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FINAL PARCEL F PROPOSED PLAN FOR OFFSHORE SEDIMENT CLEANUP

04/01/2018

ECC - INSIGHT, LLC

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Naval Facilities Engineering Command Southwest
BRAC PMO West
San Diego, CA

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Prepared for:

Department of the Navy
Naval Facilities Engineering Command Southwest
BRAC PMO West
33000 Nixie Way, Bldg 50
San Diego, CA 92147

Prepared by:

ECC-Insight
2749 Saturn Street
Brea, CA 92821

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Hunters Point Naval Shipyard – Parcel F Proposed Plan for Offshore Sediment Cleanup

San Francisco, California **April 2018**

NAVY ANNOUNCES PROPOSED PLAN

The United States Navy (Navy) encourages the public to comment on this ***Proposed Plan*** for cleanup of ***sediment*** contamination at Parcel F, Hunters Point Naval Shipyard (HPNS) in San Francisco, California (Figure 1). Parcel F consists of 446 acres of sediment that surrounds HPNS. Past shipyard operations have contributed to ***polychlorinated biphenyl (PCB)***, copper, lead, and mercury contamination of sediment in certain areas of Parcel F. This Proposed Plan summarizes the cleanup methods evaluated under the ***Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*** and explains the basis for choosing the cleanup alternatives being considered for sediment contamination at Parcel F. Implementation of the cleanup plan will protect the public and environment by reducing the ***risk*** of exposure to contaminated sediment. The United States Environmental Protection Agency (EPA), the California Department of Toxic Substances Control (DTSC), and the San Francisco Regional Water Quality Control Board (Water Board), reviewed all the documents that helped the Navy develop this plan, and concur with the Navy's preferred cleanup alternative described below.

Active cleanup is limited to Areas III, IX, and X because these are the only Parcel F areas that pose unacceptable risk to human health or the environment. Institutional Controls (ICs) encompassing legal and administrative documents and processes will be implemented for Parcel F site-wide to ensure site conditions remain protective of human health and wildlife and maintain integrity of the cleanup action until cleanup goals have been achieved (see page 8). The Navy proposes the following preferred cleanup plan:

- **Area III:** ***Capping*** to prevent contact with metals (copper, lead, and mercury) or PCBs in sediment in water depths less than 30 feet and focused excavation or dredging of nearshore sediments.
- **Areas IX/X:** Treating sediment in deeper water using carbon-based amendments (i.e., treatment media). Focused excavation or dredging of sediments in shallow water areas or where very high concentrations of PCBs are present. ***Monitored natural recovery*** (***MNR***) of sediments where levels of PCBs are lower but exceed background levels established for nearshore sediments within San Francisco Bay.
- **Parcel F Site-wide ICs:** Limit public exposure and maintain the integrity of the remedy.

Radiological investigations of piers are ongoing as part of the Basewide Radiological Cleanup Program and are not a part of this plan.

How to Comment on this Proposed Plan

30-day Public Comment Period From April 7 to May 7, 2018

The 30-day public comment period runs from April 7 to May 7, 2018. You may use the comment form included with this Proposed Plan to send written comments to:

Derek J Robinson, Base Realignment and Closure (BRAC) Environmental Coordinator
BRAC Program Management Office West
33000 Nixie Way, BLDG 50, Suite 207
San Diego, CA 92147

You may also submit comments by email or fax (with or without the form) to: derek.j.robinson1@navy.mil (email) or (619) 524-5260 (fax).

Please join us at a public meeting to learn more about the Proposed Plan for cleanup on

April 11, 2018

5:30 p.m. to 7:30 p.m.
OCII Community Room
451 Galvez Avenue
San Francisco, CA 94124

You may provide your comments at the meeting or at any time throughout the comment period.

Note: Bolded and *Italicized* words are defined in the Glossary on page 18 (Attachment 1).

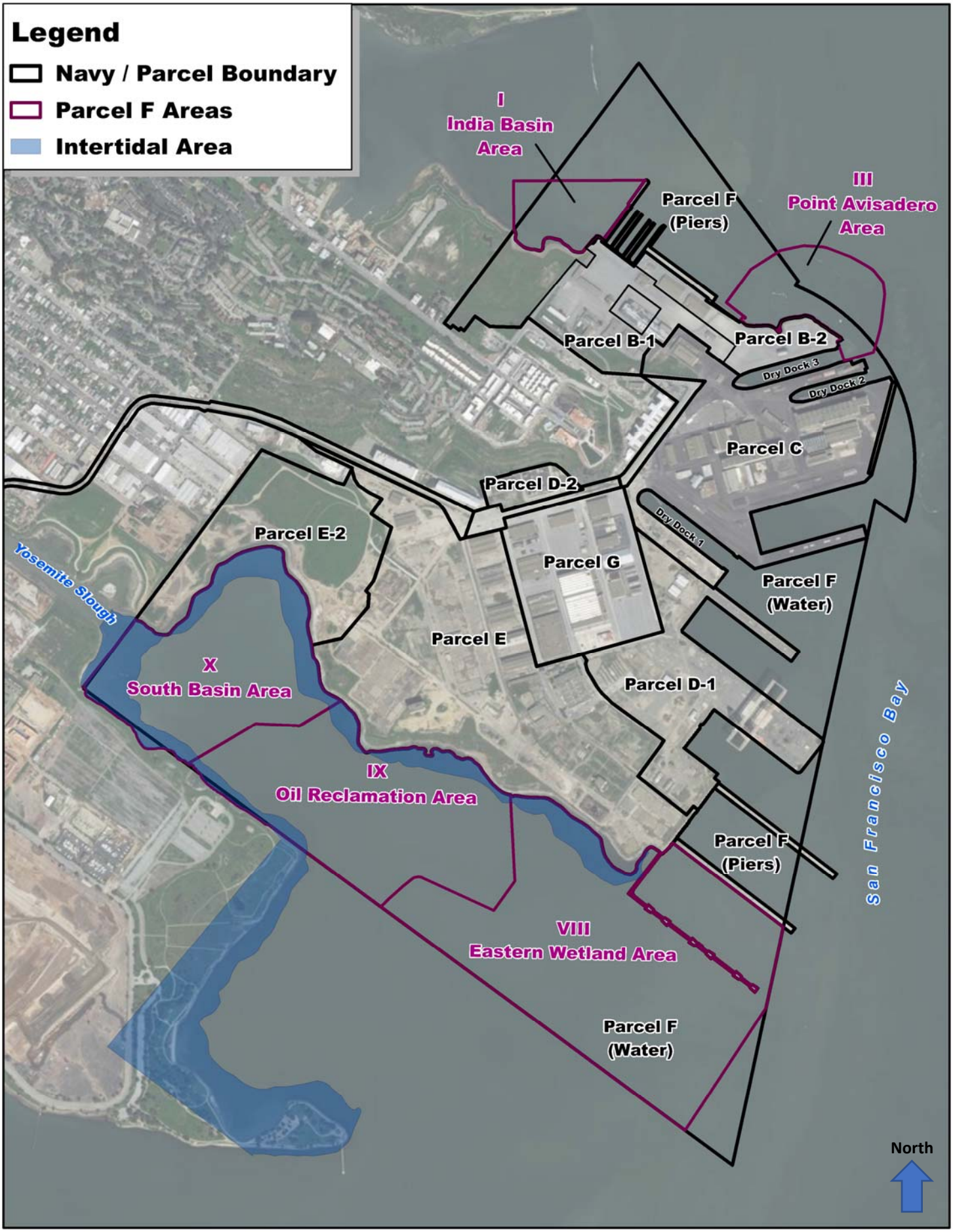

Figure 1. Parcel F Areas. Only Areas III, IX, and X are proposed for active cleanup. All areas will include Institutional Controls.

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Summary of the CERCLA Process

The Navy is issuing this Proposed Plan to solicit input and as a part of its public participation responsibilities under Section 117(a) and (d) of CERCLA and Section §300.430(f)(3) (i)(a) of the ***National Contingency Plan (NCP)***. The CERCLA process for investigating and cleaning up hazardous waste sites is shown on Figure 2.

Numerous studies and evaluations were conducted for Parcel F sediments to develop this Proposed Plan. The studies describe the nature and extent of contamination, risk to human health and the environment, and cleanup options. The studies and evaluations are included in the following documents and are located in the HPNS administrative record (page 17):

- The 1991 Environmental Sampling and Analysis Plan and the 1994 Phase 1A and 1996 Phase 1B Ecological Risk Assessments evaluated data to identify contaminants present in sediment and general areas of contamination, described the conceptual site model, chemical migration routes and ***exposure pathways***, and provided an initial assessment of ecological risk. These investigations fulfilled the Site Inspection phase of CERCLA.
- The 2005 Validation Study Report and 2007 ***Feasibility Study*** Data Gaps Investigation further delineated and refined the extent of chemical release, evaluated toxicity, and assessed human and ecological risk. These studies fulfilled the Remedial Investigation phase of CERCLA.
- The 2008 Feasibility Study proposed ***remedial action objectives (RAOs)***, and evaluated cleanup alternatives and costs for Parcel F contamination. The 2017 Feasibility Study Addendum updated the nature and extent of contamination and risk to human health and the environment based on additional radiological data.

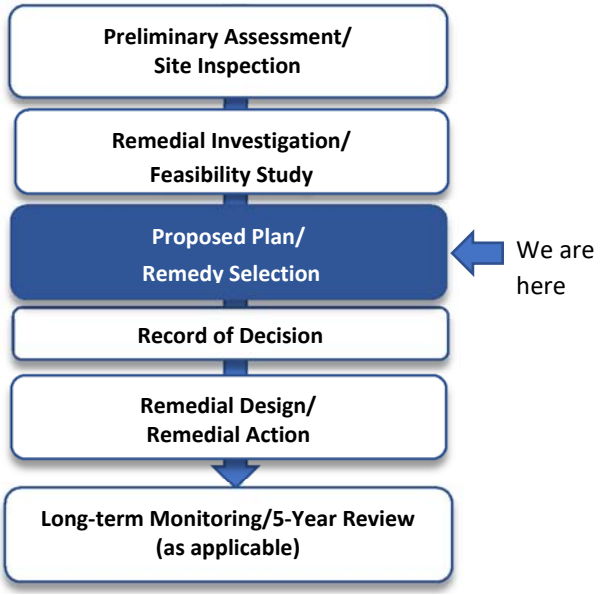


Figure 2. Steps in the CERCLA Process

Parcel F is currently in the Proposed Plan/Remedy Selection phase of CERCLA. This Proposed Plan was prepared to provide the public with a reasonable opportunity to understand and comment on the ***preferred alternatives*** for cleanup action, comment on the alternative plans under consideration, and to participate in the selection of the cleanup action for Parcel F.

Information about the public meeting for this Proposed Plan and how to submit comments during the 30-day public comment period is also presented on page 1. The Navy encourages the public to attend the public meeting, gain an understanding of the basis for the proposed cleanup, and provide comments.

After the public comment period ends on May 7, 2018, the Navy, in consultation with EPA and the State, will select the cleanup action (i.e., preferred alternative), which may be modified based on community feedback or new information. The selected cleanup action will be documented in a ***Record of Decision (ROD)***, which will include a summary explaining how public comments were considered. Any changes in the cleanup strategy would include consultation with and obtaining concurrence from the regulatory agencies.

Site Background

HPNS is a former naval shipyard located on a peninsula in southeast San Francisco that extends east into San Francisco Bay (Figure 1). The land portion of the shipyard is approximately 420 acres. In 1940, the Navy obtained ownership of HPNS for shipbuilding, repair, and maintenance during World War II. After the war, activities shifted to submarine maintenance and repair. The Naval Radiological Defense Laboratory was also located at HPNS. HPNS was deactivated in 1974, and the Navy leased most of the property to Triple A Machine Shop, Inc. between 1976 and 1986. The Navy resumed occupancy of HPNS in 1987, and it was listed on the National Priorities List in 1989. In 1991, HPNS was designated for closure pursuant to the terms of the Defense Base Realignment and Closure Act of 1990. Closure activities at HPNS involve environmental cleanup and making the property available for nondefense use and transfer.

Past shipyard operations left hazardous materials and chemicals on site. These chemicals migrated to San Francisco Bay through groundwater discharge, storm and surface water runoff, and soil erosion, resulting in sediment contamination in some areas of Parcel F. Some releases occurred directly to San Francisco Bay from overwater activities at HPNS.

Parcel F was initially subdivided into 11 subareas, Areas I through XI, because of its size and complexity. Early site investigations identified Areas I (India Basin), III (Point Avisadero), VIII (Eastern Wetland), IX (Oil Reclamation), and X (South Basin) for further evaluation (Figure 1).

Follow-on investigations conducted by the Navy concluded that PCBs, copper, lead, and mercury are present in sediment at concentrations that pose an unacceptable risk to human health and the environment at Areas III, IX, and X (Figure 1). Thus, they were identified as ***chemicals of concern* (*COCs*)** for Parcel F and cleanup actions were evaluated to address these COCs in Areas III, IX, and X**.** The follow-on investigations concluded that chemical concentrations in sediment at Areas I and VIII do not pose unacceptable risk to human health or the environment.

What about radionuclides?

A series of investigations were conducted between 2009 and 2013 to characterize radionuclides of concern (ROCs) at Parcel F. These investigations concluded that concentrations of ROCs in sediment at Parcel F were equal to or less than background and that there was no evidence of bioaccumulation of ROCs in clam tissue at Parcel F. Therefore, there is no unacceptable risk to human health and the environment due to the presence of ROCs.

The Navy did not recover any radioluminescent items such as dials, gauges, or deck markers from Parcel F sediments during the radiological characterization investigations mentioned above. However, based on the CSM for HPNS activities, which include the potential for inadvertent disposal of radioluminescent items, the potential remains for these radioluminescent items to be present in Parcel F sediments where ships docked during HPNS operations. Therefore, the Navy decided that it is appropriate to place ICs on Parcel F sediments for the management of low-level radiological objects (see Institutional Controls box, page 14).

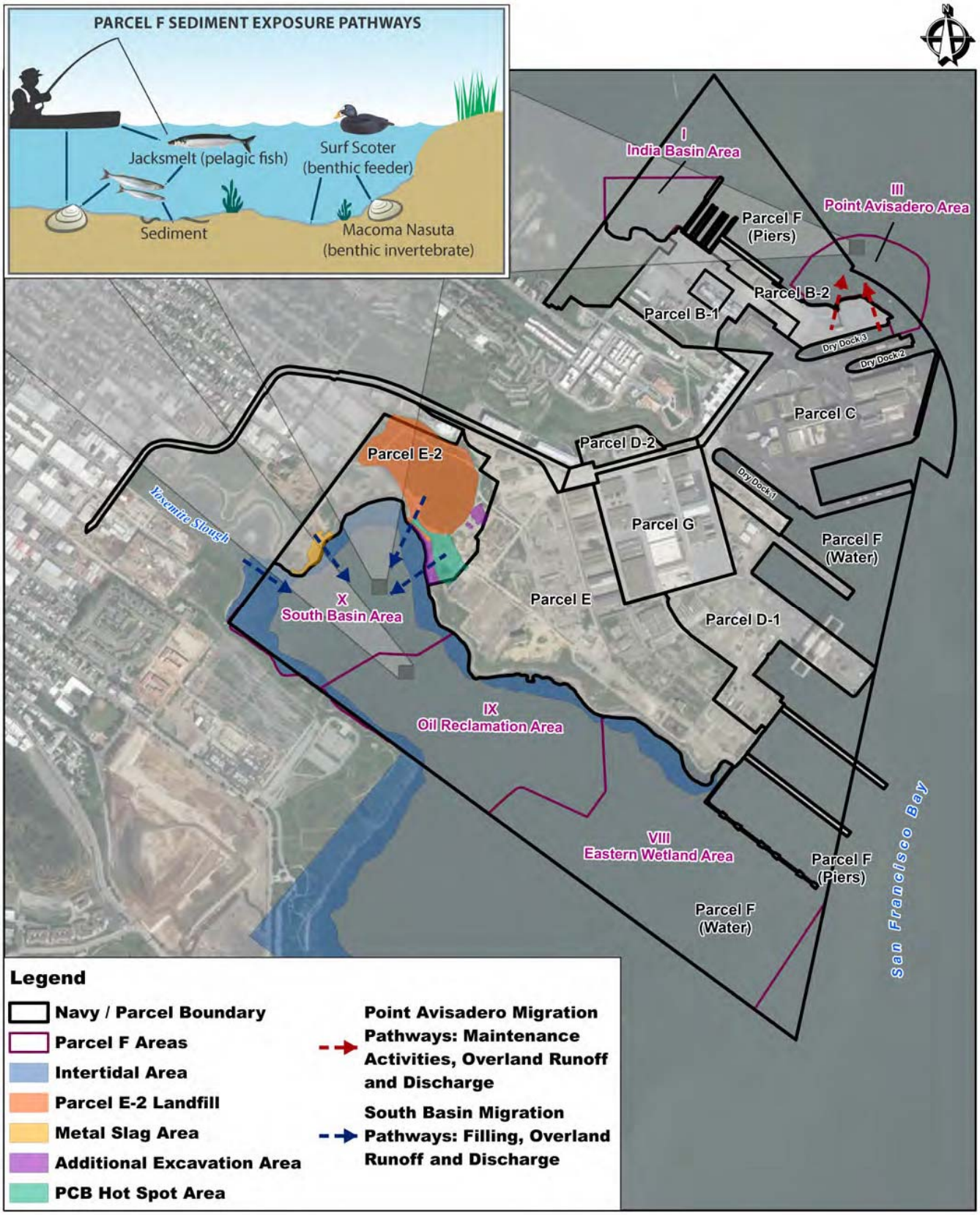


Figure 3. Conceptual Site Model

Conceptual Site Model

The conceptual site model (CSM) is a basic description of how contaminants enter the environment, how they are transported, and what routes of exposure to organisms and humans are present. It also provides a framework for assessing risks from contaminants, developing cleanup strategies, determining source control requirements, and methods to address unacceptable risks. Figure 3 shows the CSM for current and future receptors at Parcel F Areas III, IX, and X.

Migration Routes and Exposure Pathways

The natural processes that can disturb sediment and bring contaminants to the surface where human and animal receptors may be exposed are wave action, strong currents, and burrowing activity of ***benthic*** organisms.

Current potential human receptors at the site include individuals consuming shellfish and sportfish, as well as individuals incidentally exposed to sediment during harvesting and cleaning of shellfish.

Ecological receptors include birds feeding on aquatic organisms living within the sediment, including benthic invertebrates (such as clams) and fishes. The ***surf scoter*** (bird) was selected as a representative ecological receptor that forages within Area III and Areas IX/X for food. Foraging depths for the surf scoter are limited to water less than 30 feet in depth.

Background Level of COCs in San Francisco Bay Sediments

To evaluate cleanup levels, the Navy considered background levels of COCs in San Francisco Bay. Background (i.e., man-made levels) consists of natural and human-made substances present in the environment as a result of human activities, but not related to activities at HPNS. Under CERCLA, cleanup levels are not set at concentrations below natural or man-made background levels.

Therefore, the cleanup goal is to achieve a total PCB concentration of 200 micrograms per kilogram (µg/kg) representative of background total PCB estimates for nearshore sediments within San Francisco Bay.

Background concentrations for copper and mercury were estimated at 68.1 milligrams per kilogram (mg/kg) and 0.43 mg/kg, respectively. These values are below the ***Preliminary Remediation Goals (PRGs)*** for copper and mercury established in the Feasibility Study.

Source Control Measures

Removal and cleanup actions have been conducted at upland Parcels B, E, and E-2 to remove contamination sources to prevent further migration of contaminants into Parcel F Areas III, IX, and X water and sediments:

- Area III: Cleaning and removal of storm water conveyance piping and soil excavations at Parcel B.
- Areas IX and X:
  - Parcel E – Installation of a sheet pile wall and ***cap*** at the former oil reclamation ponds, shoreline cleanup, metal slag removal, metal debris reef removal, radiologically affected soil removal, and PCB hotspot removal.
  - Parcel E-2 – Installation of a sheet pile wall and riprap along shoreline, capping of the former landfill, shoreline cleanup, metal slag removal, metal debris reef removal, PCB hotspot removal, and installation of a slurry wall along the shoreline.

Summary of Risk

"Risk" is the likelihood or probability that a hazardous chemical, when released to the environment, will cause negative health effects (such as cancer or other illness) to exposed humans and wildlife. Parcel F currently provides open water and ***intertidal*** habitat. The adjacent shoreline will likely be redeveloped as open space for a park or similar use. People could potentially use this area for fishing and collecting shellfish for food. No other potential uses have been identified.

Human health and ecological risk assessments were conducted to estimate risks associated with exposure to contaminants in sediment at Parcel F. Exposure was assessed for current and potential future uses of the area after redevelopment.

Human Health Risk Assessment

In the human health risk assessment, the Navy considered the ways humans might be exposed to COCs, the concentrations of COCs, and the amount of current and future exposure to the COCs. Risk is estimated based on conservative assumptions to protect human health, and tend to overestimate risk to ensure that cleanup goals protect human health. The human health risk assessment considered both cancer risk (for contaminants that cause cancer) and noncancer risk (for contaminants that do not cause cancer, but are harmful to humans in other ways).

The estimated risk to human health is summarized in Table 1. The Navy calculated the potential cancer and noncancer risk to adults from eating fish and shellfish and direct contact with sediment during shellfish collection. The results of the human health risk assessment indicate that excess lifetime cancer risks due to direct contact with sediment and through fish and shellfish consumption were within the EPA acceptable risk range of a 1 in 10,000 chance to a 1 in 1,000,000 chance to develop cancer during one's lifetime.

Risk to human health from fish consumption represents all areas in Parcel F because fish migrate between areas and potentially outside of the parcel boundary. San Francisco Bay contains elevated concentrations of PCBs. In addition to the contamination at Parcel F, PCB sources outside of HPNS may have also contributed to calculated fish consumption risks.

The hazard quotient is a measure of noncancer health effects and is calculated as the potential exposure divided by the reference value set by regulatory agencies. A hazard quotient value of 1 or less is considered an acceptable exposure level. For the fish consumption exposure pathway, it exceeds 1 for total PCBs, which indicates that adverse noncancer human health effects are possible.

Ecological Risk Assessment

In the ecological risk assessment, the Navy concluded that contaminated sediment in Parcel F poses a potential threat to wildlife. Unacceptable risks were identified for birds, such as the surf scoter, feeding on organisms such as clams, snails, worms, or insects. The surf scoter was chosen as a representative species due to its feeding pattern and presence at the site. Risks to the surf scoter are summarized in Table 2. In Area III, elevated concentrations of COCs that pose a risk to benthic feeding and fish-eating birds include PCBs, copper, lead, and mercury. Few sediment samples had PCB concentrations above the not-to-exceed cleanup level (RAO 1 PRG) or high concentrations of lead, while concentrations of mercury and copper above the RAO 1 PRGs are more widespread. Within Area IX/X, PCBs are the primary risk drivers, while mercury and copper

Table 1. Human Health Cancer Risks and Noncancer Hazards from Sediment and Consumption of Fish and Shellfish

Chemical	Exposure Pathway	Area-Specific Human Health Risk Estimate				
		I	III	VIII	IX	X
Excess Lifetime Cancer Risk						
Total PCBs	Direct Contact Sediment	*3 x 10^{-6}*	5 x 10^{-7}	9 x 10^{-7}	1 x 10^{-7}	*5 x 10^{-5}*
Total PCBs	Shellfish Consumption	3 x 10^{-7}	4 x 10^{-7}	7 x 10^{-7}	*6 x 10^{-6}*	*8 x 10^{-6}*
Total PCBs	Fish Consumption	*9 x 10^{-5}*				
Noncancer Hazard Quotient						
Total PCBs	Direct Contact Sediment	0.006	0.1	0.002	0.02	0.1
Total PCBs	Shellfish Consumption	0.02	0.04	0.06	0.2	0.4
Total PCBs	Fish Consumption	**8**				

Italic: Exceeds cancer risk of 1 x 10^{-6} (1 in 1,000,000 chance of getting cancer)

Bold number: Exceeds cancer risk of 1 x 10^{-4} (1 in 10,000 chance of getting cancer) or Hazard Quotient of 1 (threshold level above which health may be negatively affected)

Footnote: The fish consumption pathway showed unacceptable noncancer risk for all of Parcel F, but only Areas III, IX and X have PCBs exceeding background as measured on an area weighted basis.

Source: *Final Addendum to the* Feasibility Study *Report for Parcel F, Hunters Point Naval Shipyard, San Francisco California.* KCH, 2017.

concentrations do not exceed sediment PRGs. Elevated lead concentrations are limited to intertidal sediments in Areas IX/X, which also contain elevated levels of PCBs.

Table 2. Ecological Risk Assessment Summary Risk Drivers

Chemical	Rece-ptor	Area-Specific Hazard Quotient (Unitless)				
		I	III	VIII	IX	X
Copper	surf scoter	0.5	**3**	0.7	0.7	0.8
Mercury		0.3	**4**	0.3	0.3	0.3
Total PCBs		0.1	0.3	0.2	**1**	**2**

Source: *Hunters Point Shipyard Parcel F Validation Study Report, San Francisco, California.* Battelle, Blasland, Bouck & Lee, Inc. and Neptune and Company 2005. Note: The Navy and regulatory agencies decided to take action at Area IX since the total PCB area weighted average exceeds background, even though the hazard quotient is at or below 1 and the not-to-exceed RAO 1 PCB PRG was not exceeded. See Table 3.

Remedial Action Objectives

The Navy developed RAOs as the first step in identifying and assessing options for the cleanup strategy (cleanup alternatives). Consistent with CERCLA guidance, RAOs consist of specific cleanup goals for protecting human health and the environment. Each RAO specifies: COCs, exposure routes and receptors, and the goal(s) for the cleanup action that ensures protectiveness, known as the PRG, presented in Table 3. RAOs include both a chemical level and an exposure route because a protective cleanup can be achieved by reducing either exposure or chemical levels. Ultimately, the success of a cleanup action is measured by its ability to meet the respective RAOs.

The three RAOs for Parcel F Area III, and Areas IX and X, are focused on exposure from consumption of fish and shellfish by humans and wildlife.

- **RAO 1**. Reduce the risk of benthic feeding and fish-eating birds, including surf scoters, to acceptable levels from exposure to copper, lead, mercury, and total PCBs through eating of contaminated prey and incidental ingestion of sediment.
- **RAO 2**. Limit or reduce the potential risk to human health from eating shellfish from Parcel F.
- **RAO 3**. Limit or reduce the potential ***biomagnification*** of total PCBs at higher trophic levels in the food chain to reduce the potential risk to human health from eating sport fish.

A summary of the PRGs is shown in Table 3.

Table 3. PRG Summary for Parcel F Surface Sediment

RAO	COC	Concentration	Basis
RAO 1	Copper	271 mg/kg	Not to exceed threshold
RAO 1	Lead	NE	
RAO 1	Mercury	1.87 mg/kg	
RAO 1	Total PCBs	1,240 µg/kg	
RAO 2	Total PCBs	1,350 µg/kg	Area-weighted average
RAO 3	Total PCBs	200** µg/kg	

mg/kg = milligrams per kilogram; µg/kg = micrograms per kilogram
NE = not established; A PRG for lead was not developed due to uncertainty associated with ***bioavailability*** and toxicity of lead. Lead is collocated with PCB***s*** in sediment, so achieving the cleanup goals for PCB***s*** is expected to address any risks associated with lead.
** 200 µg/kg total PCBs is based on background total PCB estimates for nearshore sediments in San Francisco Bay.

Pilot Study of Activated Carbon Amendments

A pilot study is a small-scale study conducted to assess whether a specific cleanup technology will work. A pilot study that evaluated the effectiveness of two commercially available activated carbon-based products to reduce PCB bioavailability recently concluded at Parcel F Area X (South Basin). The pilot study demonstrated that activated carbon amendments:

1) Can be accurately and efficiently placed in the South Basin area of Parcel F;
2) Remain in place for up to 26 months post-placement; and
3) Are effective at reducing PCB exposure to marine organisms. Bioavailability of PCBs, as measured by pore water (water in between sediment particles) and clam tissue concentrations, was reduced up to 91% and 90% respectively. The amendments also did not result in any long-term negative impacts to the local benthic community.

Summary of Cleanup Alternatives

Alternatives to clean up contaminated sediments evaluated in the Parcel F Feasibility Study ranged from no action to complete removal with off-site disposal of contaminated sediment. The Navy's cleanup strategy is to cleanup Parcel F sediments using a combination of technologies. This cleanup, in conjunction with ICs and previously implemented source control measures, will reduce risks to human health and the environment to acceptable levels. This is expected to be a final action for Parcel F sediment at the HPNS.

In addition to the cleanup alternatives evaluated in the Feasibility Study, the Navy prepared Cleanup Alternative 7 for Areas IX and X to take advantage of advances in the use of ***in situ*** treatment using carbon-based amendments to cleanup PCB-contaminated sediment and minimize the volume of material requiring removal, management, and disposal. Excavation/dredging of contaminated sediment is included in each of the cleanup alternatives for Area III because strong tidal currents prevent application of *in situ* treatment and MNR, which are better for low energy environments like Areas IX and X. The six alternatives evaluated for Area III are shown in Table 4 and the nine alternatives evaluated for Area IX and X are shown in Table 5.

Table 4. Area III Cleanup Alternatives

Alternative*	Components of Remedy**	Cost ($M)
1	No Action. No actions taken to reduce risks to human health or the environment. This alternative is required by CERCLA to serve as the baseline condition for comparison with the other alternatives.	$0
2	Removal/Backfill and Off-Site Disposal (*Unrestricted Use/Unrestricted Exposure* [*UU/UE*]). Full sediment removal uses excavation or dredging of sediment with concentrations above the not to exceed PRGs (Table 3) for copper, mercury, and PCBs (excavation depths ranging from 1 to 5 feet with an estimated removal volume of 26,500 cubic yards). Contaminated sediments disposed at off-site landfill. Removal may require placement of backfill or residual management layers to limit exposure to contamination that remains. May require dewatering of dredged sediment prior to transport and disposal.	$15.4
3	Focused Removal/Backfill, Off-Site Disposal, Armored Cap, and ICs. Focused sediment removal to a depth of 2 feet (approximately 1,790 cubic yards) and capping for contaminated sediment (estimated area of 454,550 square feet) exceeding the PRGs for copper, mercury, and PCBs. Most of the area would be capped with a thick layer of sand overlain by armor stone for erosion protection. Nearshore sediments too shallow to be capped will be dredged or excavated to prevent potential loss of shallow water habitat. Expected to be protective of surf scoters, based on foraging depth, and limit exposure to the benthic community and fish. ICs will protect cap integrity from human disturbance. Off-site disposal of contaminated sediments.	$12.9
3A	Focused Removal/Backfill, Off-Site Disposal, Reactive Cap, and ICs. Same as Alternative 3, but uses a reactive cap (i.e., Aquablok®) to limit transport of chemicals and prevent exposure to contaminated sediment below. Expected to be protective of surf scoters, based on foraging depth, and limit exposure to the benthic community and fish.	$15.9
4* (preferred alternative)	Focused Removal/Backfill, Off-Site Disposal, Modified Armored Cap, and ICs. Combination remedy similar to Alternative 3, comprising focused sediment removal to a depth of 2 feet (estimated volume of 1,790 cubic yards). Capping footprint (area of approximately 68,670 square feet) limited to areas with water depths less than 30 feet. Expected to be protective of surf scoters, based on foraging depth. Would not limit exposure to the benthic community and fish in water depths greater than 30 feet.	$7.3
4A* (preferred alternative)	Focused Removal/Backfill, Off-Site Disposal, Modified Reactive Cap, and ICs. Combination remedy similar to Alternative 3A, except capping is limited to water depths less than 30 feet with same volume and areas as Alternative 4. Expected to be protective of surf scoters, based on foraging depth. Would not limit exposure to the benthic community and fish in water depths greater than 30 feet. As with 3A, the reactive cap (i.e., Aquablok®) limits transport of chemicals and prevents exposure to contaminated sediments below.	$9.2

*The selection of capping material will be determined during remedial design based on characterization findings and maintainability considerations. Depending on the type of cap, either Alternative 4 or 4A will be implemented (not both).

**Remediated volumes are estimated and will be refined during the pre-remedial design.

Table 5. Area IX and X Cleanup Alternatives

Alternative	Components of Remedy**	Cost ($M)
1	**No Action.** No actions taken to reduce risks to human health or the environment. This alternative is required by CERCLA to serve as the baseline condition for comparison with the other alternatives.	$0
2	**Removal/Backfill and Off-Site Disposal (UU/UE).** Full sediment removal to depths ranging from 0.5 to 5 feet (estimated at 150,520 cubic yards) includes excavation or dredging of sediment above the not to exceed PRGs for copper, mercury, and PCBs and disposal of contaminated sediments at an off-site landfill.	$39.7
3	***In situ* Treatment and ICs**. Full sediment treatment option (estimated area of 1,787,400 square feet) with ***activated carbon*** mixed into top 1 foot of the sediment bed (estimated volume of 66,200 cubic yards). Cost effective and implementable. Some disruption of benthic community during mixing, but it is less invasive than remedies using removal or capping with sand or stone. Effects can be mitigated with natural mixing through ***bioturbation***. ICs would prevent human disturbance of treated sediment. Performance monitoring may require both bulk sediment and pore water sampling.	$18.1
4	**MNR and ICs.** Full sediment MNR option relies on natural processes, such as deposition and dispersion, to reduce concentrations. ICs limit exposure until RAOs are met. Less expensive and disruptive than more active cleanup approaches. Although the Feasibility Study estimated MNR would take 10 years to achieve RAOs, there is uncertainty regarding that time frame.	$2.6
5	**Focused Removal/Backfill, Off-Site Disposal, MNR, and ICs.** Focused removal of sediment contamination to a depth of 1 foot (estimated volume of 57,850 cubic yards) in areas above the not to exceed PRGs for copper, mercury, and PCBs in sediment. MNR would reduce chemical concentrations beyond removal area. Sediments removed to a depth of 1 foot and backfilled with clean sand or other suitable material to existing grade. ICs would protect sediment from human disturbance after backfill is placed.	$20.9
5A	**Focused Removal/Activated Backfill, Off-Site Disposal, MNR, and ICs**. Identical to Alternative 5, except clean backfill would be mixed with activated carbon as an additional barrier to any contamination left in place. Combination remedy that increases long-term effectiveness and permanence.	$27.2
6	**Focused Removal/Backfill, Modified Shoreline Removal/Backfill, Off-Site Disposal, MNR, and ICs.** Combination remedy with targeted sediment and shoreline removal to a depth of 1 to 2.5 feet (estimated volume of 61,940 cubic yards) that limits sediment disturbance. Targeted removal of nearshore contaminated sediments (to about 2.5 feet) limits exposure to humans on shoreline.	$21.3
6A	**Focused Removal/Activated Backfill, Modified Shoreline Removal/Backfill, Off-Site Disposal, MNR, and ICs.** Identical to Alternative 6, except clean backfill would be mixed with activated carbon as an additional barrier to any contamination left in place. Reactive materials increase long-term effectiveness and permanence.	$28.1
7 *(preferred alternative)*	**Focused Removal/Backfill, *In situ* treatment, Off-Site Disposal, MNR, and ICs.** *In situ* treatment of ***subtidal*** sediments (estimated area of 864,000 square feet) and removal of intertidal sediments followed by placement of backfill. Intertidal sediments would be removed to a depth of 1 foot. Subtidal sediments that exceed 12,400 µg/kg PCBs would be removed to a depth of 1 foot, followed by placement of backfill. The total volume of material to be removed in Area IX/X is estimated at 39,000 cubic yards. Subtidal sediments exceeding 1,240 µg/kg but below the 12,400 µg/kg removal threshold would be treated *in situ*. MNR would clean up sediments below the not-to-exceed PCB PRG of 1,240 µg/kg. ICs would prevent human disturbance of sediment. Will result in an area weighted average total PCB concentration of about 260 µg/kg for Area IX and 330 µg/kg for Area X. Attenuation modelling supporting MNR shows surface sediments in Areas IX and X will reach the background concentration of 200 µg/kg on an area weighted average within 5 and 8 years following completion of the active treatments, respectively.	$23

**Remediated volumes are estimated and will be refined during the pre-remedial design.

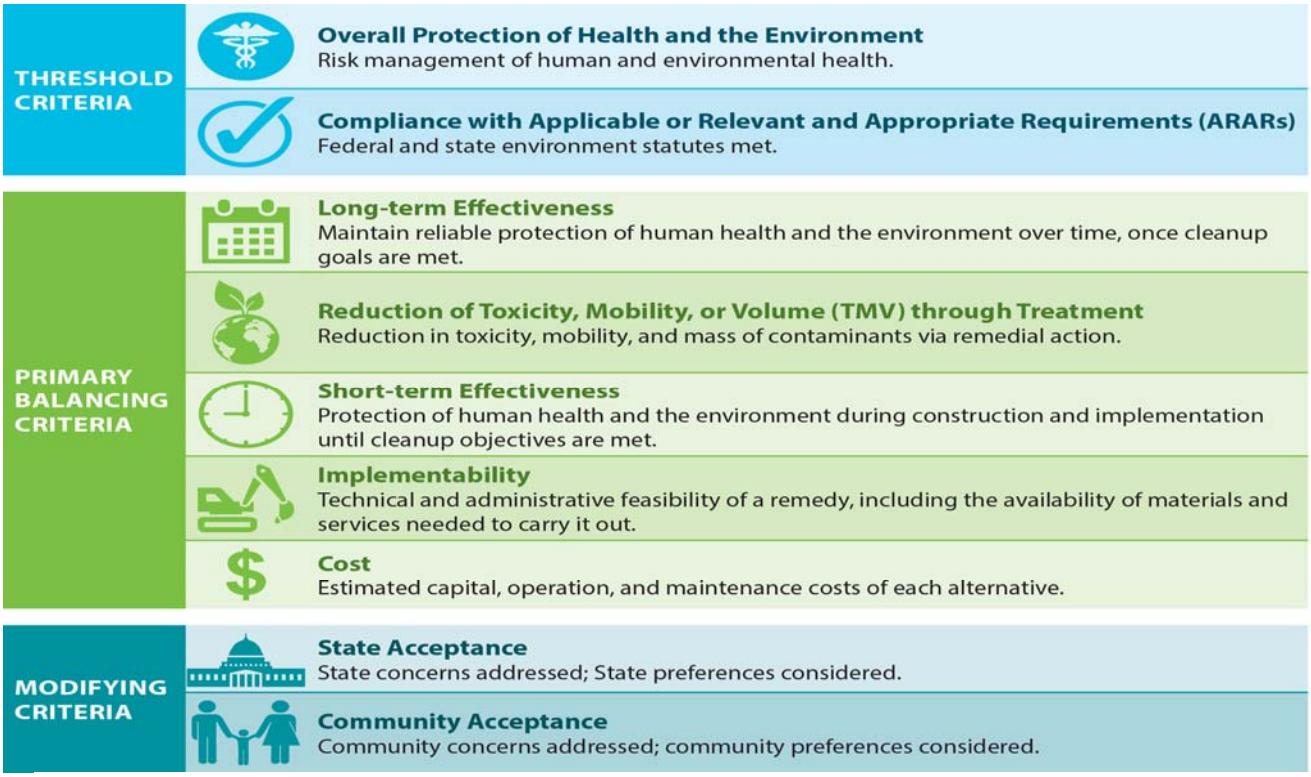


Figure 4. NCP Evaluation Criteria

How Do the Cleanup Alternatives Compare?

The Navy evaluated the cleanup alternatives based on seven of the nine criteria specified by federal regulations in the NCP:

- **Two threshold criteria -** overall protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs).
- **Five balancing criteria** - long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost.

These criteria are summarized on Figure 4. Community acceptance will be evaluated based on comments received from the public during the comment period. State acceptance will be evaluated through on-going discussions with State of California regulatory agencies.

CERCLA requires selected remedies to be cost effective, use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and satisfy a preference for treatment that reduces toxicity, mobility or volume as a principal element. In addition, the environmental footprint, climate change impacts, and community impacts were compared for each alternative. Both short-term and long-term effectiveness and permanence criterion were considered to maximize long-term durability and maintainability of the remedy.

Under CERCLA, the proposed cleanup must achieve the threshold criteria of overall protection of human health and the environment and compliance with ARARs. Alternatives are evaluated against threshold criteria on a “yes/no” basis.

For the five balancing criteria, alternatives are rated on a 5-point scale from “low” to “high”. A detailed comparison of alternatives, as well as a detailed discussion of each technology, can be found in the Feasibility Study and subsequent technical memorandum *Optimized Remedial Alternative for Parcel F*, which is available at the ***information repository***. Figure 5 presents the results of the comparative evaluation of alternatives for Area III and Areas IX and X, respectively.

Area III Alternatives Evaluation Summary

	Alternative 1 No Action	Alternative 2 Removal and Off-Site Disposal	Alternative 3 Removal, Off-Site Disposal, Armored Cap and ICs	Alternative 3A Removal, Off-Site Disposal, Reactive Cap and ICs	Alternative 4 Removal, Off-Site Disposal, Modified Armored Cap and ICs	Alternative 4A Removal, Off-Site Disposal, Modified Reactive Cap and ICs
Overall Protection of Human Health and the Environment	Not Protective	Protective	Protective	Protective	Protective	Protective
Compliance with ARARs	Does not comply with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs
Long-Term Effectiveness and Permanence	○	◐	◐	◐	◐	◐
Reduction in Toxicity, Mobility and Volume through Treatment	○	○	○	○	○	○
Short Term Effectiveness	○	◐	◐	◐	◐	◐
Implementability	●	◐	◐	◐	◐	◐
Cost ($M)[1]	$0	$15.4	$12.9	$15.9	$7.3	$9.2

○ Low ◐ Low to Moderate ◐ Moderate ◐ Moderate to High ● High ■ Preferred Alternatives

[1] Costs from Parcel F FFS have been escalated by 2.1% per year to represent costs in 2017 dollars.

Area IX/X Alternatives Evaluation Summary

	Alternative 1 No Action	Alternative 2 Removal and Off-Site Disposal	Alternative 3 In Situ Treatment[2] and ICs	Alternative 4 MNR and ICs	Alternative 5 Removal, Off-Site Disposal, MNR and ICs	Alternative 5A Removal, Activated Backfill, Off-Site Disposal, MNR and ICs	Alternative 6 Removal including Shoreline, Off-Site Disposal, and MNR and ICs	Alternative 6A Removal including, Shoreline, Off-Site Disposal, and MNR and ICs	Alternative 7 Removal, In Situ Treatment, Off-Site Disposal, MNR and ICs
Overall Protection of Human Health and the Environment	Not protective	Protective	Protective	Protective	Protective	Protective	Protective	Protective	Protective
Compliance with ARARs	Does not comply with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs	Complies with ARARs
Long-Term Effectiveness and Permanence	○	◐	○	◐	●	●	●	●	●
Reduction in Toxicity, Mobility and Volume through Treatment	○	○	◐	○	○	◐	○	◐	◐
Short Term Effectiveness	◐	◐	◐	◐	◐	◐	●	●	◐
Implementability	●	◐	◐	◐	◐	◐	◐	◐	◐
Cost ($M)[1]	$0	$39.7	$18.1	$2.6	$20.9	$27.2	$21.3	$28.1	$23.0

○ Low ◐ Low to Moderate ◐ Moderate ◐ Moderate to High ● High ■ Preferred Alternatives

[1] Applicable cost elements from Parcel F FFS have been escalated by 2.1% per year to represent costs in 2017 dollars

[2] This technology was referred to as in situ stabilization in the Parcel F FFS, but is referred to here as in situ treatment, which is more appropriate for the application of carbon-based amendments. Stabilization technologies often use other amendments (i.e. cement) which are not included here.

Acronyms:

ARAR- Applicable or Relevant and Appropriate Requirement
FFS- Final Feasibility Study
ICs- Institutional Controls
M- Million

Figure 5. Comparative Evaluation Summary of Alternatives for Area III and Areas IX and X

Summary of the Preferred Alternatives

The Navy has identified Alternatives 4/4A for Area III and Alternative 7 for Areas IX and X as the Preferred Alternatives for Parcel F. The preferred alternative achieves the RAOs established for Parcel F, while achieving an average area total PCB concentration less than background and eliminates exposure to copper and mercury, exceeding the RAO 1 PRGs (Figures 6 and 8).

These are the Preferred Alternatives because they will effectively reduce site risks by removing significant amounts of COCs and safely contain or treat the remaining contaminants, while implementing a sustainable remedy that minimizes the environmental footprint, likelihood of accident or risk/injury per hour during implementation, and socioeconomic and community impacts. The preferred alternatives would also include monitoring and maintenance that would be performed as long as necessary to protect human health and the environment. The total remediation cost for the preferred remedy, including ICs, ranges from $30.3 to $32.2M (Area III implementation of either Alternative 4 or 4A at $7.3M or $9.2M, respectively; and Areas IX/X implementation of Alternative 7 at $23M).

The preferred alternatives are cost-effective remedies that will achieve long-term protection of human health and the environment within a reasonable time-frame while minimizing short-term impacts to site workers, the community and the environment.

Area III

Alternatives 4/4A – Focused Removal/Backfill, Off-Site Disposal, Capping, and ICs

The preferred alternative (Alternatives 4/4A) is a combination remedy of focused sediment removal and capping for contaminated sediment that exceed the PRGs for copper, mercury, and PCBs within Area III (Figure 6). The technology assignment decision matrix is presented on Figure 7. The selection and specifications of capping material will be finalized during design of the cleanup remedy.

Cleanup is not required where COC concentrations do not exceed RAO 1 PRGs. Contaminated sediments exceeding the RAO 1 PRGs in the nearshore area too shallow to be capped will be removed followed by backfilling with clean sediment to pre-removal elevations. Beyond the nearshore area, contaminated sediments in water depths less than 30 feet would be capped. Contaminated sediments in deeper water exceeding RAO 1 PRGs would not be addressed due to the lack of exposure by the surf scoter, which does not forage in water depths greater than 30 feet. Although lead does not have a PRG, there are only three locations, two in deeper water and one in the excavation area, with elevated concentrations of lead as compared to the National Oceanic and Atmospheric Administration's effects range-median (ER-M) screening level of 218 mg/kg based on protection of the benthic community.

Areas IX and X

Alternative 7 – Focused Removal/Backfill, *In Situ* Treatment, Off-Site Disposal, MNR, and ICs

The preferred alternative (Alternative 7) is a combination remedy consisting of *in situ* treatment, removal with backfill, MNR, and ICs. It results in the removal of all intertidal sediments to a depth of one foot. The footprint for the preferred alternative is shown on Figure 8. Subtidal sediments will be cleaned up based on PCB concentration, as follows:

- PCB concentration **exceeding 12,400 µg/kg** = removal;
- PCB concentration **exceeding 1,240 µg/kg, but below 12,400 µg/kg** = *in situ* treatment; and
- PCB concentration **equal to or less than 1,240 µg/kg** = MNR.

Sediments with metal concentrations above the RAO 1 PRGs (or ER-M for lead) are confined to intertidal sediments or areas of sediment with PCB concentrations exceeding 12,400 µg/kg, and are planned for removal.

The technology assignment decision matrix is presented on Figure 9.

The preferred alternative achieves the RAOs and overcomes the challenges to long-term effectiveness and permanence found in Alternatives 3 (*in situ* treatment) and 4 (MNR). Incorporation of additional sustainability elements such as selection of amendment material will be considered during design of the cleanup remedy.

Summary

Based on information currently available, the preferred alternatives (4/4a for Area III and 7 for Areas IX and X) meet the NCP threshold criteria and satisfy the following statutory requirements of CERCLA 121(b):

1) Protectiveness of human health and the environment;

2) Compliance with ARARs;

3) Cost-effectiveness;

4) Utilization of permanent solutions and alternative treatment technologies to the maximum extent practicable; and

5) Preference for treatment.

In addition, re-use opportunities of removed sediments will be considered during remedial design. A pre-design investigation will be performed to collect additional sediment concentration data.

Post-Remedy Performance and Long-Term Effectiveness Monitoring

After the remedy is implemented, monitoring will be conducted to evaluate whether it is performing as intended and to evaluate the effectiveness of the remedy at meeting RAO***s*** for the COCs (PCBs, copper, lead, and mercury). The following activities will be performed and further developed during remedial design:

- Post-construction performance monitoring to confirm that any backfill, *in situ* treatment, or capping material remains in place following implementation of the remedy.
- Post-remedy performance monitoring will include site inspection activities following significant storm events.
- Biological resources monitoring to assess and help limit the impact to local animals and their ecosystems (aquatic and inland habitats) during and following cleanup activities.
- Long-term effectiveness monitoring to monitor COC concentrations in sediment, evaluate progress towards achieving RAOs, and to evaluate the effectiveness of MNR.
- Monitoring results will be incorporated into the Five-Year Review, which will assess the performance of the remedy and determine if it remains protective of human health and the environment. Data collection requirements will be developed during remedial design and in the Long-Term Monitoring Plan.

Institutional Controls

Site-wide ICs for Parcel F consist of legal and administrative documents and processes to limit exposure of a future landowner(s) or user(s) to hazardous substances remaining on the property and maintain integrity of the cleanup action until cleanup goals have been achieved. Monitoring and inspections will be conducted to assure that the ICs are being followed. ICs under consideration at the HPNS Site Include:

- Fish consumption advisories and commercial fishing bans to limit the potential for human exposure through fish consumption.
- Land and waterway use restrictions, within Areas III and IX/X only, to limit the potential for exposure and prevent physical disturbance of the cleanup.
- Restricted uses, including limitations on water use such as anchoring, swimming, or clamming. The clamming restrictions would be implemented by posting warning signs and through physical barriers to restrict access.
- Restricted activities in accordance with the "Covenant(s) to Restrict Use of Property," Quitclaim Deed(s), and the Parcel F Risk Management Plan, which will be reviewed and approved by the Federal Facility Agreement Signatories:
    - "Sediment disturbing activity," which includes but is not limited to (1) dredging of sediment or (2) any other activity that involves movement of sediment;
    - Alteration, disturbance, or removal of any component of a response or cleanup action (including but not limited to cap/containment systems); and
    - Removal of or damage to security features or signs
- Procedures for proper management and disposal of low-level radiological objects (e.g., radioluminescent dials, gauges, and deck markers) if encountered during future site activities, such as dredging.
- Periodic inspections and reporting requirements, including the CERCLA Five-Year Review, to verify that the cleanup within Areas III and IX/X is functioning properly.

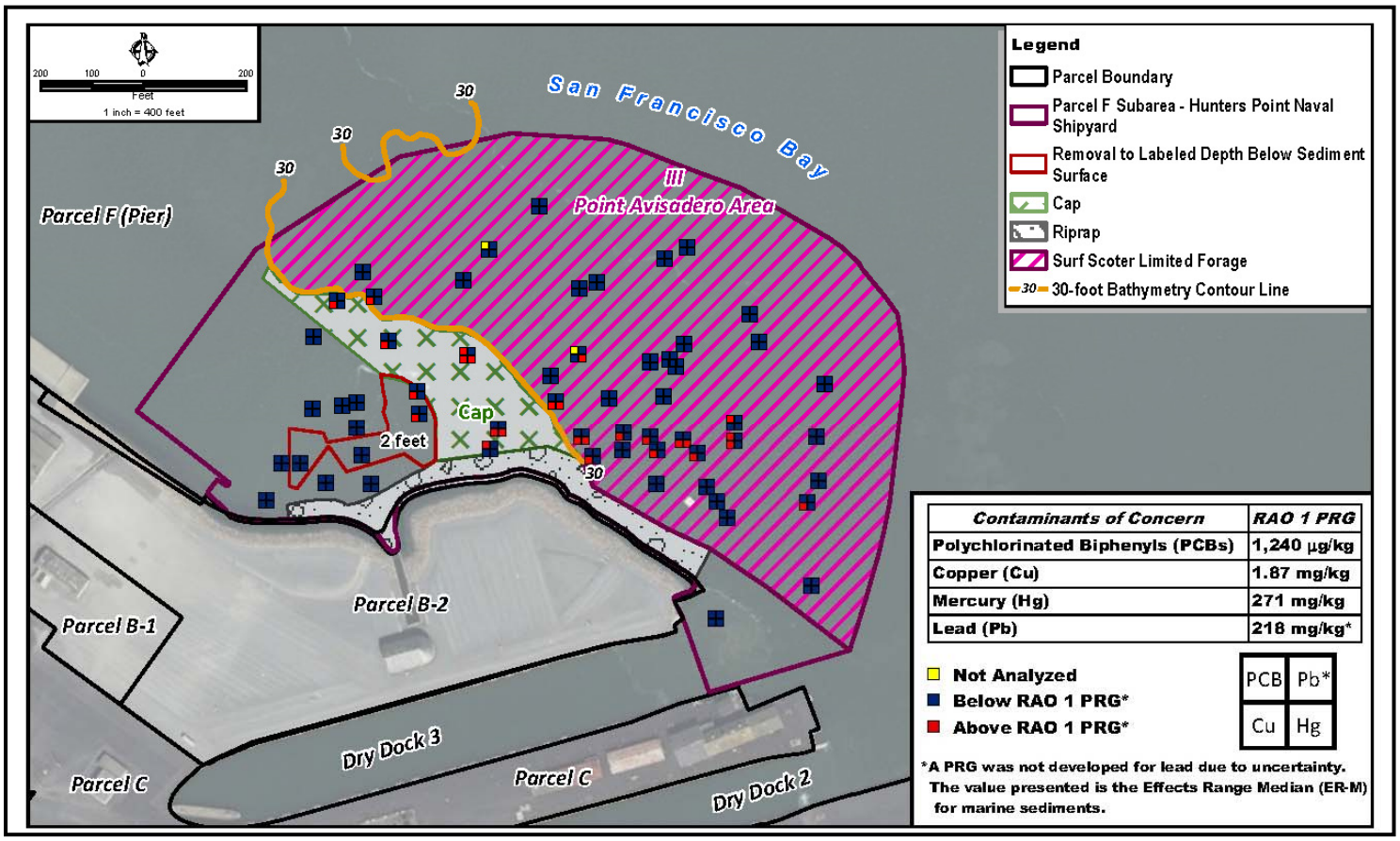


Figure 6. Footprint Cleanup Alternatives 4/4A, Area III

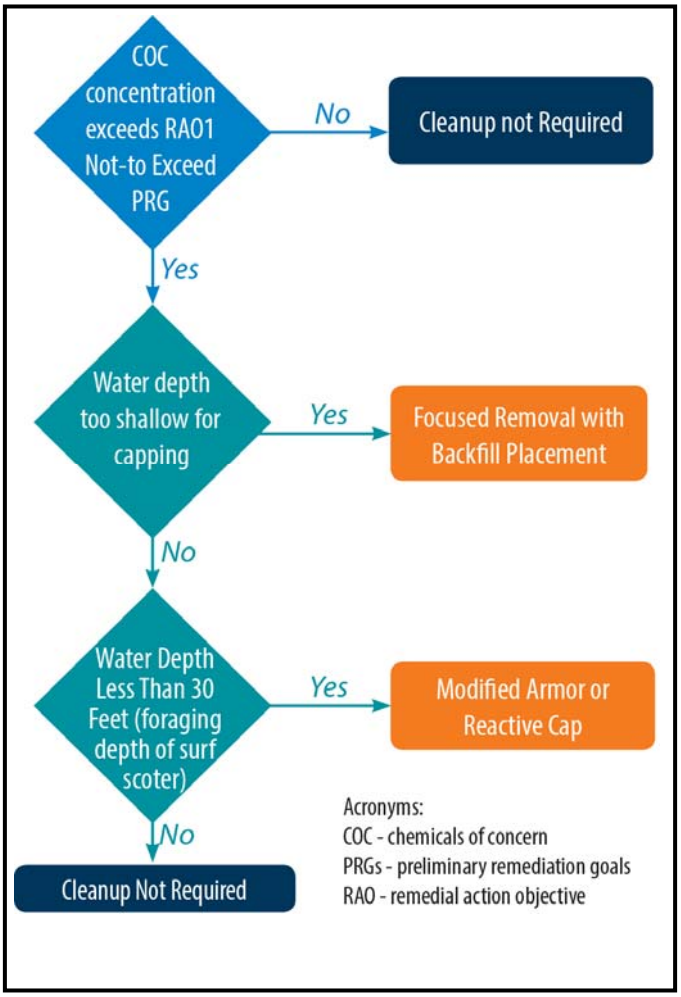


Figure 7. Area III Technology Decision Matrix

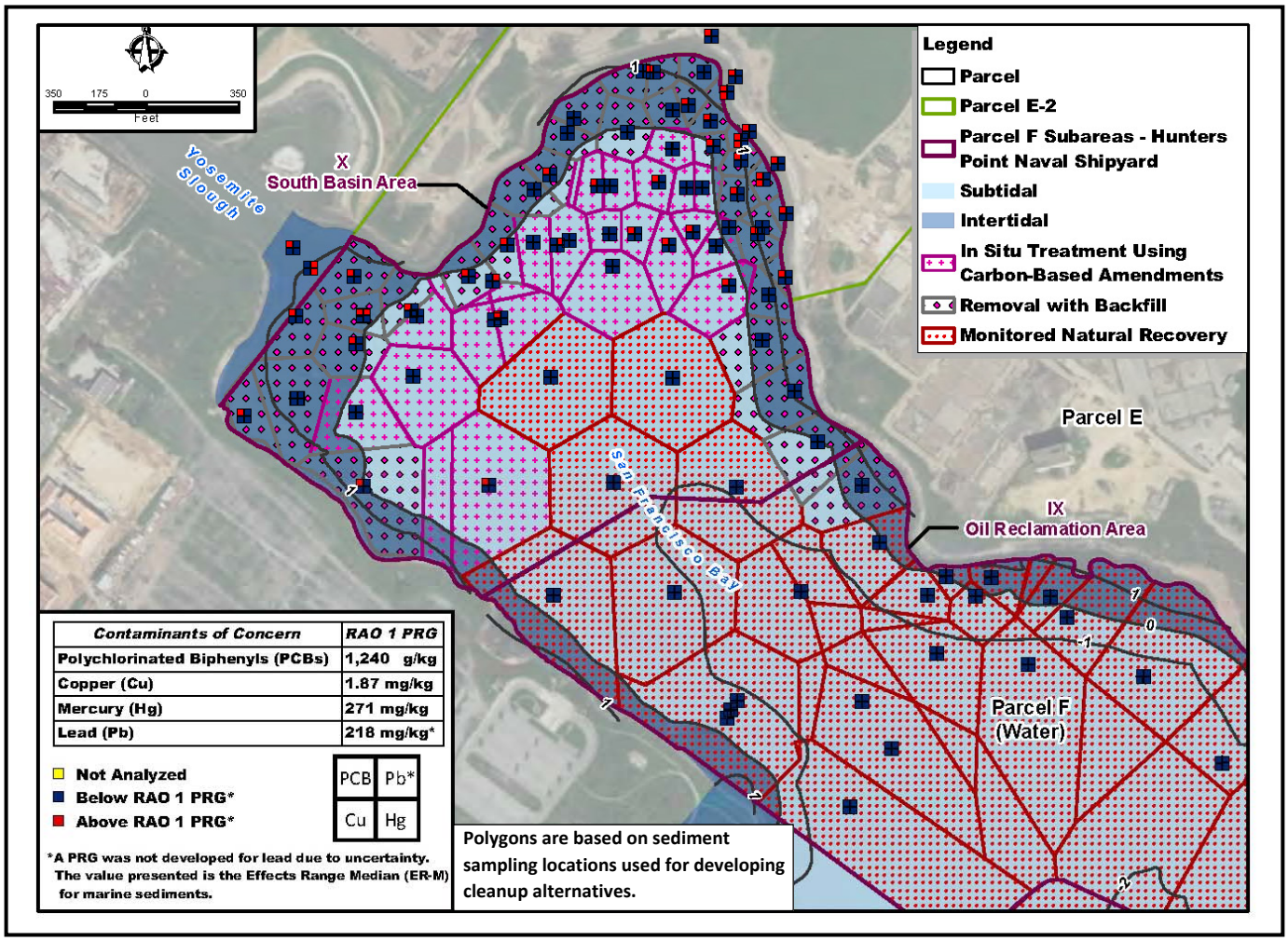
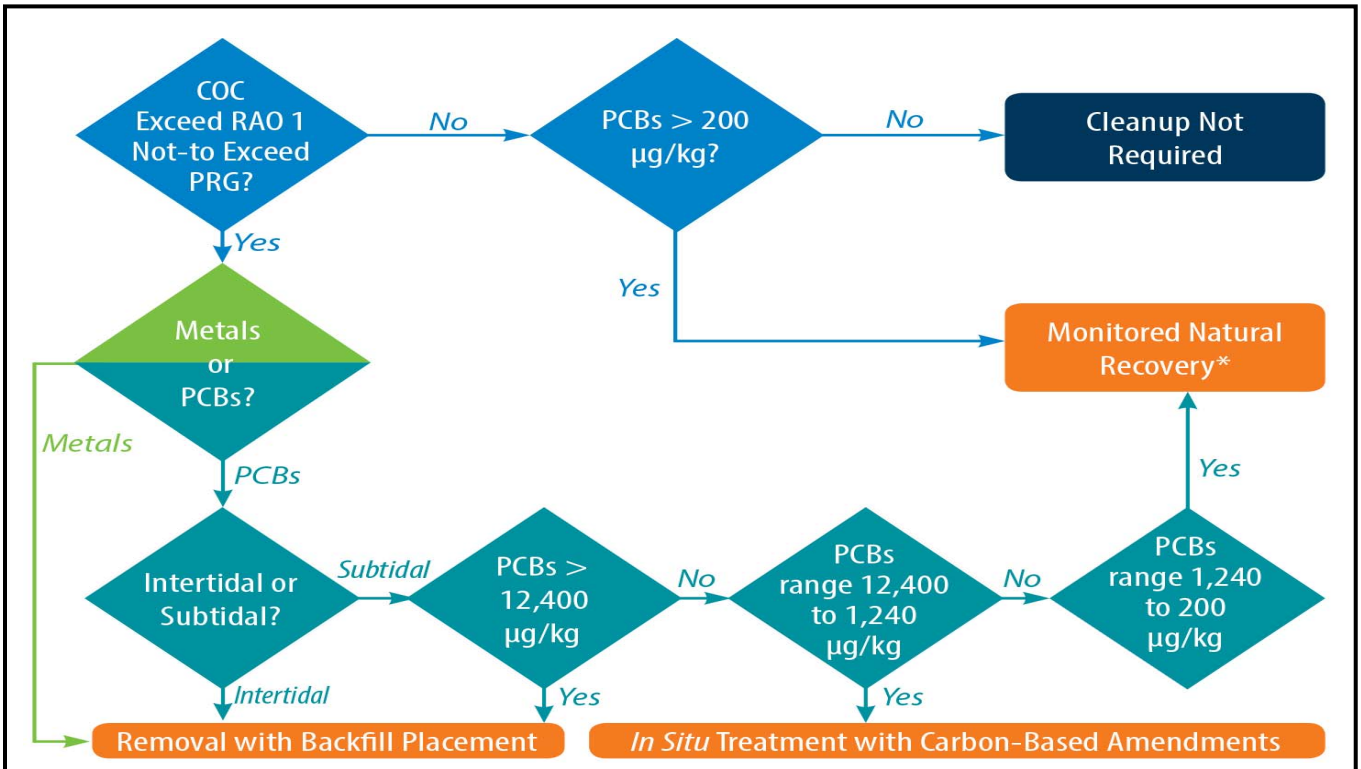


Figure 8. Footprint Cleanup Alternative 7 (Optimized Alternative), Areas IX and X



*Based on constructability considerations, sediments below the not-to exceed PRG may be cleaned up through removal with backfill or *in situ* treatment with carbon-based amendments depending on location to facilitate MNR.

Figure 9. Technology Assignment Decision Matrix Areas IX and X

Administrative Record

The Proposed Plan summarizes information detailed in environmental and engineering reports and documents (such as the Feasibility Study) contained in the site administrative record, a specialized file containing the information considered or relied upon to select the remedy at a site. If you are interested in the full technical details beyond the scope of this Proposed Plan, please visit the local information repository and review the administrative record file.

The Parcel F administrative record file is located at:

Naval Facilities Engineering Command Southwest
2965 Mole Road, Building 3519
San Diego, CA 92136

Command Records Manager, Diane Silva, can be reached at (619) 556-1280. Community members can also find technical reports and other supporting documents at the local information repositories:

- City of San Francisco Main Library Science, Technical, & Government Document Room:

  100 Larkin Street
  San Francisco, CA 94102
  (415) 557-4400

- United States Navy Hunters Point Naval Shipyard Site Trailer:

  690 Hudson Ave
  San Francisco, CA 94124

- Superfund Records Center:

  Mail Stop SFD-7C
  75 Hawthorne Street, Room 3110
  San Francisco, CA 94105
  (415) 947-8717

Community Participation

The Navy and the regulatory agencies encourage you to learn more about the site and the Proposed Plan for cleanup. Information regarding the cleanup at Parcel F are provided to the public through public meetings, the administrative record file, and announcements published in the San Francisco Chronicle, San Francisco Bay View, and The San Francisco Examiner newspapers. You can also be added to the HPNS mailing list to receive project updates. For more information, visit the Navy's website at:

https://www.bracpmo.navy.mil/brac_bases/california/former_shipyard_hunters_point.html.

The dates for the public comment period, and the date, location, and time of the public meeting, are provided on the front page of this Proposed Plan.

Site Contacts

Public concerns or questions about environmental activities at Parcel F and HPNS should feel free to contact any of the following representatives:

- **Derek Robinson,**
  BRAC Program Management Office West
  33000 Nixie Way, BLDG 50, Suite 207
  San Diego, CA 92147
  derek.j.robinson1@navy.mil; (619) 524-6026

- **Lily Lee,** EPA Region IX
  75 Hawthorne Street (SFD-8)
  San Francisco, CA 94105-3901
  Lee.Lily@epa.gov; (415) 947-4187

- **Nina Bacey,** DTSC
  700 Heinz Avenue, BLDG F, Suite 200
  Berkeley, CA 94710-2721
  juanita.bacey@dtsc.ca.gov; (510) 540-2480

- **Jeff White,** Water Board
  1515 Clay Street, Suite 1400
  Oakland, CA 94612
  jeff.white@waterboards.ca.gov; (510) 622-2375

Attachment 1 – Glossary

Activated carbon: An absorbent material that can reduce the bioavailability and toxicity of organic compounds such as PCBs.

Benthic: Relating to the bottom of a water body, includes sediment surface, subsurface layers, and residing organisms.

Bioavailability: Portion of the total quantity of chemical present potentially available for uptake by organisms.

Biomagnification: The increasing concentration of a chemical in the tissues of organisms at successively higher levels in a food chain.

Bioturbation*:* The disturbance of sedimentary deposits by living organisms.

Capping*:* Process of placing a clean layer of sand, sediment or other material over contaminated sediments in order to lessen the risk posed by those sediments.

Chemicals of Concern (COCs): Chemicals that pose the greatest risk to human health and the environment and are to be addressed by the cleanup

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): The federal law establishing a program to identify hazardous waste sites and procedures for cleaning up sites to protect human health and the environment and to evaluate damages to natural resources.

Exposure Pathway: The route a chemical takes from its source (where it began) to its end point (where it ends) and how people or wildlife can come into contact with (or be exposed to) it.

Feasibility Study: The Feasibility Study identifies, screens, and compares cleanup alternatives.

Information Repository: A place where current information, technical reports, and reference materials regarding the site are stored. Typically found in public libraries or municipal offices.

***In situ*:** Treated in-place, within the subsurface.

Intertidal: Area of shoreline covered at high tide and exposed during low tide.

Monitored Natural Recovery (MNR)*:* The use of ongoing, naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants in sediment.

National Contingency Plan (NCP): Also known as the National Oil and Hazardous Substances Pollution Contingency Plan, it is the basis for government responses to oil and hazardous substance spills, releases, and sites where these materials have been released.

Polychlorinated biphenyls (PCBs): A mixture of up to 209 individual chlorinated organic compounds. PCBs have been used as coolants and lubricants in electrical equipment. Their use is now banned.

Preferred Alternative: The cleanup option selected by the Navy, in conjunction with the regulatory agencies that best satisfies remedial action objectives and cleanup goals, based on evaluation of options presented in the Feasibility Study.

Preliminary Remediation Goals (PRGs): Goals used to develop the long-term contaminant concentration levels needed to be achieved to meet remedial action objectives by the cleanup alternatives.

Proposed Plan: A document used to facilitate public involvement in the remedy selection process. It presents the lead agency's preliminary recommendations about how to best address contamination at the site, presents alternatives that were evaluated, and explains the reasons the lead agency recommends the preferred alternative.

Record of Decision (ROD): A decision document that identifies the cleanup alternative chosen for implementation at a CERCLA site. The ROD is based on information from the validation study, Feasibility Study, and other reports, and on public comments and community concerns.

Remedial Action Objectives (RAOs)*:* Media-specific goals that cleanup alternatives/remedies need to achieve for protecting human health and the environment.

Risk: An assessment of the likelihood or probability that a hazardous chemical, when released to the environment, will have negative effects on exposed humans or wildlife. Risk levels are evaluated as both cancer and noncancer risk.

Sediment: Loose sand, clay, silt and other soil particles that settle at the bottom of a body of water.

Subtidal: Shallow area, near shore below the low-tide mark.

Surf Scoter: Large sea duck native to North America.

Unrestricted Use/Unrestricted Exposure (UU/UE*):* Generally, UU/UE is the level of cleanup at which all exposure pathways present an acceptable level of risk for all land use.

Proposed Plan Comment Form
Parcel F of the Hunters Point Naval Shipyard

The public comment period for the Parcel F Proposed Plan, Hunters Point Naval Shipyard (HPNS) in San Francisco, California, is from **April 7 to May 7, 2018.** A public meeting to present the Proposed Plan will be held at the OCII Community Room on **April 11, 2018** from **5:30 pm to 7:30 pm**. You may provide comments verbally at the public meeting, where all comments will be recorded by a court reporter. Alternatively, you may provide written comments in the space provided below or on your own stationery. All written comments must be postmarked no later than **May 7, 2018.** After completing your comments and your contact information, please mail this form to the address provided on the cover page. You may also submit this form to a Navy representative at the public meeting. Comments are also accepted by e-mail or fax; please address e-mail messages to derek.j.robinson1@navy.mil or fax to (619) 524-5260.

Name: _____

Representing: (optional) _____

Phone Number: (optional) _____

Address: (optional) _____

☐ Please check box if you would like to be added to the Navy's Environmental Mailing List for HPNS.

Comments:

Fold Here

To:

Derek Robinson

BRAC PMO West

33000 Nixie Way BLDG 50, Suite 207

San Diego, CA 92147

Re: Comments on Proposed Plan for Parcel F,

Hunters Point Naval Shipyard

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Attn: Derek Robinson
BRAC PMO West
33000 Nixie Way
BLDG 50, Suite 207
San Diego, CA 92147

Proposed Plan for Offshore Sediment Cleanup at Parcel F, Hunters Point Naval Shipyard San Francisco, California

Public Comment Period
From April 7 to May 7, 2018
Public Meeting - April 11, 2018
See Inside How to Comment