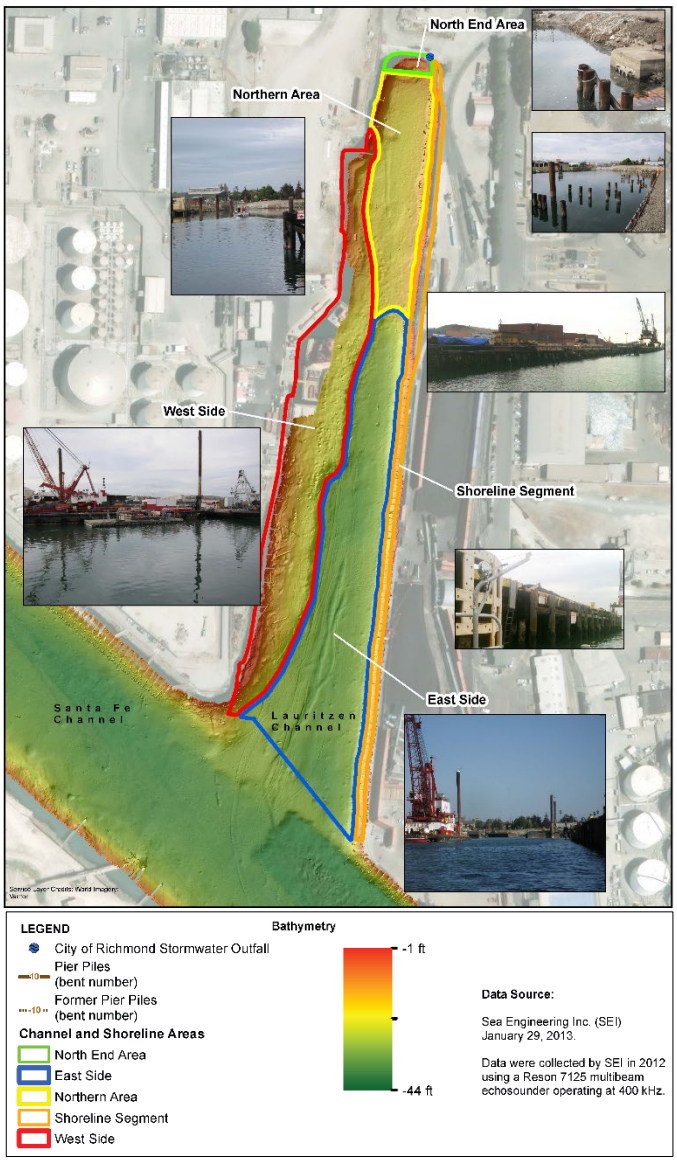


Figure 4. The United Heckathorn Site and Operational Areas of the Lauritzen Channel

- **North end and shoreline segment:** The north end and shoreline segment include areas closest to the shore and areas underneath piers, which are not as accessible to dredging. A portion of this area features steel and timber retaining walls and abandoned wood pilings from former docks that are still present. Additionally, the City of Richmond's stormwater outfall is within the northeastern corner of the north end area.

Marine Area Sediment Characteristics

The Lauritzen Channel is a man-made feature designed to provide a low-energy environment for vessel berthing. The region is protected from the San Francisco Bay by an offshore breakwater designed to block waves from entering the area. The Lauritzen Channel is dominated by the tidal hydrodynamics of San Francisco Bay and experiences a semidiurnal tide from the Pacific Ocean.

The bed sediment in the marine area (Operable Unit 2) is composed of two units, identified as the Younger Bay Mud and Older Bay Mud (Figure 5).

- **Younger Bay Mud:** This unit consists of dark gray to black very soft clay, silt and fine-grained sand that accumulated in the Lauritzen Channel since it was constructed, making this material less compact and more moveable throughout the channel. Much of the Younger Bay Mud within the Lauritzen Channel was removed during remedial dredging in the 1990s; however, Younger Bay Mud, approximately 2.5' thick, remains in undredged areas (such as along embankments or under piers that were inaccessible to dredging) and from generated residuals that either sloughed during dredging or resuspended during the initial remedy.

Figure 5. Photo of Sediment Core Collected in 2013

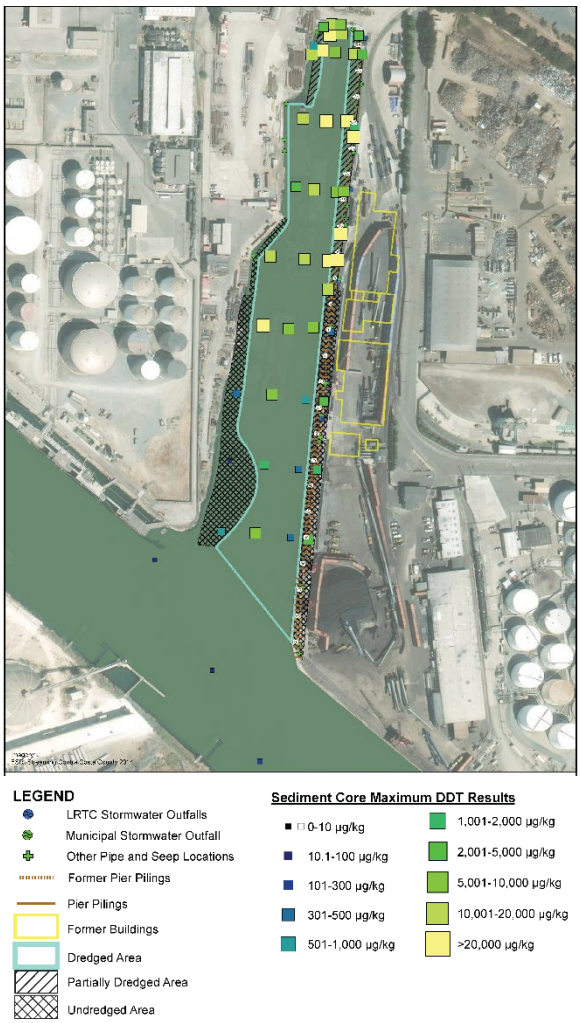
- **Older Bay Mud:** This unit underlies the Younger Bay Mud and is approximately 50 feet thick along the Richmond shoreline. It consists of firm to hard silts and clays with varying amounts of sand and gravel. The Older Bay Mud appears to be laterally continuous across the marine area.

High-resolution multibeam bathymetry surveys and side-scan sonar surveys conducted in 2012 provided a detailed characterization of the bottom of the Lauritzen Channel. Figure 4 includes these bathymetry survey results of the Lauritzen Channel, clearly showing the extent of the Levin-Richmond Terminal Corporation berths on the eastern side of the channel, the shallower region in the northern part of the channel, and the deeper dredged channel mean berth in the Santa Fe Channel, including the Levin-Richmond Terminal Corporation berth on the south side of the Levin-Richmond Terminal Corporation site.

Nature and Extent of Current Contamination

The nature and extent of sediment contamination in the Lauritzen Channel were assessed in the 2026 Focused Feasibility Study by completing statistical analyses and spatial evaluations of 2013 sediment sampling data. General trends identified during these assessments are detailed as follows:

- The average total DDT concentration in Younger Bay Mud is several orders of magnitude greater in the Lauritzen Channel than in the Santa Fe Channel.
- Dieldrin concentrations showed similar trends throughout the Lauritzen Channel; however, dieldrin concentrations were three orders of magnitude less than total DDT.
- The average concentrations of total DDT and dieldrin were greatest near the former plant (Operable Unit 1), followed by the northern portion (northern area and north end area) of the channel. The average concentrations in the east side (berth) and west side areas were an order of magnitude less.
- Older Bay Mud is generally uncontaminated, except where disturbed by dredging or other anthropogenic activity (for example, anchoring and vessel scour).[4]



Notes:
µg/kg: micrograms per kilogram
OBM: Older Bay Mud
YBM: Younger Bay Mud
Total DDT is the sum of the detected 2,4'- and 4,4'- isomers of DDD, DDE and DDT.

Figure 6. Maximum Total DDT Concentrations in the Channel

The largest amount of sediment accumulation is in the active ship berth on the east side of the Lauritzen Channel. Accumulation is occurring in the deep dredged region where currents are likely the lowest, causing the berth to behave as a sediment trap. The west side of the channel, which experiences frequent vessel activity in relatively shallow regions, generally accumulates less Younger Bay Mud. Finally, the northern area and north end area of the channel, with low-energy shallow water and moderate barge activity, shows a moderate Younger Bay Mud accumulation and a mix of potential erosion and deposition.

[4] One 2013 sample collected from Older Bay Mud had DDT concentrations exceeding the 1994 remedial goal (590 µg/kg); however, EPA considers this result to be a laboratory artifact because of the concentrations' similarity to the Younger Bay Mud concentrations that lie above the Older Bay Mud unit and the difference in the sample material compared to other samples collected from the Older Bay Mud (CH2M, 2026).

The spatial distribution of maximum concentrations of total DDT across the Lauritzen Channel is shown in Figure 6.

Beyond these general trends, the 2013 data show no uniform or predictable distribution of the contaminants of concern laterally across Lauritzen Channel because of the frequent resuspension of the contaminated material from the daily vessel-related activities. The Lauritzen Channel is a low tidal energy protected region with tidal velocities that are not likely to result in sediment resuspension; therefore, ***ongoing vessel operations are responsible for disturbing the sediment bed and resuspending and redistributing sediment within the channel.*** Vessel and spud disturbances to the sediments of the channel are depicted on Figure 7. Ongoing vessel operations were considered when screening remedial technologies and developing remedial alternatives for the Lauritzen Channel.

Lauritzen Channel Contamination Sources

The remedial investigation completed in 1997 for the initial remedy concluded that the main source of total DDT and dieldrin to the Lauritzen Channel was waste discharges during pesticide processing activities at the former facility. Multiple investigations since the original cleanup support the conclusion that ***contaminated sediment in the channel (including shoreline and embankment sediment) not removed during the initial cleanup is responsible for most of the DDT and dieldrin mass currently found in the channel.***

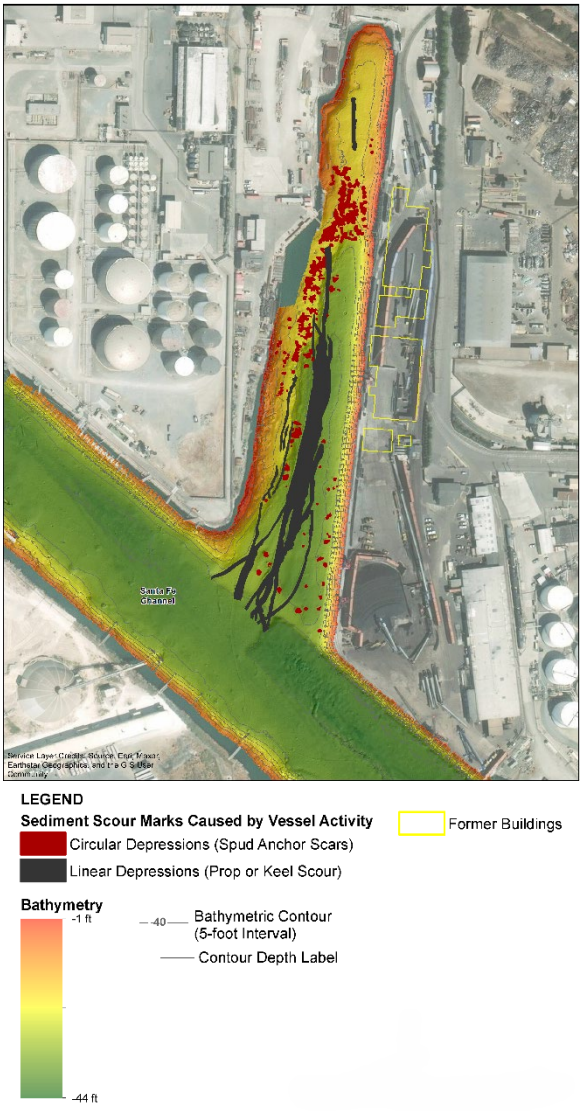


Figure 7. 2012 Bathymetry of the Channel with Sediment Scour Marks Caused by Vessel Activity

Potential Ongoing Sources of Contamination

In addition to the main sources contaminating the channel, as previously detailed, EPA evaluated potential ongoing sources of contamination that could lead to recontamination of the channel after this second remedy. The general descriptions and conclusions for each potential ongoing source are described in the following subsections and depicted in Figure 8. To address these potential sources, source control measures are included in each of the proposed remedial alternatives, as detailed in Section 3. Non-site-related sources of DDT and dieldrin to the Lauritzen Channel or the rest of Richmond Inner Harbor have not been identified.

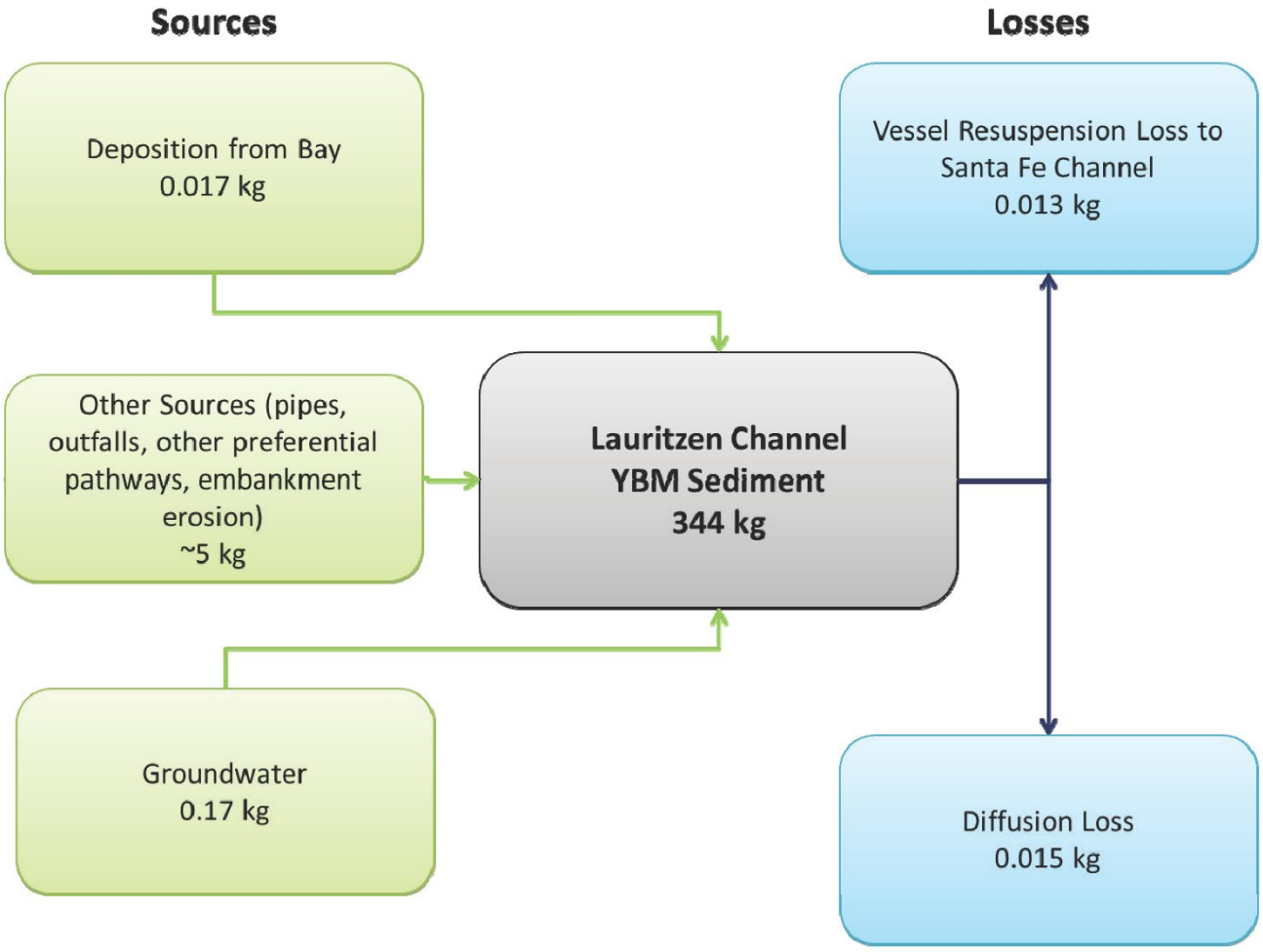


Figure 8. Conceptual Diagram of Average Yearly Sources and Losses of DDT in the Channel

Notes:
kg: kilogram(s)
YBM: Younger Bay Mud
Total DDT is the sum of the detected 2,4'- and 4,4'- isomers of DDD, DDE and DDT.

Upland Groundwater

The shallow aquifer of the upland area (Operable Unit 1) contributes total DDT mass to the Lauritzen Channel sediment; however, the estimated contribution of total DDT from groundwater is not of sufficient magnitude to solely account for the elevated levels of DDT in channel sediment (Figure 8). Although minimal, groundwater discharge will continue to contribute DDT to sediment and surface water in the Lauritzen Channel if it is not controlled.

Pipes and Seeps

Pipes and conveyances (including features that terminate behind riprap, sheet pile or features that are subtidal) may function as preferential pathways for DDT transport from the upland area (Operable Unit 1) to the Lauritzen Channel (Operable Unit 2). This is particularly relevant for areas adjacent to the former plant and former train scale area.

Wood Pilings

Elevated concentrations of DDT were found in the majority of samples collected from creosote-treated wood piling along the eastern side of the channel in 1999. DDT is not likely to desorb, or release, from the pilings into the sediment and water of the channel; however, the breakdown of these pilings is an ongoing source of DDT-contaminated particles to the sediment bed and potentially to marine organisms. DDT-contaminated wood particles will continue to accumulate in sediment if the pilings are not removed or cut off, thereby increasing DDT concentrations in sediment and potentially allowing DDT to be incorporated into the food web.

Stormwater Outfalls

Both the City of Richmond and the Levin-Richmond Terminal Corporation stormwater management systems within the upland area (Operable Unit 1) are potential ongoing sources of DDT and dieldrin to the Lauritzen Channel.

The City of Richmond stormwater system outfall is located at the head of the Lauritzen Channel, in the northeast corner of the north end. Sediment from the upland area has accumulated in the stormwater system and will continue to contribute contamination to the channel if not removed.

The Levin-Richmond Terminal Corporation stormwater treatment system, installed in 2014, receives surface water runoff from five onsite interceptors and uses flocculation, settling, and sand filtration to remove contaminants identified in the state-issued discharge permit (which does not list DDT and dieldrin). Influent and effluent to the treatment system is sampled during major storm events, typically three to four storm events per year. In accordance with the discharge permit, treated stormwater (effluent) is discharged to the Lauritzen Channel through an outfall near stormwater interceptor SW-5 (Figure 9). The system is not designed to actively treat DDT and dieldrin, but sample results from 2016 to 2021 indicate there is a reduction in DDT and dieldrin concentrations in stormwater effluent. However, these concentrations in effluent discharged to the channel remain above surface water remediation goals.

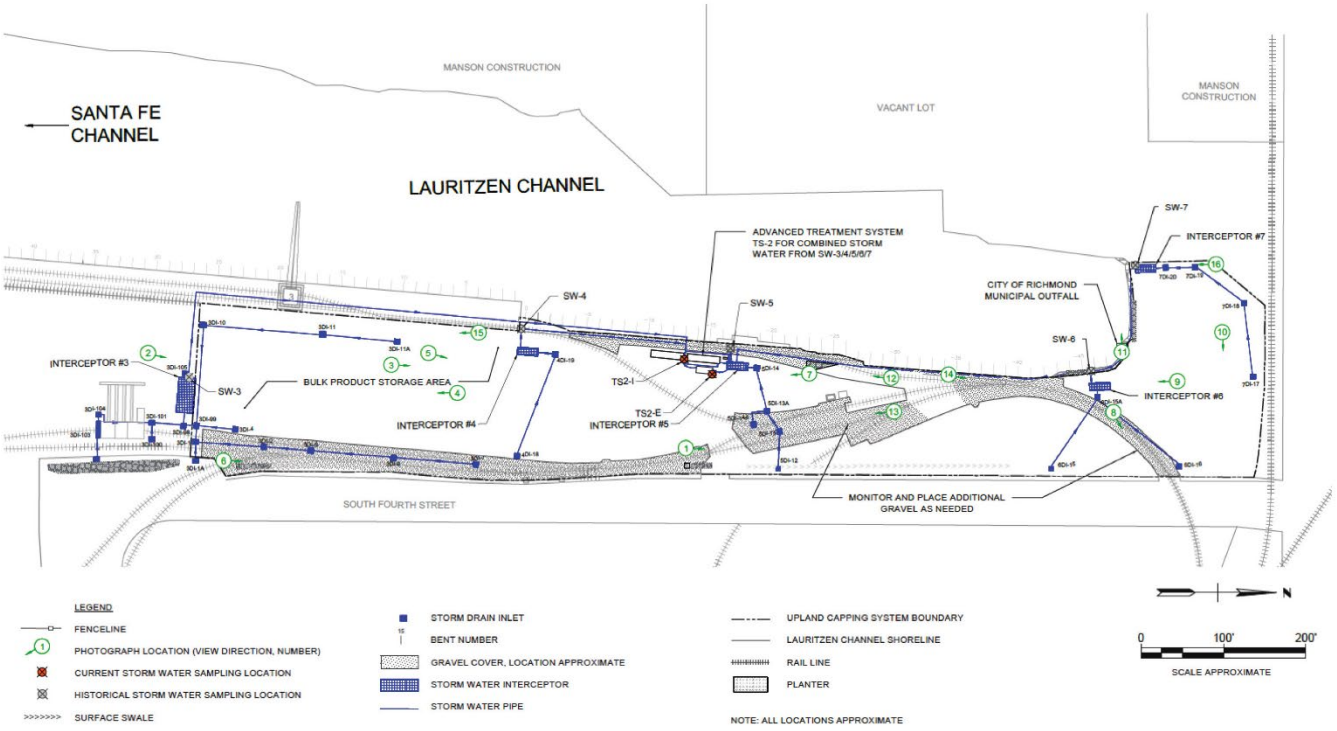


Figure 9. Stormwater Drainage System

Note: Photo references are not applicable to this Proposed Plan.

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

Principal Threat Waste

Some of the sediment in the Lauritzen Channel contains very high concentrations of DDT and dieldrin, particularly in areas that were not fully dredged during the 1990s cleanup. As previously discussed, sampling shows the highest levels along the eastern shoreline and in the northern portion of the channel (Figure 6).

Under EPA's guidance for identifying principal threat waste, this material meets the definition because contaminant levels create an estimated risk of approximately 10^{-3} (a one-in-one-thousand chance of harm), which exceeds EPA's threshold for requiring treatment.

Consistent with CERCLA and the NCP, EPA evaluated cleanup options that reduce toxicity and mobility to the maximum extent practicable. The planned approach combines:

- Treatment, using activated carbon to reduce the mobility and bioavailability of DDT and dieldrin.
- Removal, by dredging sediment and stabilizing it before offsite disposal.
- Containment, by placing clean material over remaining areas to isolate contamination and prevent movement.

When treatment alone is not feasible, the NCP supports combining treatment, removal, and containment to effectively reduce overall risk. The Preferred Alternative, as detailed in Section 9, applies these measures together to control exposure and provide long-term protection.

What is a "Principal Threat"?

Section 300.430(a)(1)(iii)(A) of the NCP, 40 C.F.R. Section 300.430(a)(1)(iii)(A), establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable. The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. Source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Principal threat wastes are highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur.

A "threshold level" of toxicity and mobility for principal threat waste is not established; however, EPA recommends that remediation should be considered if the toxicity and mobility present a combined potential risk of 10^{-3} (1 in 1,000 chance of causing harm) or greater. EPA evaluates remedial alternatives on a site-specific basis using the nine remedy selection criteria, further detailed in Section 8. The nine criteria provide the statutory basis for evaluating and selecting a remedy under CERCLA making a statutory finding that the remedy employs treatment as a principal element. Treatment of a principal threat waste can involve a permanent solution to physically alter the contamination and reduce its mobility. Various technologies such as in situ stabilization or solidification, for example, are considered treatment.

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practical.

4. Scope and Role of Operable Units and Response Action

The remedial alternatives developed in the 2026 Focused Feasibility Study for the Lauritzen Channel (Operable Unit 2) and outlined in this Proposed Plan target total DDT and dieldrin sediment contamination in the marine area of the Lauritzen Channel as the initial remedy in the 1990s was deemed unsuccessful (EPA, 2001a). Neither the 2026 Focused Feasibility Study nor this Proposed Plan include Operable Unit 1 (upland area) because the previous remedial actions (sediment removal and capping) have been protective of human health and the environment (EPA, 2000, 2011, 2016, 2021); no additional work is required in Operable Unit 1 (upland area) to address the total DDT and dieldrin contamination at this time.

The Preferred Alternative will address sediment contamination that has remained in the Lauritzen Channel since the initial 1990s remedy and potential sources of contamination. The remedial action objectives, discussed in more detail in Section 6, are to prevent exposure to total DDT and dieldrin in sediments that present a threat to ecological receptors and human health. Principal threat waste will be addressed through treatment with dredging contamination, activated carbon, and containing/isolating any remaining waste to prevent movement. In addition, this Proposed Plan details the interim measure for surface water within the Lauritzen Channel, and proposes an interim waiver for ARARs for surface water, discussed in more detail in Sections 6 and 8.

5. Summary of Site Risks

Risk is the likelihood that a hazardous substance, pollutant or contaminant in the environment will cause harmful effects to people and wildlife. EPA evaluates site risks through **human health risk assessments** and **ecological risk assessments**, which help determine how people and ecological receptors may be exposed to Site contamination and whether those exposures could cause adverse effects.

Human Health Risk Assessment

EPA's Integrated Risk Information System database classifies both DDT and dieldrin as "probable human carcinogens."

The 1994 Human Health Risk Assessment for the Site found that the consumption of fish containing total DDT and dieldrin from the Lauritzen Channel may pose excess carcinogenic risks and noncarcinogenic hazards that exceed EPA's acceptable risk range and identified total DDT and dieldrin as contaminants of concern. Concentrations of these contaminants in the Santa Fe and Inner Richmond Harbor Channels were at the upper end of EPA's acceptable risk range. The 1994 Human Health Risk Assessment was based on interviews conducted by EPA with six people,

What Is a "Human Health Risk Assessment" and How Is It Calculated?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance released from a site in the absence of actions to control or mitigate these releases under current and anticipated future land uses. A four-step process is used for assessing site-related human health risks for reasonable maximum exposure scenarios:

Hazard Identification: In this step, chemicals of concern in various media (that is, soil, groundwater, surface water, and air) are identified based on factors such as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: Different pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include direct and incidental ingestion of, and dermal contact with, contaminated sediment, fish, and surface water. Factors relating to the exposure assessment encompass, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of that exposure. Using these factors, a "reasonable maximum exposure" scenario that portrays the greatest level of human exposure that could reasonably be expected to occur is calculated.

Toxicity Assessment: This step determines the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure and severity of adverse effects. Potential health effects are chemical specific and may include the risk of developing cancer over a lifetime or other noncancer health hazards, such as changes in the normal functions of organs within the body (for example, changes in the effectiveness of the immune system). Some chemicals can cause both cancer and noncancer health hazards.

Risk Characterization: The final step summarizes and combines outputs of the exposure and toxicity assessments (that is, Steps 2 and 3) to provide a quantitative assessment of site risks for all chemicals of concern. Exposures are evaluated based on the potential risk of developing cancer and the potential for noncancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a 1 in 10,000 excess cancer risk, or 1 additional cancer case may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions identified in the exposure assessment. Current Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an individual excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a 1 in 10,000 to a 1 in 1,000,000 excess cancer risk. For noncancer health effects (such as changes to the immune system, respiratory irritants, neurotoxicity, etc.), a **hazard index** rating is calculated. Noncancer health effects are not expected when the calculated hazard index is equal to or less than one; noncancer health effects are expected when the hazard index is greater than one. The goal of protection is 10^{-6} for cancer risk and a hazard index of 1 for a noncancer health hazard. *Chemicals that exceed a 10^{-4} cancer risk (1 in 10,000) or a hazard index of 1 are typically those that require remedial action at a site and are referred to as chemicals or contaminants of concern in the ROD.*

which found that a number of people fished from an unrestricted, publicly accessible shoreline of the Richmond Inner Harbor Channel near the Parr Canal and, to a lesser extent, in the Santa Fe Channel. Several interviewees also indicated that boat fishing took place in the Richmond Inner Harbor. Risk associated with fish consumption was estimated for both recreational and subsistence fishing scenarios, based on the assumption that 100% of the fish diet comes from the study area.

In 2010, EPA updated the evaluation of risks and hazards from fish consumption using 2008 fish tissue data collected from the Lauritzen Channel, Richmond Inner Harbor, Santa Fe Channel and Parr Canal. The updated evaluation incorporated a local fish ingestion rate, based on the Asian Pacific Environmental Network seafood consumption survey that interviewed 229 participants, and the assumption that 50% of the fish diet comes from the study area. Results of the updated evaluation indicated the following:

- **Lauritzen Channel:** Consumption of most types of fish caught in the Lauritzen Channel in 2008 would pose an unacceptable cancer risk and noncancer hazard. The excess lifetime cancer risk associated with consumption of fish caught from the Lauritzen Channel was calculated to be greater than 10^{-3} (1 case of cancer in 1,000 people exposed) or greater than EPA's threshold of 1 for noncancer hazard for whole fish and fish fillets at the local consumption rate, based on the Asian Pacific Environmental Network seafood consumption survey.
- **Parr Canal:** Only two fish species were caught in the Parr Canal: sculpin and walleyed perch. Based on maximum detected concentrations, consumption of sculpin at the local consumption rate (based on the 1998 Asian Pacific Environmental Network seafood consumption survey) was calculated to pose an unacceptable noncancer hazard slightly above EPA's threshold (i.e., a hazard of 2 versus EPA's threshold of 1) and an excess lifetime cancer risk at the upper end of EPA's acceptable range (10^{-4}). Excess lifetime cancer risk and hazard estimates associated with consumption of perch, the other fish species sampled, did not exceed EPA-acceptable levels. However, concentrations found in fish from the Parr Canal were consistent with the San Francisco Bay overall. Hence differences could not be attributed to the Site's contamination and, therefore, do not fall under the authority of CERCLA. Long-term monitoring of fish tissue in the Parr Canal will be included in the Record of Decision Amendment.
- **Santa Fe Channel:** The excess lifetime cancer risk estimates associated with consumption of fish at the local consumption rate (based on the 1998 Asian Pacific Environmental Network seafood consumption survey) did not exceed EPA's acceptable levels, and noncancer hazards did not exceed EPA's threshold. While the maximum detected concentration of one fish species (jacksmelt, whole fish) was associated with an excess lifetime cancer risk of 10^{-4}, the concentrations found in this species were consistent with those found for jacksmelt throughout the San Francisco Bay. Therefore, differences could not be attributed to the Site's contamination and do not fall under the authority of CERCLA. The excess lifetime cancer risk did not exceed EPA's acceptable level.
- **Inner Richmond Harbor:** The excess lifetime cancer risk and noncancer hazard estimates associated with consumption of fish at the local consumption rate (based on the 1998 Asian Pacific Environmental Network seafood consumption survey) did not exceed EPA-acceptable levels.

It should be noted that the surrounding fenced industrial facilities prevent overland public access to most of the harbor shoreline, including the Lauritzen Channel. Furthermore, future uses of the Site must be taken into consideration, meaning future use excluding restrictive land access was considered in risk assessment. Future users may have potentially greater access to the Lauritzen Channel, increasing the potential of adverse health effects for subsistence anglers. Additionally, recreational boats (i.e. kayaks) have been observed in these water bodies.

California's Office of Environmental Health Hazard Assessment updated advisories for the San Francisco Bay and the Lauritzen Channel in April 2023 and retained the 1994 recommendation that no one eat fish from the Lauritzen Channel.

Ecological Risk Assessment

EPA evaluated the likelihood of adverse ecological effects from the interaction of the Lauritzen Channel contaminants with the environment in the ecological risk assessment. The ecological risk assessment found that DDT and dieldrin posed an unacceptable risk to benthic (bottom-dwelling) invertebrates, water column organisms, and sensitive fish-eating birds. DDT in channel sediment is biologically available and contributes to benthic toxicity. The ecological risk assessment concluded that the ecological risk was substantial. For example, it concluded that a fish-eating bird would only need to consume fish from the Lauritzen Channel for about 1 day for the bird's annual DDT exposure to exceed the National Academy of Sciences toxicity threshold.

An updated ecological evaluation focused on development of acceptable risk-based concentrations for relatively mobile organisms (including one invertebrate species, nine fish species or taxonomic groups, three bird species, and a mammalian species) and averaged their exposure to DDT and dieldrin throughout the Lauritzen Channel. Sediment is the primary medium of concern for elevated risk of exposure to DDT and dieldrin in the marine area. Acceptable risk-based sediment DDT concentrations for mobile ecological receptors (birds, mammals, fish, and some invertebrates) ranged from 400 to 24,000 µg/kg; the lowest was based on the surfperch, and the greatest was based on a male harbor seal. Acceptable risk-based sediment dieldrin concentrations for ecological receptors ranged from 66 to 1,600 µg/kg. Surficial sediment concentrations reported for the Lauritzen Channel ranged from 23.5 to 88,830 µg/kg for DDT and 1.3 to 2,800 µg/kg for dieldrin. The evaluation made comparisons of the calculated risk-based sediment concentrations to surface sediment concentrations of dieldrin and DDT, and concluded that half of the surface sediment samples from the Lauritzen Channel had dieldrin concentrations greater than at least one risk-based concentration, and up to 80 percent of DDT samples in surface sediment from the Lauritzen Channel had concentrations greater than at least one DDT risk-based concentration.

Basis for Action

Based on the results of the 2026 Focused Feasibility Study and the updated human health and ecological risk assessments, it is EPA's current judgement that the Preferred Alternative identified in this Proposed Plan, or one of the other active measures considered in the Proposed Plan, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

6. Remedial Action Objectives

EPA's human health and ecological risk evaluations show that contamination in the Lauritzen Channel poses unacceptable risks to people and wildlife, making remedial action necessary. The first step in developing cleanup options is establishing **remedial action objectives** and **preliminary remediation goals**, which provide the framework for addressing Site contaminants of concern and their associated risks. These objectives were developed in the 2026 Focused Feasibility Study and are summarized below.

Remedial Action Objectives

Remedial action objectives describe what the proposed cleanup is expected to accomplish. These objectives are based on available information and standards, such as ARARs (explained in Section 8), to-be-considered guidance, site-specific risk-based levels, and considerations such as the following:

- Protecting human health and the environment,
- Where site contamination occurs,
- How the contamination moves,
- How the community and environment encounter contamination, and
- Reasonably anticipated future land use.

Updated Remedial Action Objectives for the Lauritzen Channel Marine Area

1. Reduce the risks to human health from consumption of fish contaminated with total DDT and dieldrin to acceptable levels.
2. Reduce the risks to ecological receptors, including benthic invertebrates, water column organisms and fish-eating marine birds, from total DDT and dieldrin in sediment to acceptable levels.
3. Reduce the risks to human health and aquatic life from DDT (including degradation compounds DDD and DDE) and dieldrin in surface waters.
4. Prevent the offsite transport of DDT- and dieldrin -contaminated sediment that exceed concentrations protective of human health and ecological receptors.

The remedial action objectives for the marine area (Operable Unit 2) were defined in the 1994 Feasibility Study as follows (Lincoff et al., 1994):

> *The primary remedial action objective identified for the Site is the attainment of the EPA water quality criteria and equivalent state objectives for bay waters, which are applicable or relevant and appropriate requirements of federal and state environmental laws. This objective is expected to be achieved by the remediation of contaminated sediment in the Lauritzen Channel.*

The chemicals and pathways driving unacceptable risk for the Lauritzen Channel (Operable Unit 2) have not changed since the 1994 Record of Decision (EPA, 1994). However, the remedial action objectives for the Lauritzen Channel have been updated to be consistent with the Sediment Remediation Guidance (EPA, 2005) and approaches used more recently at similarly contaminated sediment sites.

Preliminary Remediation Goals

A preliminary remediation goal is an initial, health-protective concentration target for a specific chemical in sediment, water or another environmental medium. EPA developed preliminary remediation goals for DDT and dieldrin in the Lauritzen Channel to ensure the remedy is protective of human health and wildlife. EPA also chose performance measures to serve as environmental indicators of the progress toward achieving remedial action objectives and the interim measure (detailed in Section 8).
The preliminary remediation goals and performance measures, shown in Table 1, also provide the basis for comparing different remedial alternatives. Final cleanup levels for sediment and fish tissue will be selected in the Record of Decision Amendment, while a separate decision document will be required for surface water following completion of a regional background study for DDT and dieldrin in surface water.

To develop preliminary remediation goals and performance measures, EPA evaluated the most sensitive ways people and ecological receptors may be exposed to contamination. This included risks to anglers who may consume locally caught fish, risks to bottom-dwelling organisms and the wildlife that feed on them, applicable water quality standards, and **background concentrations** of DDT and dieldrin in surface water.

For DDT in sediment, EPA will apply sitewide and "not-to-exceed" preliminary remediation goals in a tandem, stepwise approach to ensure protection of sensitive species. The first step is to apply the sitewide preliminary remediation goal (in this case, 450 µg/kg) as a spatially weighted average of post-cleanup samples to the entire footprint of the cleanup area. If the post-cleanup samples from the initial sitewide remediation effort identify any areas of sediment that exceed the not-to-exceed preliminary remediation goal (in this case, 715 µg/kg), then a second step will be performed to remediate any remaining sediment above the not-to-exceed value.

Reducing the concentrations of DDT and dieldrin in sediment is expected to improve water quality in the Lauritzen Channel and reduce DDT and dieldrin in fish tissue. An interim surface water performance measure was selected to monitor contaminant concentrations following remediation. The surface water performance measure does not need to be attained with this proposed action. A regional background study (Section 7) will be completed, and a final remediation goal for surface water will be selected in a separate decision document. Similarly, the selected fish tissue performance measure will also be used to measure the achievement of remedial action objectives by monitoring contaminant concentrations in fish tissue. Since it is expected to take years for DDT and dieldrin concentrations in fish tissue to be reduced to acceptable levels for human consumption, a monitoring plan will be developed following the Record of Decision Amendment for sediment.

Table 1. Preliminary Remediation Goals and Performance Measures		
Media	**Preliminary Remediation Goals for Contaminants of Concern**	**Basis for the Preliminary Remediation Goal**
Unamended sediment	Total DDT: 450 µg/kg applied as a sitewide spatially weighted average concentration Dieldrin: 4.3 µg/kg	Human health risk-based concentration for a target noncancer hazard quotient of less than 1 and a target excess lifetime cancer risk between $1x10^{-5}$ and $1x10^{-4}$
Unamended sediment (not to exceed)	Total DDT: 715 µg/kg Applied as a not-to-exceed concentration	Protection of direct contact exposure of sediment associated with benthic invertebrates that are primarily sessile (that is, that do not move substantially around the Lauritzen Channel)
Surface water	Human health: Total DDT: 0.03 ng/L DDD: 0.12 ng/L DDE: 0.018 ng/L Dieldrin: 0.0012 ng/L Aquatic Life (saltwater): Total DDT*: 130 ng/L (acute) 1 ng/L (chronic)	Performance measure; Clean Water Act, Section 304, 33 U.S.C. §1314. National Recommended Water Quality Criteria • Human Health Criteria Table (fish consumption) • Aquatic Life Criteria Table
Fish tissue	Total DDT: 0.12 mg/kg wet weight Dieldrin: 0.0025 mg/kg wet weight	Performance measure; human health risk-based concentration for a target excess lifetime cancer risk of $-1x10^{-5}$

µg/L = microgram(s) per liter

ng/L = nanogram(s) per liter

unamended sediment = sediment that has not been treated with activated carbon to reduce contaminant bioavailability.[5]

*priority pollutant 4,4-DDT; DDT, DDD and DDE are not listed separately in the Aquatic Life Criteria Table

[5] Remedial action alternatives may include the use of an activated carbon amendment to treat dredge residuals.

7. Remedial Alternatives

EPA has evaluated a wide range of cleanup options and technologies to develop remedial alternatives that would reduce the risks the contaminated sediments of the Lauritzen Channel pose to human health and the environment. These evaluations considered the following:

- 10 general response actions (for example, different cleanup methods such as capping, treatment or offsite disposal) expected to accomplish the remedial action objectives,
- 30 remedial technologies (such as different types of caps or water treatment processes), and
- 29 process options (different ways of using cleanup technologies).

General response actions and the associated remedial technologies needed to complete those response actions were evaluated to determine what actions and technologies could successfully remediate the Lauritzen Channel. Response actions/technologies that were not retained for further evaluation as part of remedial alternatives include, but are not limited to, **dry excavation** because most of the contaminated sediment volume in the channel is within water depths that are too deep to allow for dewatering of the channel.

The following subsections outline the common elements included in each of the developed remedial alternatives, detail common remedial technologies and summarize each remedial alternative.

Common Elements for Each Alternative

Each of the remedial alternatives, except Alternative 1 (No Action), include the same strategy for a background study, source controls, and technology used for sediment dredging, sediment processing and disposal. These elements are detailed in the following subsections.

Regional Background Study – Surface Water

A surface water background study is required for all remedial alternatives to determine the concentrations of the Site contaminants of concern within and around the Lauritzen Channel that are present without the influence of contamination from the former United Heckathorn facility. Background concentrations are typically considered to be either naturally occurring or present because of human activity (i.e., anthropogenic).

The surface water portion of the proposed remedy is considered interim, and the performance measure does not need to be attained at the conclusion of the proposed remedy (further details included in Section 8, Criteria 2). The results of the background study will be used to determine if the proposed remedy will effectively meet the performance measure. These findings and the surface water remediation goal for the Lauritzen Channel will be documented in a separate decision document specifically for surface water, separate from the Record of Decision Amendment for sediment remediation.

Source Control Measures

For any of the remedial alternatives to be effective, potential ongoing sources of contamination must be controlled to not re-contaminate the channel. Each alternative presented in this Proposed Plan include the following source control measures, in addition to the proposed sediment cleanup (Figure 10):

- Removal and/or sealing of nonfunctional pipes and outfalls.
- One-time removal of sediment from the City of Richmond storm drain system within the upland area (Operable Unit 1).
- Removal and/or cutting of abandoned wood pilings along the northeastern section of the channel.
- Installation of a permanent engineered barrier (such as a sheet pile wall) along sections of the shoreline to prevent recontamination from upland area seeps and groundwater and to provide structural support for the proposed active cap in the shoreline segment.. This measure is intended as source control only and does not constitute a groundwater cleanup action.

For more information regarding source control, refer to Section 3.

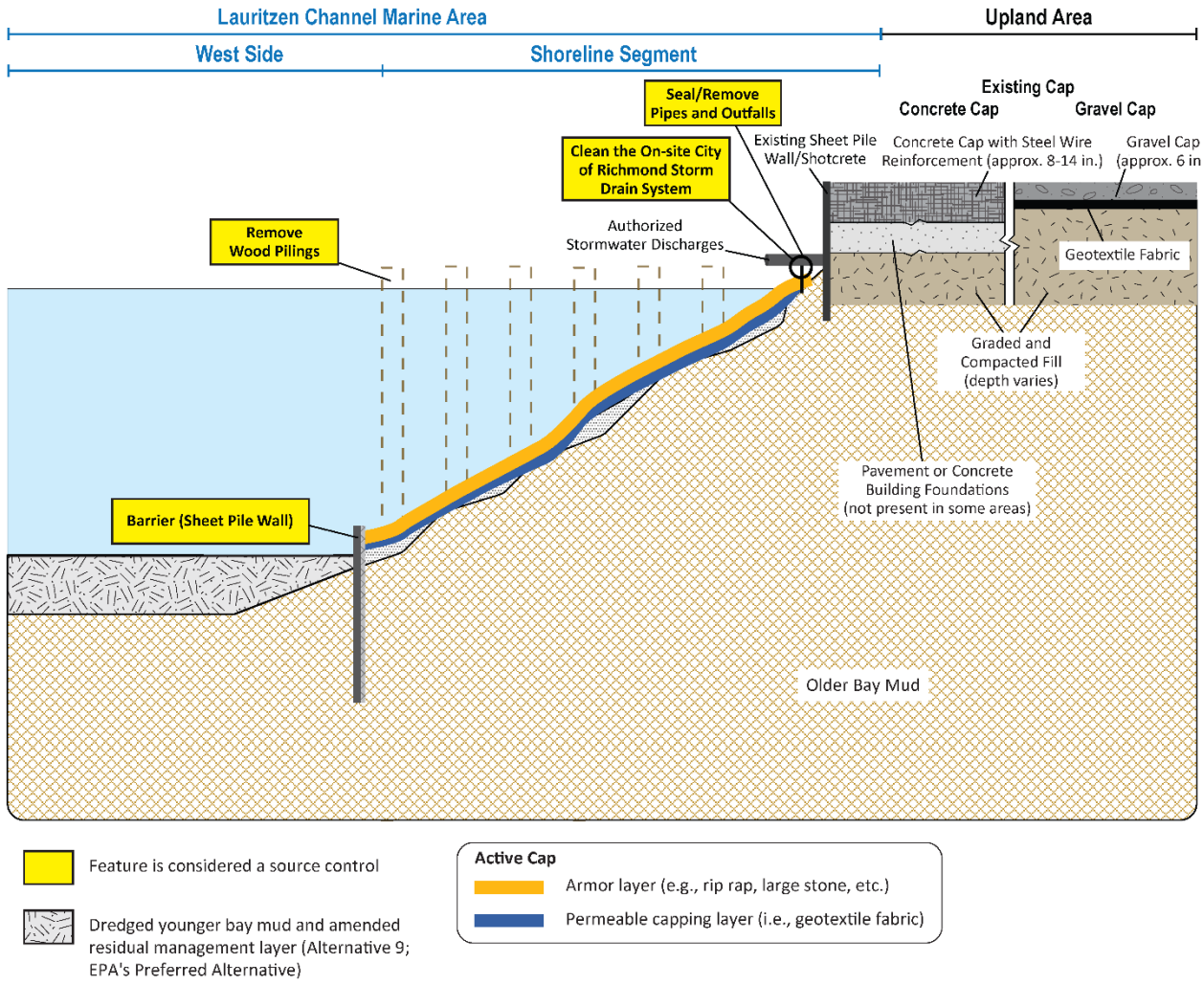


Figure 10. Source Control Elements

Sediment Removal, Management and Disposal

All alternatives, except Alternative 1 (No Action), involve some level of sediment removal (dredging) using a crane-like machine mounted on a barge with a tool that removes sediment from the bottom of the channel (Figure 11). The selected tool used to remove the sediment will limit the potential for dredging material overflowing or being released into the channel. A thin layer of clean sand—sometimes mixed with activated carbon (i.e., a "residual management layer")—would be placed over dredged areas to address low-level residual contamination that may involuntarily re-enter the channel. Additional technologies, like turbidity curtains, will also be used to help prevent movement of resuspended sediment outside the Lauritzen Channel.

Dredged material would be loaded onto a vessel and transferred to a watertight truck for transportation to the offsite staging area where it would be **dewatered** and **stabilized**. Stabilization is a treatment process that mixes dewatered, dredged sediment with binding reagents, making the dredged material cement-like. This treatment would reduce the mobility of DDT and improve the physical properties of the material for handling, transport and disposal. A processing and staging area to dewater and stabilize the sediment has not been identified; however, offsite staging for stabilization is assumed in all remedial alternatives as an area between 1.5 and 3.0 acres in size is needed for this process, which the United Heckathorn property cannot accommodate.

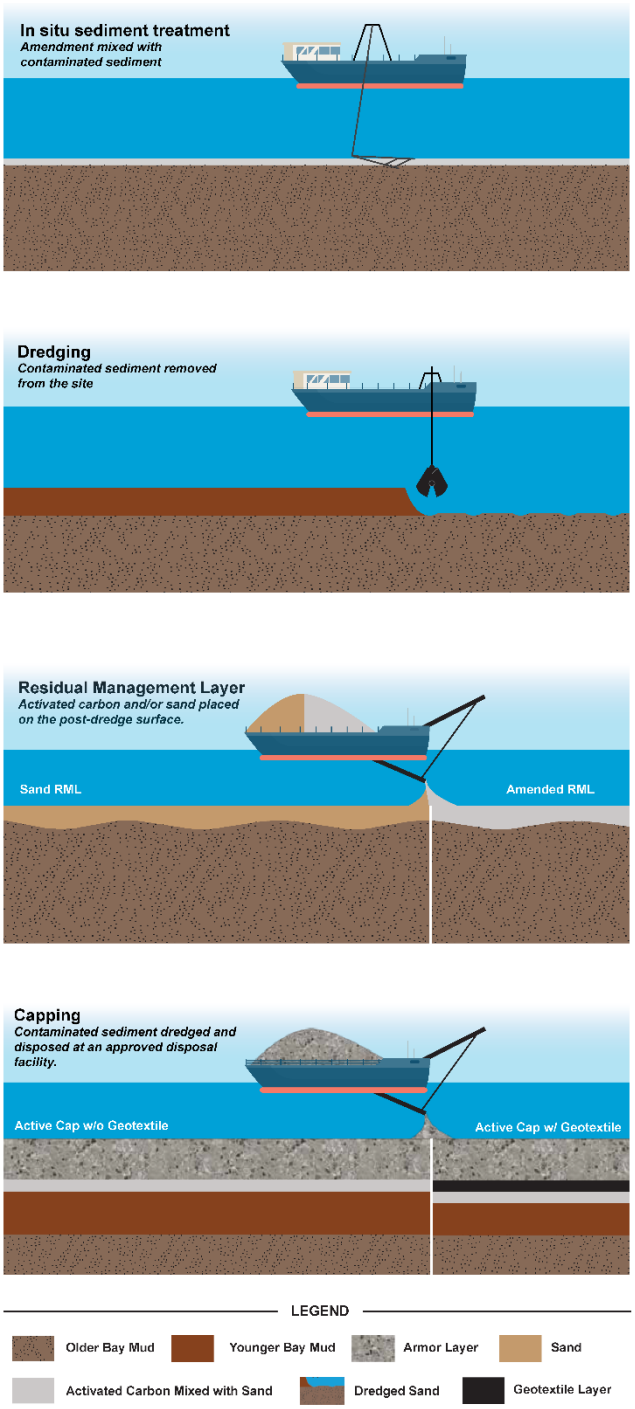


Figure 11. Remedial Technologies

Stabilized material would then be transported to an EPA-approved landfill for disposal either via truck or rail. Cost estimates for the remedial alternatives presented in this Proposed Plan assume disposal at an out-of-state landfill; however, the final disposal facility will be selected during the design phase.

Institutional Controls

Institutional controls will be implemented to limit anchoring, mooring, dredging and construction within the portions of the channel with active caps after the remedy is completed to minimize damage to the installed caps and engineered barrier. These controls will be developed and finalized during the remedial design phase.

Common Remedial Technologies

Following consideration of 30 different remedial technologies, EPA selected five key technologies (Figure 11) to develop the remedial alternatives.

- **In Situ Carbon Treatment** – Placement of a mixture of sand and activated carbon over the contaminated sediment that would remain in place. This treatment is typically used in lieu of dredging activities.
- **Dredging** – Mechanical removal of contaminated material followed by offsite disposal of the dewatered and stabilized sediment.
- **Residual Management Layer** – Placement of either a layer of sand ("sand residual management layer") or a mixture of sand and activated carbon placed ("amended residual management layer") over a dredged surface. This layer will reduce potential exposure to low level residual contamination after dredging and assist in preventing resuspension of any residual sediment from vessel activity after remediation.
- **Active Capping** – An active cap physically isolates the contaminated sediments through the placement of activated carbon mixed with sand. Depending on site conditions, the active cap material may be covered with a permeable geotextile fabric and stone to help keep the material in place.
- **Sand Isolation Layer** – Another type of cap that only uses sand to cover the contaminated sediments.

Post-Construction Activities

Each remedy will include the development and implementation of long-term monitoring and annual operations and maintenance to ensure remediation success. These plans will be developed for the Preferred Alternative during the remedial design phase.

Long-Term Monitoring

Long-term monitoring will help protect any active caps, sand isolation layers and/or residual management layers included in the final remedy, maintain the integrity of the engineered barrier, track environmental conditions in the Lauritzen Channel, and support the prevention of further human exposure to Site contaminants.

Long-term monitoring to confirm the effectiveness of the Parr Canal remedy completed in the 1990s will also be included in the plan developed during the remedial design phase. Although this Proposed Plan only includes work within the Lauritzen Channel, 2013 surface water and mussel tissue samples from the Parr Canal (also within the Operable Unit 2 marine area) indicated concentrations that exceed the 1994 Record of Decision remediation goals.

Annual Operations and Maintenance

Each remedial alternative includes annual operations and maintenance costs associated with the remedy for the Lauritzen Channel. These activities may include measuring the depths of the channel using bathymetric surveys, monitoring water quality, routine inspections, and repairing barriers like the active cap or sheet pile wall.

Summary of Remedial Alternatives

Table 2 provides an overview of the evaluated remedial alternatives with detailed descriptions of each option. Note that the alternative numbers are not sequential because some remedies were eliminated in the preliminary evaluation. Please refer to the 2026 Focused Feasibility Study for details on the eliminated remedies.

Table 2. Summary of Retained Remedial Alternatives

Alternative	Key Components	Summary Description
1. No Action	• No cleanup actions • Required NCP baseline	Serves as baseline for comparison. No active remediation is performed and existing sediment contamination is not reduced.
5. Targeted Dredging/In Situ Carbon Treatment/Active Cap at North End and Shoreline Segment/Source Controls/Long-Term Monitoring/ Institutional Controls	• Targeted dredging of contaminated Younger Bay Mud and offsite disposal • In situ activated carbon treatment • Active caps (shoreline segment, north end) • Source control and institutional controls • Surface water background study	Removes contaminated sediment from targeted hotspots throughout the channel. Uses activated carbon treatment in undredged areas to bind contaminants and active caps in the north end and shoreline segment where additional isolation/stability is needed. Includes source controls to limit potential sources of recontamination.
9. Full Dredging/Amended Residual Management Layer/Active Cap at North End and Shoreline Segment/Source Controls/Long-Term Monitoring/ Institutional Controls ***(Preferred Alternative)***	• Full dredging of Younger Bay Mud (east side, west side, northern area) and offsite disposal • Carbon-amended residual management layer • Active caps (shoreline segment, north end) • Source control and institutional controls • Surface water background study	Removes all Younger Bay Mud from the east side, west side, and northern area. An amended residual management layer on the post-dredged surface controls. Active caps in the north end and shoreline segment improve isolation/stability. Strongest long-term effectiveness and reduces reliance on institutional controls.
10. Full Dredging/Sand Residual Management Layer/Active Cap at Northern Area, North End, and Shoreline Segment/Source Controls/Long-Term Monitoring/ Institutional Controls	• Full dredging of Younger Bay Mud (east and west sides) and offsite disposal • Sand residual management layer • Active caps (shoreline segment, north end, northern area) • Source control and institutional controls • Surface water background study	Removes all Younger Bay Mud from the east and west sides with a sand residual management layer on the post-dredged surface. Active capping of the shoreline segment, north end and northern area. Capping applied to larger northern areas for stability.
11. Full Dredging/Sand Residual Management Layer/Active Cap at Northern Area/Active Cap at North End and Shoreline Segment/Source Controls/Long-Term Monitoring/ Institutional Controls	• Full dredging of Younger Bay Mud (east side, west side, 75% of northern area) and offsite disposal • Sand residual management layer • Active caps (shoreline segment, north end and ~25% of the northern area) • Source control and institutional controls • Surface water background study	Removes all Younger Bay Mud from the east and west sides and 75% of Younger Bay Mud from the northern area with a sand residual management layer on the post-dredged surface. Active capping of the shoreline segment, north end and 25% of the northern area. Similar approach as Alternative 10, but with a reduced active cap footprint (~25% of northern area) and increased dredging volume. Relies more on sand isolation and source control.

Table 2. Summary of Retained Remedial Alternatives		
Alternative	**Key Components**	**Summary Description**
12. Full Dredging/Sand Residual Management Layer/Active Cap at North End and Shoreline Segment/Source Controls/Long-Term Monitoring/ Institutional Controls	• Full dredging of Younger Bay Mud (east side, west side, northern area) and offsite disposal • Sand residual management layer • Active caps (shoreline segment, north end) • Source control and institutional controls • Surface water background study	Similar dredging approach to Alternative 9, but with a sand residual management layer. Relies on sand isolation plus active caps for treatment and stability.

Alternative 1: No Action

Estimated Capital Costs: $0
Estimated Annual Operation & Maintenance Cost: $0
30-year Total Cost: $0

The No Action alternative is required under the NCP and serves as a baseline for comparing the other cleanup options. Under this alternative, EPA would not conduct any additional cleanup activities in the Lauritzen Channel. Contaminated sediment would remain in place, and no actions would be taken to reduce risks to people or wildlife, prevent recontamination, or address ongoing sources of contamination.

Because contamination levels in sediment and fish exceed health-protective thresholds, the No Action alternative would not meet the remedial action objectives and would not be protective of human health or the environment. This option is included only for comparison and will not be selected as the final remedy.

Alternative 5: Targeted Dredging/In Situ Carbon Treatment & Active Cap at North End and Shoreline Segment/Source Controls/Long-Term Monitoring/Institutional Controls

Estimated Capital Costs: $40,296,262
Estimated Annual Operation & Maintenance Cost: $6,574,741
30-year Total Cost: $46,871,004

Targeted dredging of Younger Bay Mud to address "hot spots" or increase navigational depth followed by placement of in situ carbon treatment (activated carbon) in the east side, west side and northern area of the Lauritzen Channel; placement of an active cap (activated carbon, geotextile fabric and stone) on the shoreline segment and in the north end; and sediment disposal at an offsite landfill. This alternative includes a surface water background study, source control measures and institutional controls.

Alternative 9: Full Dredging/Amended Residual Management Layer & Active Cap at North End and Shoreline Segment/Source Controls/Long-Term Monitoring/Institutional Controls

Estimated Capital Costs: $86,063,761
Estimated Annual Operation & Maintenance Cost: $7,317,720
30-year Total Cost: $93,381,481

Full dredging of Younger Bay Mud with an amended residual management layer (mixture of activated carbon and sand) over the post-dredge surface in the east side, west side and northern area of the Lauritzen Channel; placement of an active cap (activated carbon, geotextile fabric and stone) over the shoreline segment and in the north end; and sediment disposal at an offsite landfill. This alternative includes a surface water background study, source control measures and institutional controls.

Alternative 10: Full Dredging/Sand Residual Management Layer & Active Cap at Northern Area, North End and Shoreline Segment/Source Controls/Long-Term Monitoring/Institutional Controls

Estimated Capital Costs: $77,076,945
Estimated Annual Operation & Maintenance Cost: $6,665,958
30-year Total Cost: $83,742,903

Full dredging of Younger Bay Mud with a sand residual management layer on the post-dredge surface of the east side and west side of the Lauritzen Channel; active capping (activated carbon, a sand isolation layer and stone) in the northern area; active capping (activated carbon, geotextile and stone) over the shoreline segment and north end; and sediment disposal at an offsite landfill. This alternative includes a surface water background study, source control measures and institutional controls.

Alternative 11: Full Dredging/Sand Residual Management Layer/Partial Active Cap Area/Active Cap at North End and Shoreline Segment/Source Controls/Long-Term Monitoring/Institutional Controls

Estimated Capital Costs: $81,278,972
Estimated Annual Operation & Maintenance Cost: $6,460,864
30-year Total Cost: $87,739,836

This alternative is identical to Alternative 10, except a smaller portion of the northern area would be capped. Full dredging of Younger Bay Mud from the east side, west side and portion (~75%) of the northern area of the Lauritzen Channel followed by a sand residual management layer; active capping (activated carbon, a sand isolation layer and stone) in the other portion (~25%) of the northern area; active capping (activated carbon, geotextile and stone) over the shoreline segment and north end; and sediment disposal at an offsite landfill. This alternative includes a surface water background study, source control measures and institutional controls.

Alternative 12: Full Dredging/Sand Residual Management Layer/Active Cap at North End and Shoreline Segment/Source Controls/Long-Term Monitoring/Institutional Controls

Estimated Capital Costs: $82,405,613
Estimated Annual Operation & Maintenance Cost: $6,536,735
30-year Total Cost: $88,942,348

This alternative is identical to Alternative 9, except for the sand residual management layer placed after dredging instead of an amended residual management layer.

Full dredging of Younger Bay Mud from the east side, west side and northern area of the Lauritzen Channel followed by a sand residual management layer; placement of an active cap (activated carbon, geotextile fabric and stone) over the shoreline segment and north end; and sediment disposal at an offsite landfill. This alternative includes a surface water background study, source control measures and institutional controls.

8. Evaluation of Alternatives

EPA uses nine criteria, specified in the NCP at 40 CFR § 300.430(e)(9)(iii), to evaluate the remedial alternatives and select remedial actions (refer to Figure 12 for a more detailed description of the NCP evaluation criteria). This section summarizes the relative performance of each alternative against the nine criteria and each other.

The alternatives are evaluated against two threshold criteria (Criteria 1 and 2): overall protection of human health and the environment, and compliance with ARARs. The next five criteria, Criteria 3 through 7, are balancing criteria that help compare the advantages and disadvantages of each alternative, including long-term effectiveness; reduction of toxicity, mobility, or volume through treatment; short-term impacts; implementability; and cost. Criteria 8 and 9, state acceptance and community acceptance, are modifying criteria. EPA identifies the Preferred Alternative by determining which alternative satisfies the two threshold criteria (Criteria 1 and 2) and provides the best balance among the five balancing criteria (Criteria 3 through 7). The remedial alternative comparison is presented in Table 2. A more detailed analysis of the alternatives is provided in the 2026 Focused Feasibility Study.

The State of California's concurrence with the Preferred Alternative is discussed further in this section. EPA will consider Community Acceptance, Criteria 9, after reviewing public comments on this Proposed Plan and will describe the results of its review in the Record of Decision Amendment.

Threshold Criteria

Criterion 1: Overall Protection of Human Health and the Environment

EPA evaluates overall protection of human health and the environment using information from the other criteria. All action alternatives meet this threshold criterion, except for Alternative 1 (No Action). The remaining alternatives differ in how they perform on the balancing criteria, as described further in the "Balancing Criteria" section below.

Criterion 2: Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

ARARs are cleanup standards, standards of control and other substantive requirements, criteria or limitations from federal or state environmental laws that apply to hazardous substances, pollutants, contaminants or conditions at the Site. Remedial alternatives that are carried forward must meet threshold criteria, including the ability to comply with ARARs, unless such requirements are waived under CERCLA.

Section 121(d)(4)(A) of CERCLA, 42 U.S.C. § 9621(d)(4)(A), provides that EPA may waive an ARAR for a remedial action if it "is only part of a total remedial action that will attain such level or standard of control when completed." EPA has identified the 2015 National Recommended Water Quality Criteria (NRWQC), which lists national ambient human health and aquatic water quality criteria for total DDT and dieldrin, as ARARs for surface water. These criteria were published and revised by EPA under Section 304(a) of the Clean Water Act. Although the proposed action is a final action for sediment in the Lauritzen Channel, it is an interim action for surface waters. EPA is invoking the waiver under Section 121(d)(4)(A) of CERCLA for surface water. EPA intends to monitor the performance of the surface water interim remedy and evaluate its performance relative to the 2015 NRWQC using a performance measure. Monitoring data will support a surface water quality background study and the final surface water remedy. Unlike the other preliminary remediation goals for sediment, the performance measure for surface water will not be used to assess achievement of ARARs for surface water, which are waived for this interim remedy.

Currently available estimates show that surface water regional background concentrations of total DDT and dieldrin in the central San Francisco Bay, outside the Lauritzen Channel, may exceed NRWQC concentrations of 0.03 ng/L and 0.0012 ng/L,[6] respectively.[7] Moreover, the entire San Francisco Bay is listed as impaired for DDT and dieldrin under Section 303(d) of the Clean Water Act. EPA expects to select a final remedial action for surface water that attains the NRWQC upon completion of the remedial action, unless EPA determines it is appropriate to waive ARARs under Section 121(d)(4)(A) of CERCLA, 42 U.S.C. § 9621(d)(4)(A).

Except for the No Action alternative, all alternatives evaluated can meet all other ARARs.

[6] San Francisco Central Bay Ambient Water concentrations for total DDT and dieldrin from 2003-2011 were estimated to be 0.00012 µg/L and 0.000034 µg/L, respectively. Ambient concentrations for total DDT and dieldrin in 2011 only were 0.000023 µg/L and 0.000040 µg/L, respectively.

[7] DDT degradation compounds include DDD and DDE with NRWQC criteria of 0.12 ng/L, and .018 ng/L, respectively (human health for the consumption of organism only).

Figure 12. NCP Screening Criteria

Balancing Criteria

Criterion 3: Long-Term Effectiveness and Permanence

This criterion assesses the residual risk remaining from untreated waste at the Site and the capability of controls, if used, to manage treated residuals or untreated wastes.

Alternatives 1 and 5 rank the lowest for long-term effectiveness and permanence. Alternative 1 (No Action) leaves all contamination in place. Alternative 5 is also ranked low as the effectiveness of in situ treatment with activated carbon would be disturbed due to channel vessel traffic and it removes the least volume of contaminated sediment.

Alternatives 10 and 11 have moderate rankings, however, capping of the northern area instead of complete dredging would rely on more institutional controls to ensure long-term effectiveness and permanence.

Alternative 12 ranks moderate to high as it permanently removes the most volume of contaminated sediment. Although Alternative 9 removes the same amount of contaminated sediment as Alternative 12, it ranks the highest in long-term effectiveness and permanence because it includes an amended residual management layer which mitigates the potential bioavailability of contaminants in dredge residuals.

Criterion 4: Reduction of Toxicity, Mobility, or Volume Through Treatment

This evaluation criterion addresses the statutory preference for selecting remedial alternatives that use treatment technologies that result in the permanent and significant reduction of toxicity, mobility or volume of the principal threat waste.

Alternative 1 does not include any treatment and therefore would not reduce the toxicity, mobility or volume of contaminated sediment. This criterion is not applicable to the No Action alternative.

Alternative 5 was ranked low to moderate for this criterion because this alternative has the least removal and there would be comparatively less reduction of mobility through dredge material stabilization. Alternatives 10, 11 and 12 were ranked as moderate for reduction in contaminant mobility that would be achieved through dredged material undergoing solidification before placement into a permitted landfill. Alternative 9 was ranked as moderate to high for its use of an amended residual management layer.

Active capping addresses both sediment-bound and dissolved-phase contaminants and is common to all alternatives in the north end and shoreline segment. In all cases, mobility would be reduced; however, volume would not be reduced.

Criterion 5: Short-Term Effectiveness

This criterion assesses the effects of an alternative during its construction and implementation until the remedial action objectives are met. Factors considered during this evaluation include risks to the community resulting from remedy implementation, threats posed to workers, environmental impacts and time required to achieve protection.

The short-term effectiveness of Alternative 1, No Action, was considered low because no action is implemented. Short-term risks to workers and the community would be minimal because no construction or intrusive activities would occur. Alternatives 5, 9, 10, 11 and 12 would present comparable short-term risks to workers and the surrounding community during implementation and were ranked moderate to high risk. Short-term risks to workers would be addressed through health and safety plans and use of personal protective equipment.

Alternatives with the least amount of dredging could be considered to have less short-term- impact. However, the magnitude of these differences would not result in measurable differences on the surrounding community from truck traffic transporting materials and equipment to and from the Site. These impacts can be addressed by developing adequate traffic control plans and covering the truck beds to prevent spillage on the roadways. There would be a risk of some adverse short-term impacts on the environment during the construction period from resuspension of sediment; however, these potential risks could be mitigated and controlled using floating turbidity curtains and industry standard best management practices for mechanical dredging.

Alternatives 9 through 12 have a residual management layer, which is an effective method to prevent short-term impacts from resuspension of sediment from the dredging activities. Efforts will be made to apply the residual management cover material as soon as possible.

Criterion 6: Implementability

Technical and administrative feasibility to complete the alternative is considered under this criterion, such as difficulties with the selected technology, ability to monitor remedy effectiveness and availability of offsite treatment and disposal services.

All alternatives, including Alternative 1 (No Action), have comparable rankings for implementability and are ranked high for construction and operation, reliability, ease of taking on additional remediation, monitoring and availability of services.

Criterion 7: Cost

Cost estimates have been prepared to compare the relative cost of the alternatives from the information available at the time of the estimate. The final cost of the project will depend on numerous factors, including actual labor and material costs, competitive market conditions, implementation schedule and field conditions. As a result, the final project costs will vary from the estimates presented herein.

Based on estimated total costs, Alternative 1 would be the least expensive ($0), followed by Alternative 5 ($46.9 million), Alternative 10 ($83.7 million), Alternative 11 ($87.7 million), Alternative 12 ($88.9 million) and Alternative 9 ($93.4 million). If space for onsite sediment processing becomes available, the costs for Alternatives 9, 10, 11 and 12 would be approximately 50% less.

Table 3. Retained Remedial Alternatives Evaluation Summary						
Evaluation Criteria	**Alternative 1, No Action**	**Alternative 5, Targeted Dredging Activated Carbon Treatment/ Active Cap/ Source Controls/Long-Term Monitoring/ Institutional Controls**	**Alternative 9, Full Dredging Activated Carbon/ Sand Cover/ Active Cap/ Source Controls/Long-Term Monitoring/ Institutional Controls**	**Alternative 10, Full Dredging Sand Cover/ Active Cap/ Source Controls/Long-Term Monitoring/ Institutional Controls**	**Alternative 11, Full Dredging Sand Cover/ Active Cap/ Source Controls/Long-Term Monitoring/ Institutional Controls**	**Alternative 12, Full Dredging Sand Cover/ Active Cap/ Source Controls/Long-Term Monitoring/ Institutional Controls**
Overall protection of human health and the environment	No	Yes	Yes	Yes	Yes	Yes
Compliance with ARARs	No	Yes	Yes	Yes	Yes	Yes
Long-term effectiveness and permanence	None	Low	High	Moderate	Moderate	Moderate to High
Reduction in toxicity, mobility, and volume through treatment	None	Low to Moderate	Moderate to High	Moderate	Moderate	Moderate
Short-term effectiveness	None	Moderate to High	Moderate to High	Moderate to High	Moderate to High	Moderate to High
Implementability	High	High	High	High	High	High
Cost	$0	$46.9 million	$93.4 million	$83.7 million	$87.7 million	$88.9 million

9. EPA's Preferred Alternative

EPA's Preferred Alternative is Alternative 9, Full Dredging/Amended Residual Management Layer/Active Cap (Figure 13); however, the Preferred Alternative can change in response to new information or public comment, as detailed in Section 6. This alternative includes the following components:

- Full removal (dredging) of the Younger Bay Mud sediment on the east side, west side and northern area within the Lauritzen Channel (approximately 82,400 cubic yards); and offsite disposal of the dewatered and solidified/stabilized sediment.
- Covering dredged areas with an amended residuals management layer (clean sand mixed with activated carbon) to physically immobilize the low level of residual sediment and assist in preventing resuspension of any residual sediment from vessel activity after remediation.
- Placement of an active cap (activated carbon, geotextile fabric and stone) in the north end and shoreline segment to prevent area erosion.
- Completion of a surface water background study; a final remedy for surface water in a separate decision document.
- Use of source control measures to prevent recontamination, including removal of old pilings and piping, cleaning the City of Richmond storm drain system and installation of an engineered barrier (i.e., a sheet pile wall) along the shoreline segment.
- Implementation of institutional controls with long-term monitoring during post-construction operations and maintenance to protect the integrity and performance of the active caps and engineered barrier (i.e., sheet pile wall), and to reduce the potential for human exposure to site contaminants.

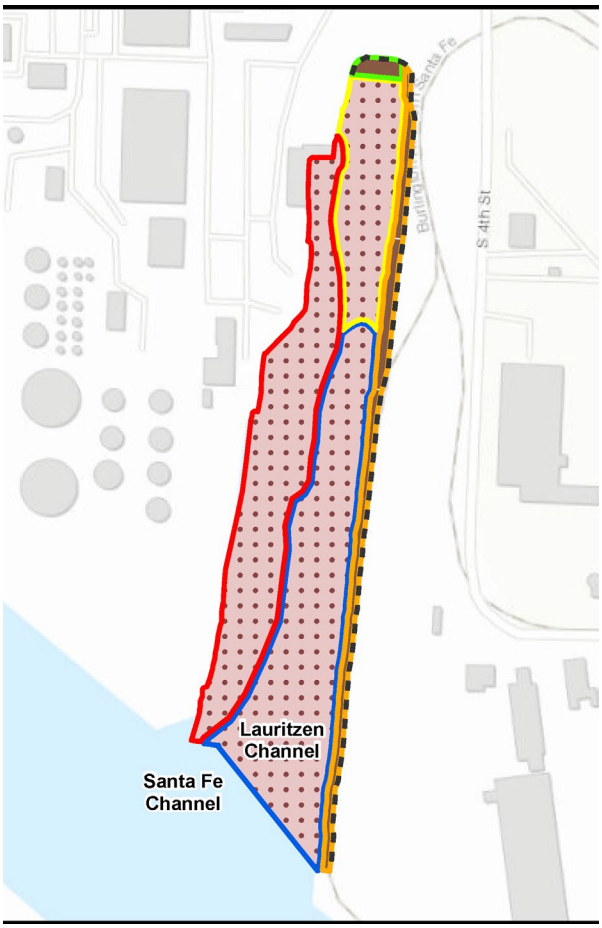


Figure 13. Conceptual drawing of EPA's Preferred Alternative

Implementation of Alternative 9 is estimated to take less than 6 months after the remedial design is finalized.

Among the six remedial alternatives that were evaluated in the 2026 Focused Feasibility Study, Alternative 9 leaves the least volume of contaminated sediment within the Lauritzen Channel. Dredging all Younger Bay Mud from the east side, west side and northern area of the channel protects human health and the environment by permanently removing all contaminated sediment (also considered principal threat waste), compared to alternatives with only partial dredging in these portions of the channel. Sediment within the shoreline segment and north end would be covered with an active cap (sand amended with activated carbon covered with a geotextile fabric and stone) to sequester the contaminants by chemically binding them, therefore reducing their mobility, bioavailability and upward diffusion into the water column. Extensive removal of Younger Bay Mud and active capping will also improve surface water quality by eliminating contact between surface water and contaminated material.

Alternative 9 ranked the highest among the six remedial alternatives in long-term effectiveness and permanence because full dredging would prevent future recontamination from vessel scour/spudding (when compared to Alternatives 5, 10 and 11), as a residual management layer would mitigate the potential of bioavailability of any residual contaminants along the channel floor (when compared to Alternatives 10, 11 and 12), and institutional controls would not limit commerce and future vessel operations (when compared to Alternative 5).

Dredged materials under Alternative 9 would be treated through dewatering and solidification/ stabilization before landfill disposal, thus reducing contaminant mobility. Each of the retained remedial alternatives involve short-term risks to workers (such as direct exposure to contaminated sediments) and the surrounding community (for example, increased traffic) during implementation; however, these risks would be carefully managed through health and safety plans and the use of personal protective equipment.

The Preferred Alternative will meet Remedial Action Objectives 1 and 2 by achieving compliance with sediment preliminary remediation goals, thus reducing contamination in both sediment and water. The benthic invertebrate community will be protected by applying the not-to-exceed value during and after dredging activities. Remedial Action Objective 4 will be met when the sediment and not-to-exceed values are reached within the channel during dredging. This alternative would also be designed to comply with all ARARs. Remedial Action Objective 3 will be achieved because the risk to human and aquatic health from contaminants in surface water will be reduced as the sources of contaminants to surface water are addressed. EPA intends to monitor the performance of the surface water interim remedy and evaluate its performance relative to the 2015 NRWQC. Monitoring data will support the regional background study and the final surface water remedy to be presented in a future decision document.

Preferred Alternative Cost Evaluation

The 2026 Focused Feasibility Study included the calculation of estimated costs for each alternative. Total estimated costs for the Preferred Alternative (Alternative 9) are provided in Table 4. The Preferred Alternative does have the greatest estimated cost of the six alternatives; however, final costs for the project will depend on numerous factors, including actual labor and material costs, competitive market conditions, implementation schedule, and final design conditions.

Table 4. Preferred Alternative 9 Estimated Cost

Cost Type	Alternative 9
Capital cost	$86,100,000
Annual operations and maintenance (30 years)	$590,000
Present value 30 years operations and maintenance (7% discount rate)	$7,318,000
Total present value analysis (30 years)	$93,381,000

Conclusion

EPA believes the Preferred Alternative (Alternative 9) includes the best elements of the evaluated remedial technologies while avoiding identified weaknesses. This approach permanently removes the highly contaminated sediments (principal threat waste) unaddressed during the 1996-1997 dredging, treats any residual contamination with the placement of carbon-amended sand on the post-dredge surface, and controls remaining sources of DDT to the channel. The Preferred Alternative is marginally more expensive than the second-most expensive alternative (Alternative 12); however, it ranks higher in long-term effectiveness and permanence and provides a greater reduction in contaminant mobility and the potential for exposure. The Preferred Alternative meets Remedial Action Objectives 1 and 2, by achieving sediment preliminary remediation goals during and after dredging. Remedial Action Objective 3 will be achieved because the risk to human and aquatic health from contaminants in surface water will be reduced as the sources of contaminants to surface water are addressed. Remedial Action Objective 4 will be satisfied once preliminary remediation goals and not-to-exceed values are met.

Based on information currently available, EPA believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA Section 121(b):

- Be protective of human health and the environment.
- Comply with ARARs.
- Be cost effective.
- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practical.
- Satisfy the preference for treatment as a principal element.

EPA may modify its position regarding the Preferred Alternative based on its assessment of state and community acceptance, the final two criteria, which will be addressed in the Record of Decision Amendment after public comments are received. The support agency, the State of California Department of Toxic Substances Control, concurs with the findings of the 2026 Focused Feasibility Study, the evaluation of alternatives and the screening and analysis performed. The support agency also concurs with the Preferred Alternative presented in this Proposed Plan and will have the opportunity to review and comment on this document. If the Preferred Alternative changes based on public comments or new information, the support agency will have an additional opportunity to review the cleanup plan.
The State of California Department of Toxic Substances Control concurrence on the selected remedy will be documented in the Record of Decision Amendment.

10. Community Participation

Community Comment Period and Cleanup Implementation Process

This Proposed Plan documents EPA's Preferred Alternative for the sediments of the Lauritzen Channel and provides an opportunity to screen the alternatives against the final two NCP criteria, state and community acceptance (also referred to as the modifying criteria).

EPA will hold a public comment period to obtain comments on the Proposed Plan, in accordance with the NCP. A public meeting will be held in the community to allow for a presentation of the proposed plan information and to provide an opportunity for community members and stakeholders to ask questions. Public comments can be submitted to EPA during this time and will be incorporated into the public record.

EPA's responses to comments received on the Proposed Plan during the public comment period will be presented in the responsiveness summary included in the Record of Decision Amendment that will document the chosen remedial alternative.

Following the formal selection of the remedial alternative in the Record of Decision Amendment, the remedial design will then be prepared to develop detailed engineering of specific components (for example, sheet pile modifications and dredging design) for the chosen remedial alternative. The remedial design will be required to account for specific factors, such as sea-level rise, to ensure the long-term effectiveness of the chosen remedy. In addition, the remedial footprint may be refined based on updated sediment sampling data, although no significant change in the size of the footprint is expected.

Once the design is finalized, the project will enter the remedial action phase and construction activities will be initiated, including staging and dredging operations. A construction schedule for the remedial work will be provided to the public when the commencement date is determined.

Public Meeting

The purpose of this meeting is to give the community the opportunity to ask questions and provide official comments regarding the proposed remediation plan. In addition to the public meeting, the public is invited to send their comments to Hiruni Jayasekera via letters and emails to EPA.

October 21, 2026

at Richmond Recreation Complex, Social Hall

3230 MacDonald Avenue, Richmond, CA, 94804

5:00 to 8:00 p.m.

EPA will give a presentation on the cleanup options described in this Proposed Plan (including EPA's recommended option), answer questions and receive feedback. If you have any questions or concerns about how to attend, please contact EPA's Community Involvement Coordinator for the site, Hiruni Jayasekera.

EPA will provide a transcript of the public meeting on our website, and once the final cleanup action is selected in a document called a Record of Decision Amendment.

Public Comment Period

To make sure that the community's concerns are being addressed and in response to requests from the community for an extended public comment period, a Public Comment Period lasting ninety (90) calendar days will open **Wednesday, Sept. 30 and end on Tuesday, Dec. 29.**

Ways to Comment

EPA and other government agencies want to hear your opinion on this cleanup plan!

- Verbally comment at public meeting
- Written comments – you can deliver them at the public meeting or submit them to EPA via mail/email

Technical Assistance Services for Communities

The Technical Assistance Services for Communities (TASC) program provides the community with technical assistance so they can better understand the science, regulation, and policies. This service is free of charge and the assigned advisor can assist with services ranging from reviewing and explaining a technical document to facilitating public meetings.

More information about TASC can be found on EPA's website (https://www.epa.gov/superfund/technical-assistance-services-communities-tasc-program). Contact information for the TASC advisor assigned to the United Heckathorn project can be requested from Karen Jurist.

How do I learn more?

An "Administrative Record"—which includes key site documents and information used to develop the cleanup options—is available for public review.

- The full Administrative Record is available on EPA's website: https://www.epa.gov/superfund/unitedheckathorn
- The key documents of the Administrative Record can be found in paper copy at the site's Information Repository at:
  EPA Records Center
  75 Hawthorne Street
  San Francisco, CA 94105

Who to Contact

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Acronyms and Abbreviations

µg/kg	microgram(s) per kilogram
ARARs	Applicable or Relevant and Appropriate Requirements
CD	consent decrees
CERCLA	Comprehensive Environmental Response Compensation, and Liability Act of 1980
CFR	*Code of Federal Regulations*
DDT	dichlorodiphenyltrichloroethane
EPA	U.S. Environmental Protection Agency
mg/kg	milligram(s) per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/L	nanogram(s) per liter
NPL	National Priorities List
NRWQC	National Recommended Water Quality Criteria
PRP	Potentially Responsible Parties
Site	United Heckathorn Superfund Site
TASC	Technical Assistance Services for Communities

Glossary

Administrative Record: A compilation of information established for all CERCLA sites made available to the public at the start of the remedial investigation of remedial actions for environmental management actions. Information in the Administrative Record supports the selected remedy for remedial actions and removal actions.

Active Cap: An active cap is an engineered sediment or waste cap that is designed not just to physically isolate contamination, but also to chemically or biologically reduce contaminant mobility or toxicity.

Applicable or Relevant and Appropriate Requirements (ARARs): ARARs, as defined in 40 *Code of Federal Regulations* (CFR) § 300.5, are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal, state, or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, Remedial Action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by the state in a timely manner and that are more stringent than federal requirements may be applicable.

Background Concentration: Refers to the concentration of a hazardous substance, pollutant or contaminant that is naturally occurring or derived from anthropogenic sources not related to the site. Background concentrations are generally considered in risk assessment and remedy selection.

Bioavailability: The potential for organisms to take up chemicals from either food or environment.

Capital Cost: Includes direct (construction) and indirect (nonconstruction and overhead) costs. Equipment, labor and materials required for the installation of the remedy are considered direct costs. Indirect costs consist of those expenses related to the engineering, financial and other services necessary to complete the remedy installation but are not part of the actual installation or construction activities.

Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA): A federal law, commonly referred to as the "Superfund" Program. CERCLA provides a legal mechanism for cleaning up contaminated sites and holds potentially responsible parties liable for the costs of cleanup. CERCLA aims to protect public health and the environment from the effects of hazardous substances. It empowers EPA to investigate and clean up contaminated sites.

Contaminant of Concern: Site-specific chemicals or contaminants that significantly contribute to unacceptable human health or ecological risk.

Dewatering: Removing water from dredged/excavated sediments. Dewatering methods for the selected remedy will be determined in the remedial design phase.

Dredging: Excavation or removal of submerged, contaminated sediments from the bottom of a water body using mechanical or hydraulic methods. Targeted or "hot spot" dredging is the selective removal of discrete areas of contaminated sediment that exceed remedial action levels or present unacceptable risk.

Dry Excavation: Excavation of contaminated sediment using earthmoving equipment (e.g., excavator and backhoe) in dry conditions. The excavation area must first be dewatered and temporary barriers may be installed to dewater and excavate the sediment.

Ecological Risk Assessment: A study that estimates the possible effects of contamination on plants and animals in the absence of remedial action.

Feasibility Study: The Feasibility Study is a report produced during the Superfund process following the Remedial Investigation. It is a systematic evaluation of potential remedial alternatives for cleaning up a contaminated site. The Feasibility Study develops potential remedial alternatives, then screens them against specific criteria to evaluate if the cleanup plan is technically feasible, financially viable, and if it can meet regulatory requirements.

Five Year Review: Required under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) program when hazardous substances remain onsite. These reports evaluate the implementation and performance of a remedy to determine if it remains protective of human health and the environment. These reviews are typically conducted 5 years after the remedy is implemented and every subsequent 5 years as long as future site uses are restricted.

Focused Feasibility Study: An evaluation of cleanup options for a specific portion of a site.

Hazard Index: A metric used to assess the potential noncarcinogenic health effects from exposure to multiple contaminants of concern or multiple exposure pathways. The index is calculated by summing the hazard quotients (the ratio of the estimated exposure to the substance over a specific period to a reference dose [a level below which no adverse health effects are expected]) for each exposure pathway. A hazard index of 1 or less typically indicates that adverse noncarcinogenic effects are unlikely, whereas a hazard index greater than 1 suggests potential for adverse effects.

Human Health Risk Assessment: A process used to evaluate the likelihood of adverse health effects in humans due to exposure to environmental contamination. The risk assessment evaluates the concentration of contaminants, possible exposure pathways and determines the likelihood and severity of potential future health effects if nothing is done to clean up a site. This step is completed during the remedial investigation phase.

In Situ: In the context of a Superfund cleanup, this term refers to a remedy or treatment technology that is implemented directly in place, meaning that the contaminated media (like soil, groundwater, or sediment) remain where they are located and the cleanup occurs without excavation or removal.

Institutional Controls: Non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of a remedy by limiting land or resource use. Examples include fishing restrictions, deed restrictions, and warning signs outside of a contaminated site.

Long-Term Monitoring: A post-construction completion component included in the Operations, Monitoring, and Maintenance Plan that confirms the selected remedy is properly maintained through monitoring and maintenance. Long-term monitoring metrics are informed by the results of short-term evaluations.

National Priorities List (NPL): A list of the most serious uncontrolled or abandoned hazardous waste sites in the United States that are eligible for long-term cleanup under the Superfund program.

Operations, Monitoring, and Maintenance Plan: Encompasses operations and maintenance, as well as any long-term monitoring needed to confirm the applied remediation performs as intended and remains protective.

Operable Unit: A discrete portion of a larger cleanup project that can be addressed separately to manage or eliminate a release or threat of release of hazardous substances. An operable unit may address geographic areas of a site, specific site contaminates or problems, or areas where specific action is required. At this site, Operable Unit 1 address the contamination in the upland area, while Operable Unit 2 addresses the marine area.

Older Bay Mud: Sedimentologists recognize two types of native sediment in the San Francisco Bay: (1) Younger Bay Mud and (2) Older Bay Mud. Older Bay Mud underlies the Younger Bay Mud sediment layer and consists of silt, silty sand, and clay. Generally, Older Bay Mud has been found to not be contaminated at the Site.

Preferred Alternative: The cleanup option selected by EPA, together with state regulators, that best satisfies remedial action objectives and cleanup goals, based on the evaluation of options presented in the Focused Feasibility Study.

Preliminary Remediation Goal: Used to develop the long-term contaminant concentration levels needed to be achieved for the remedial alternatives to meet remedial action objectives.

Record of Decision or Record of Decision Amendment: A legally binding document that outlines EPA's final decision on how a contaminated site will be cleaned up. It details the selected remedy, the rationale behind the choice, written public comments received, and provides responses to public comments received during the review of the Proposed Plan.

Remedial Investigation: Extensive technical study conducted to characterize the nature and extent of contamination, and the risks to human health and ecological receptors posed by contaminants present at a site.

Remedial Action Objectives: Objectives that specify the level, area, and time required for site cleanup.

Remedial Alternative: An action considered in the Feasibility Study, or Focused Feasibility Study intended to reduce or eliminate unacceptable risks to human health and the environment at a site. The Feasibility Study or Focused Feasibility Study considers a range of remedial alternatives.

Residual Management Layer: A layer of sand or a mixture of activated carbon and sand placed over a dredged surface to reduce potential exposure to residual contamination after dredging and assist in preventing resuspension of any residual sediment. For the Lauritzen Channel, 3.2% carbon by weight will be used for the layer.

Sediment: Soil, sand, organic matter, or minerals that accumulate on the bottom of a water body and at some point in time are submerged.

Solidification/Stabilization: A treatment process that mixes contaminated material (such as dredged sediment) with binding reagents to reduce the mobility of contaminants and improve the physical properties of the material for handling, transport and disposal.

Source Control: The construction or startup of a remedial action that is intended address contamination at its origin in order to prevent the continued release of hazardous substances so that they do not migrate and cause substantial danger to public health and welfare, or to the environment.

Superfund: The common name used for the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended in 1986.

Treatment: Any method, technique, or process designed to change the physical, chemical, or biological character or composition of a hazardous substance, pollutant, or contaminant in order to neutralize it, reduce its volume, or render it nonhazardous for safer transport or storage.

Younger Bay Mud: Sedimentologists recognize two types of native sediment in the San Francisco Bay: (1) Younger Bay Mud and (2) Older Bay Mud. Younger Bay Mud is more recent sediment that has been deposited since the 19th century following the onset of the industrial age, which is responsible for the increase in deposition in the San Francisco Bay. Younger Bay Mud has high clay and silt content.

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