Palos Verdes Shelf Superfund Site

U.S. Environmental Protection Agency $ Region 9 $ San Francisco, CA $ June 2009

EPA Announces Proposed Plan

This Proposed Plan presents the United States Environmental Protection Agency's (EPA's) Preferred Alternative to address risks to human health and the environment posed by contaminated sediment at the Palos Verdes Shelf Superfund site (PV Shelf). EPA is requesting written and oral comments on the Proposed Plan and Preferred Alternative and the information contained in the Administrative Record. The Preferred Alternative is Institutional Controls, Monitored Natural Recovery and a Cap over the area of the shelf that has the highest contaminant levels and is most susceptible to erosion. This is an Interim Remedial Action. After completion of this interim action and additional studies, EPA may propose additional actions in a subsequent Record of Decision. This Proposed Plan is being issued by EPA, pursuant to CERCLA §117(a) and the National Contingency Plan (NCP) §300.430(f)(2).

The goal of the Proposed Plan is to facilitate public comment on all of the alternatives, including the Preferred Alternative. The Proposed Plan provides a summary of the Palos Verdes Shelf Superfund site, including risks to human health and the environment, and the alternatives EPA evaluated to address these risks. It is based on the Remedial Investigation (RI) and Feasibility Study (FS) and supported by documents in the Administrative Record. EPA will make its decision after considering comments submitted during the public comment period. Public comments will be addressed in a Responsiveness Summary that is issued with the Record of Decision.

The Administrative Record file, which contains the Remedial Investigation, Feasibility Study, Risk Assessment and other information EPA used to develop the Preferred Alternative, is available at the following locations:

Redondo Beach Public Library
303 N. Pacific Coast Highway
Redondo Beach, CA 90277

San Pedro Public Library
931 S. Gaffrey St.
San Pedro, CA 90731

NOAA/Office of General Counsel
501. W. Ocean Blvd., suite 4470
Long Beach, CA 90802

U.S EPA Superfund Record Center
95 Hawthorne Street
San Francisco, CA 94105

Documents supporting this decision are available on-line at the EPA website: www.epa.gov/region09/superfund/pvshelf.

How to Submit Public Comment

EPA will accept written comments on the Proposed Plan during the public comment period. **A 30-day public comment period on this Proposed Plan** and information contained in the administrative record file **begins on June 15, 2009** and **closes on July 15, 2009**. Written **comments postmarked no later than July 15, 2009**, should be sent to:

C.R. White (SFD-8-2)
U.S. EPA, Region IX
75 Hawthorne Street
San Francisco, CA 94105

If requested, EPA may extend the comment period. Any request for an extension must be made in writing and received by EPA no later than July 6, 2009.

Public Meetings

EPA will hold a series of public meetings to explain and discuss the alternatives presented in this Proposed Plan and to answer questions about the information presented in the Feasibility Study. Oral and written public comments will also be accepted at the meetings. The Proposed Plan presentation at each meeting location will be the same.

Tuesday June 23rd
Open House 2:00-3:00 p.m.
Meeting 3:00 p.m. to 5:00 p.m.
Cabrillo Beach House
3800 Stephen M. White Dr.
San Pedro, CA

Wednesday June 24th
Open House 6:00-7:00 p.m.
Meeting 7:00 p.m. to 9:00 p.m.
Banning's Landing
100 E. Water Street
Wilmington, CA

Thursday June 25th
Open House 6:00-7:00 p.m.
Meeting 7:00 p.m. to 9:00 p.m.
Palos Verdes Library
701 Silver Spur Rd.
Rolling Hills Estates, CA

Site Background

The Palos Verdes Shelf Superfund site (PV Shelf) is a large area of contaminated sediment on the continental shelf and slope off the coast of Los Angeles, California. PV Shelf is Operable Unit 5 of the Montrose Chemical Superfund site. At one time, the Montrose Chemical Corporation of California, Inc. operated the nation's largest DDT manufacturing plant. The former plant property is now the core of the Montrose Chemical Superfund site in Torrance, California. Waste from the manufacturing plant has contaminated soil and groundwater in the vicinity of the former plant property as well as the waters and sediment within the Port of Los Angeles and in the ocean, off the Palos Verdes Peninsula.

Since 1937, the main wastewater treatment plant of the Sanitation Districts of Los Angeles County (LACSD) has sent treated industrial and municipal wastewater (effluent) to ocean outfalls at White Point on the Palos Verdes Peninsula. From the 1950s to 1971, the Montrose manufacturing plant in Torrance released tons of DDT and associated waste into the sewer system to be treated then discharged from the outfalls at White Point. Until polychlorinated biphenyls (PCBs) were banned in 1976, PCBs from local industries also formed part of the waste stream discharged to the sewer system and, after treatment, to PV Shelf. Peak mass emissions of effluent solids (167,000 metric tons), DDT (21.1 metric tons) and PCBs (5.2 metric tons) occurred in 1971. Montrose stopped discharging DDT into the sewer system in 1971. Since 1971, the heavily contaminated sediment has been gradually buried by less contaminated effluent and natural sediment. This has created a layer of cleaner sediment on top of the DDT- and PCB-contaminated sediment.

Site Characteristics

The California coast from Pt. Conception to the Mexican border curves inward, forming a large bay called the "Southern California Bight." The Palos Verdes Peninsula is a small but prominent land mass extending into the Southern California Bight. It is bordered by Santa Monica Bay to the north and the San Pedro Shelf to the south. The Channel Islands lie to the west and northwest. The narrow underwater shelf off the Palos Verdes Peninsula is called the Palos Verdes Shelf. It is approximately 9 miles long and 1½ miles wide. The seabed over most of the shelf slopes at a gentle 1 to 3 degrees. The shelf breaks at a depth of 250 to 300 feet, then drops steeply over 2,500 feet to the ocean floor. (See Figure 1.)

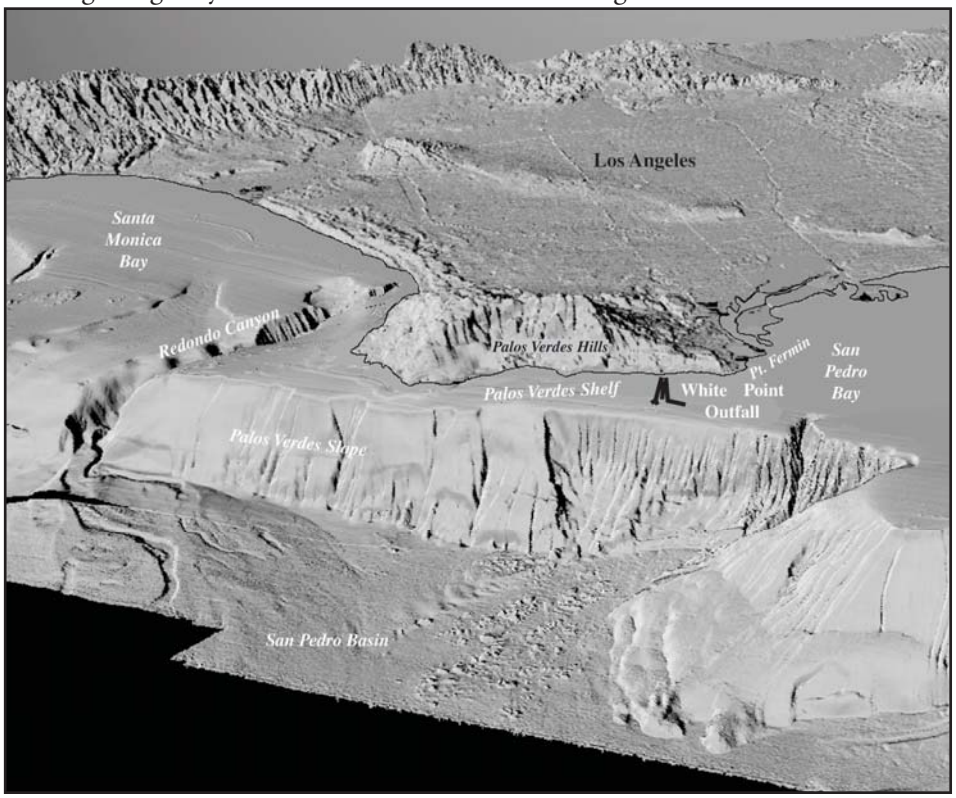

Figure 1: The Palos Verdes Shelf is a narrow, underwater shelf whose sediment is contaminated with tons of DDT and PCBs

On the Palos Verdes Shelf, an estimated 5.7 million tons of sediment have been affected by the effluent discharged from the White Point outfalls. Mixed within this effluent-affected sediment are an estimated 110 tons of DDT and 10 tons of PCBs. The effluent-affected (EA) sediment forms an identifiable deposit over a mile offshore at a depth of 150 feet to the shelf break. The deposit ranges in thickness from 2 inches to over 2 feet, with the area of greatest accumulation at the 200 feet depth.

The contaminant concentrations vary with depth in the deposit. DDT concentrations in the buried deposit exceed 200 mg/kg, while PCBs in the buried deposit reach 20 mg/kg. For most of the deposit, these maximum concentrations are found under about 1 foot of cleaner sediment. The exception is the area near the outfalls, where surface concentrations of DDT can be as high as 200 mg/kg. The deposit is thickest and has the highest concentrations of DDTs and PCBs at the 200 foot depth. The slope has the second highest contaminant concentrations in surface sediment; however, the deposit is thin.

The area of PV Shelf with surface concentrations exceeding 1 mg/kg DDT is approximately 15 square miles. The area with surface concentrations exceeding 1 mg/kg PCBs is about 2.4 square miles. Although contaminant concentrations have dropped from historical

highs, concentrations of DDT and PCBs in fish continue to pose a threat to human health and the natural environment (see Risk Summary).

Early Investigations

Because of the DDT and PCB contamination, the State of California issued an interim health advisory in 1985 discouraging consumption of white croaker caught in Santa Monica Bay, on the PV Shelf, and in the Los Angeles/Long Beach Harbor area. The advisory recommended limitations on the consumption of sport fish. The CalEPA Office of Environmental Health Hazard Assessment (OEHHA) used a 1991 study of seafood contamination to prepare a final health advisory that recommends recreational anglers not consume white croaker caught in most areas offshore of Los Angeles and Orange counties. The advisory also recommends that anglers greatly limit consumption of a number of other fish species caught on or in the vicinity of the PV Shelf due to the levels of DDT and PCBs in fish tissue. These warnings have been included in the California sport fishing regulations since March 1, 1992.

In 1990, the California Department of Fish and Game (CDFG) closed the PV Shelf to commercial fishing of white croaker. The closure extends from Pt. Vicente to Pt. Fermin, covering an area from the shoreline to the edge of California's "coastal zone," three miles from the shoreline. In March 1998, CDFG revised the white croaker recreational catch limit from unlimited to a limit of 10 fish per day.

In 1994, five state and federal agencies that are responsible for managing natural resources (Natural Resource Trustees, or "Trustees") and now comprise the Montrose Settlement Restoration Program (MSRP), issued a study of the ecological impacts caused by sediment contamination in the area on and around Palos Verdes Shelf. After reviewing these reports and other available

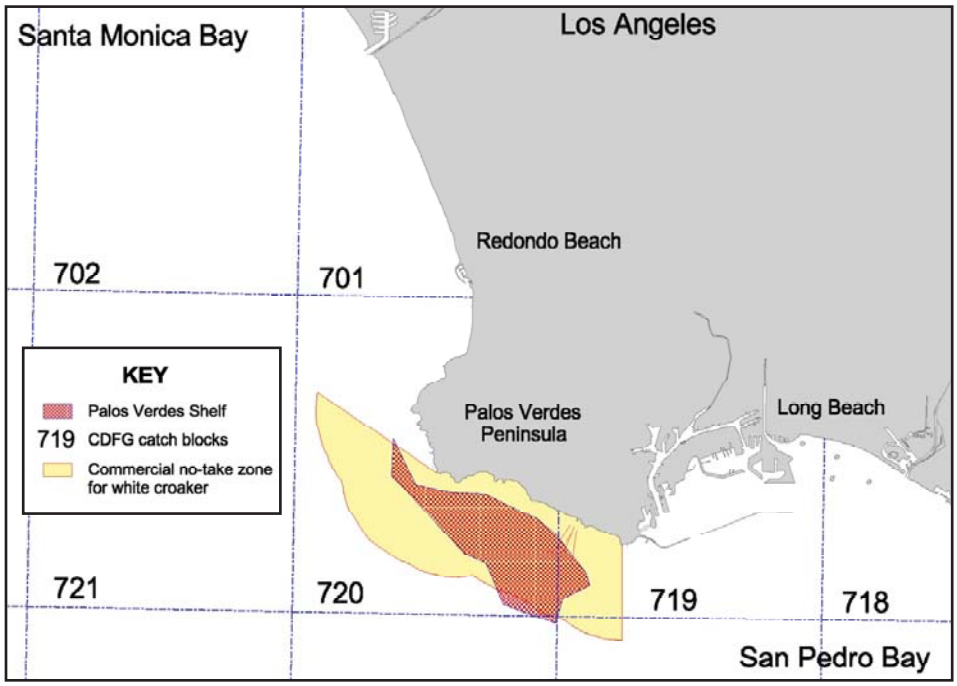

Figure 2: The PV Shelf is closed to commercial fishing of white croaker

information, EPA began its Superfund investigation of the contaminated area and joined a lawsuit initiated by the Trustees against Montrose and other companies responsible for the pollution. The lawsuit resulted in four Consent Decrees wherein the responsible parties deposited over $100 million dollars into special accounts to pay for site remediation and restoration of the environmental resources damaged by the pollution.

EPA completed an abbreviated evaluation of potential cleanup alternatives, called an Engineering Evaluation/Cost Analysis (EE/CA), in 2000. In the EE/CA, EPA recommended instituting a program to curtail consumption of fish from the PV Shelf area. After modifying the program in response to public comments, EPA issued an Action Memorandum in 2001 that established the Institutional Controls (ICs) program that is fully in place today (see description of ICs on page 7).

Pilot Capping Project and Remedial Investigations

In 2000, EPA conducted a pilot capping study to assess the feasibility of using this technique to clean up the site. Three 45-acre cells at different depths were capped with sand from two different sources, using different capping methods. Post-cap monitoring in 2002 showed that contaminant levels over the capped areas were comparable to uncapped areas. Additionally, the LACSD collected sediment cores across the PV Shelf in 2001 and noted that the peak concentration of contaminated sediment in one core collected from a capped cell was closer to the surface than it had been historically. The surface recontamination and possible sediment scouring prompted EPA to conduct four field studies in 2004 to evaluate sediment geotechnical properties, impacts of large, deep-burrowing worms and shrimp, resuspension of sediment from capping, and oceanographic conditions during winter storms. The study reports were completed in 2005 and posted on EPA's website (www.epa.gov/Region09/Superfund/pvshelf) under "Site Documents and Reports." The results of these and other studies were used to develop the Feasibility Study and the Preferred Alternative.

Coastal Marine Fish Contaminants Survey

From 2002 to 2004, EPA and MSRP collected 23 species of fish from 30 locations along the Southern California coast and analyzed them for DDT, PCBs and other contaminants. White croaker from the PV Shelf vicinity was generally the most highly contaminated species. In most cases, DDT concentrations were higher than PCBs, particularly in the PV Shelf area. OEHHA is using the multi-species survey to update Southern California fish advisories. EPA used the survey to recalculate the health hazards from consumption of certain species of fish and will use the new advisory in the ICs program.

Natural Recovery Studies

During the early 1990s, modeling of natural recovery processes occurring on PV Shelf predicted that the majority of the buried effluent-affected (EA) deposit north of the outfalls would stay buried. The area around the outfalls, however, would experience an increase in surface concentrations before reaching equilibrium. For the Remedial Investigation (RI) Report, EPA reevaluated natural recovery processes occurring on PV Shelf to assess the longterm fate of the EA sediment, which is now buried under cleaner sediment. EPA funded the U.S. Geological Survey (USGS) to perform oceanographic studies from December 2007 to April 2008. Six instrument-laden tripods were deployed across PV Shelf to measure waves, currents, bed stresses, and suspended-sediment concentrations. These measurements will allow USGS to model the stability of the contaminated sediment deposit.

Figure 3: USGS placed tripods on the PV Shelf floor to collect data on winter storms

DDT has been breaking down into less chlorinated compounds throughout the sediment deposit. A 2006 study by USGS confirmed that this process, called reductive dechlorination, was occurring at least in one area at a relatively rapid rate. Additional studies are underway to assess the reductive dechlorination rates for other areas of the deposit, and to identify the environmental conditions and microbial organisms responsible for the transformation.

Scope and Role of the Proposed Action

The Feasibility Study (FS) evaluated the three principal remedies used at sediment sites: dredging, capping, and natural recovery. The depth and size of the deposit make dredging infeasible, cost-prohibitive, and technically impracticable. Appendix F of the Feasibility Study presents the dredging alternative in detail. The study determined that only capping and natural recovery are applicable to the PV Shelf site.

EPA plans to take a phased approach to cleaning up the PV Shelf. The Preferred Alternative is the first phase. During remedial design, low-impact capping techniques that minimize disturbance of effluent-affected sediment will be tested. Also as part of remedial design, EPA will assess the viability and desirability of accelerating the DDT reductive dechlorination that is occurring. Simultaneously, EPA will fund a white croaker fish tracking study to learn where white croaker feed. This will enable EPA to determine whether there are priority areas for additional capping. Based on the success of the interim remedy and what we learn from additional studies, EPA will determine what additional cleanup actions are needed.

All alternatives (except no action) will continue the ICs program. Data from the ocean fish survey (see page 4) indicate that contaminant concentrations, particularly of PCBs, continue to pose a health risk to individuals who eat fish from the PV Shelf area. The ICs program addresses the continuing need to limit fish consumption and will remain an integral part of site cleanup.

Risk Summary

The DDTs and PCBs found in the sediment of PV Shelf enter the food chain, affecting the health of marine wildlife as well as people who regularly consume fish from the area. Elevated

levels of DDTs and PCBs are found in fish that reside on PV Shelf, especially fish like white croaker that feed on organisms that live in the sediment.

Human Health Risk

Health risk from fish consumption varies depending on the contaminant burden in the fish, how much fish is consumed, and over how long a period. For example, white croaker typically are more contaminated than other fish at PV Shelf, and the more white croaker a person eats, the higher the risk of adverse health effects. Additionally, DDTs and PCBs are stored primarily in the fatty part of the fish; therefore, if a person eats the whole fish instead of only the fillets, s/he will be exposed to more contamination. EPA calculated increased cancer risk from white croaker and other fish for different eating habits: 1) recreational angler or "average" consumer who may eat white croaker once a week (called "central tendency exposure"), or 2) someone who consumes white croaker on a subsistence basis, often daily (called "reasonable maximum exposure"). EPA found that both groups suffered increased health risks. Table 1 lists the estimated cancer and non-cancer risks for species commonly found on PV Shelf.

Ecological Risk

The concentration of DDT, but not PCBs, in PV Shelf ocean water exceeds the ambient water quality criteria (AWQC) for aquatic life. Based on EPA's Ecological Risk Assessment, DDT in fish continues to pose potential risks to piscivorous (fish eating) birds and marine mammals. The concentrations of PCBs in fish are of less concern to ecological receptors than DDTs.

Based on the human health and ecological risk assessments, it is EPA's current judgment that the Preferred Alternative or other remedial action identified in this Proposed Plan, is necessary to protect public health and the environment from actual or threatened releases of pollutants or contaminants into the environment which may present an imminent and substantial endangerment to public health or welfare.

Remedial Action Objectives

EPA's Preferred Alternative is an interim action including institutional controls, monitored natural recovery, and a clean sand cap to address potential erosion that could expose and release sediment with high concentrations of DDT and PCBs. After completing additional studies (see sidebar Remedy Selection Studies), EPA may determine that additional actions are necessary to protect human health and the environment. The interim action recommended in this proposed plan will support the following remedial action objectives (RAOs):

- Reduce to acceptable levels the risk to human health from ingestion of fish contaminated with DDTs and PCBs;
- Reduce to acceptable levels the risks from DDTs to the ecological community (i.e., benthic invertebrates, fish and piscivorous birds) at the PV Shelf;

	Subsistence consumption (Reasonable Maximum Exposure)		Recreational consumption (Central Tendency Exposure)	
Fish species	**Cancer Risk**	**Noncancer Risk** (>1 exceeds reference dose)	**Cancer Risk**	**Noncancer Risk** (>1 exceeds reference dose)
White croaker	6×10^{-3}	183	6×10^{-4}	37
Kelp Bass	1×10^{-4}	5	1×10^{-5}	0.9
Rockfish	1×10^{-4}	5	1×10^{-5}	0.9
Surfperch	7×10^{-5}	2	6×10^{-6}	0.5
CA Scorpionfish	3×10^{-4}	8	3×10^{-5}	2
Barred Sandbass	3×10^{-4}	10	3×10^{-5}	2

Table 1: Many fish found on PV Shelf pose a health risk. Reasonable maximum exposure assumed a consumption rate of 116 g/day. Central tendency exposure assumes a consumption rate of 21.4 g/day. Excess lifetime cancer risks of $1X10^{-4}$ (1 person in 10,000) to $1X10^{-6}$ (1 person in 1,000,000) are within EPA's risk management range. Noncancer risks are expressed as a hazard quotient (HQ). When the HQ is >1, there is concern for potential noncancer health effects.

Remedy Selection Studies

Reductive Dechlorination

EPA learned in 2007 that the DDT in the sediment off Long Point is transforming into less chlorinated compounds. Studies to identify the processes driving the transformation, and to learn whether this phenomenon is occurring throughout the contaminated sediment, will be completed in 2010. The potential to accelerate the process throughout the sediment deposit will also be assessed. These studies will be performed after the Interim Record of Decision (ROD) is signed.

White Croaker Tracking Study

In 2002, EPA and the National Oceanic and Atmospheric Administration (NOAA) conducted a coastal marine fish contaminants survey. One finding was that concentrations of DDT and PCBs in white croaker on the PV Shelf vary greatly over a small area. EPA and NOAA are planning a tracking study of feeding patterns of PV Shelf white croaker. The study will indicate where the fish are getting their contaminant body burdens. This information will be useful for ICs ocean monitoring, and for determining in the final ROD how much additional risk reduction is possible.

Continued on page 7

- Reduce concentrations of DDTs and PCBs in the surface waters over the PV Shelf to acceptable levels that meet ambient water quality criteria for protection of human health and ecological receptors; and

- Minimize potential adverse impacts to sensitive habitats and biological communities on the PV Shelf during remedy implementation.

Over time, the proposed action will reduce the excess cancer risk from DDT associated with consumption of white croaker from PV Shelf to one in one hundred thousand for recreational anglers and to one in ten thousand for subsistence fishermen.

The RAOs aim to reduce contaminant concentrations in fish by reducing the concentrations in their environment, i.e., sediment and water. The remedial action objectives described above are expected to be achieved when: 1) DDT in sediment averages 230 µg/kg at 1% total organic carbon (i.e., 23 mg/kg OC), and DDT in water averages 0.22 ng/L; and 2) PCBs in sediment average 70 µg/kg at 1% total organic carbon (i.e., 7 mg/kg OC), and PCBs in water average 0.064 ng/L.

The preferred interim action waives the PCB AWQC for human health. EPA will forecast when the PCB cleanup levels will be achieved after further investigation of PCBs flux and transport. Since the area with highest surface concentrations of PCBs largely overlaps the area of highest DDTs, the Preferred Alternative will reduce PCBs concentrations as well as DDTs.

Summary Of Remedial Alternatives

The Feasibility Study (FS) identified and screened possible response actions and remedial technologies for the EA sediment on Palos Verdes Shelf. The initial screening considered institutional controls, monitored natural recovery, containment (i.e., capping), removal, in-situ treatment and ex-situ treatment.

In accordance with the NCP, EPA evaluated each remedial option against implementability, effectiveness, and cost criteria. Based on this evaluation, the FS developed four alternatives:

- Alternative 1: the “no action” alternative

- Alternative 2: institutional controls and monitored natural recovery;

- Alternative 3: institutional controls, monitored natural recovery, and small cap (containment), and

- Alternative 4: institutional controls, monitored natural recovery, and large cap (containment).

EPA’s Preferred Alternative is Alternative 3: institutional controls, monitored natural recovery, and small cap.

Common Elements

All of the alternatives have an interim action waiver of the ARAR for PCBs ambient water quality criteria (AWQC) for human health. Until EPA completes an analysis of PCB loss rates, we cannot predict when the AWQC of 0.064 ng/L PCB may be

reached. Additionally, all of the alternatives (except no action) continue the ICs program, collect additional data, and monitor natural recovery.

Alternatives 2, 3, and 4 continue the ICs program of public outreach and education, enforcement, and monitoring. The ICs program limits human exposure to contaminated fish through an aggressive outreach program that uses a variety of channels to educate the public on safe fish consumption practices. Public outreach and education is carried out by the Fish Contamination Education Collaborative (FCEC), and entails angler outreach, outreach to at-risk ethnic communities, and outreach to commercial fish operations. The ICs monitoring component consists of monitoring contaminant levels in fish (particularly white croaker) at selected locations in the ocean, markets, landing areas and piers. Enforcement consists of enforcing existing white croaker regulations for commercial and recreational anglers, along with inspections of retail food facilities and enforcement of market protocol under the California Health & Safety Code. Efforts include monitoring and enforcing the daily catch limit and the commercial no-take zone for white croaker. The ICs program relies on partnerships with other federal, state, and local agencies as well as community-based organizations to prevent PV Shelf fish from reaching consumers. Please visit the www.pvsfish.org website for more information.

Another element shared by alternatives 2, 3 and 4 is some reliance on natural recovery. Data analyzed for the PV Shelf RI Report indicate contaminant loss is occurring across the site through transport, sediment burial, and, in the case of DDTs, chemical transformation. Contaminant levels in sediment and fish have dropped over the last decade. The alternatives include monitoring the levels of DDTs and PCBs in sediment, water, and fish to confirm that recovery is progressing. The alternatives would monitor chemical transformation of DDT throughout the site.

Also, alternatives 2, 3, and 4 include certain data gap studies: 1) a white croaker tracking study; 2) a DDT reductive dechlorination study; 3) toxicity tests on DDT breakdown products; and 4) analysis of PCBs in sediment and water.

Figure 4: The FCEC performs education and outreach to increase the public's awareness of the risk from consuming PV Shelf fish

PCBs on PV Shelf

Because the quantity of PCBs in the effluent-affected sediment is much less than DDTs (about 1 to 10), most of the investigation of PV Shelf has focused on DDT. However, the 2002 fish survey found that although the volume of PCBs is less, their threat to human health is greater. No data on PCBs within the sediment deposit were collected from the 1990s until 2006, when the study on DDT chemical transformation within the deposit incidentally found that PCBs are not degrading. More data on the extent of PCBs throughout PV Shelf will be obtained as part of this interim remedial action in order to calculate their long-term fate and the probable timeline to meet water and sediment goals under the selected alternative.

Capping Techniques

The combination of depth and soft sediment make PV Shelf a challenge to cap. EPA has been investigating possible low-impact capping techniques such as using a tremie tube to lay the sediment down gently. Modeling and treatability studies will be implemented as part of the remedial design for either Alternative 3 or 4.

No Action Alternative

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $0
Estimated Construction Timeframe: None

Superfund regulations require that the "no action" alternative be evaluated to establish a baseline for comparison to the other alternatives and to establish the baseline risk. Under this alternative, EPA would take no action to reduce contaminant concentrations or limit consumption of fish with unacceptable levels of DDTs and PCBs.

Alternative 2: Institutional Controls and Monitored Natural Recovery

Estimated Capital Cost: $3,650,000
Estimated Annual O&M Cost: $1,700,000 (ICs)
Estimated Five-Year Monitoring & Review: $2,360,000
Estimated Present Worth Cost: $15,500,000 (7% discount rate)
Estimated Construction Timeframe: None

Figure 6: All alternatives would monitor sediment and biota

Figure 5: All alternatives would monitor water quality

This alternative monitors the naturally occurring reduction in contaminants in the PV Shelf Study Area while controlling risks to human health through the ICs program.

Under this alternative, the surface water quality goal for DDT of 0.22 ng/L is estimated to be reached in 2037. The sediment cleanup level for DDT of 230 µg/kg is estimated to be reached in 2053. Until contaminant concentrations drop to RAO levels, this alternative would keep in place the ICs program.

Alternative 3: Institutional Controls, Monitored Natural Recovery with a Small Cap

Estimated Capital Cost: $36,600,000
Estimated Annual O&M Cost: $1,700,000 (ICs)
Estimated Five-Year Monitoring & Review: $3,136,000
Estimated Present Worth Cost: $49,000,000 (7% discount rate)
Estimated Construction Timeframe: 3 years

Alternative 3 is the preferred alternative. It includes the ICs and MNR program elements of Alternative 2. Additionally, it would accelerate natural recovery by placing clean sand/coarse silt over the area of PV Shelf that has the highest surficial contaminant concentrations and appears to be eroding. Without a cap, continued erosion will cause more EA sediment to be released into the environment. Alternative 3 would use low-impact techniques to place an 18-inch layer of clean sand/coarse silt over approximately 320 acres of the shelf. This alternative would require 864,000 cubic yards of clean silty sand. Cap material would come from harbor

or maintenance dredging projects or from clean areas of the shelf. The clean sediment cap would accelerate recovery through:

- Physical armoring of 320 acres of the shelf to prevent erosion of contaminated sediment by winter storms;
- Preventing flux of dissolved contaminants from the sediment into the water column;
- Reducing exposure and uptake of contaminants by benthic organisms by replacing effluent-affected sediment with a clean layer for recolonization.

The alternative includes studies to verify effectiveness of low-impact engineering techniques and to characterize further the geotechnical and chemical properties of the area to be capped. This alternative would cover an estimated 36.5 metric tons of DDT, accelerating attainment of water quality and sediment cleanup levels.

Under Alternative 3, the surface water quality goal for DDT of 0.22 ng/L is estimated to be reached in 2023. The sediment level for DDT of 230 µg/kg is estimated to be reached in 2039. The ICs program would continue to protect human health until remediation goals for fish are met.

Alternative 4: Institutional Controls, Monitored Natural Recovery With A Large Cap

Estimated Capital Cost: $64,100,000

Estimated Annual O&M Cost: $1,700,000 (ICs)

Estimated Five-Year Monitoring & Review: $3,420,000

Estimated Present Worth Cost: $76,700,000 (7% discount rate)

Estimated Construction Timeframe: 4 years

Alternative 4 shares the ICs and MNR program elements of Alternatives 2 and 3. Additionally, this alternative would cap approximately 640 acres under an 18-inch cap of clean sand/coarse silt. The cap would cover an estimated 54.4 metric tons of DDT. It would include areas of potential erosion as well as areas that have the highest DDT and PCB concentrations. Alternative 4 would require 1,776,000 cubic yards of clean silty sand. Cap material would come from harbor or maintenance dredging projects or from clean areas of the shelf. The clean sediment cap would accelerate recovery through:

- Physical armoring of 640 acres of the shelf bottom to prevent erosion of contaminated sediment by winter storms;
- Preventing dissolved contaminant flux from the sediment into the water column; and

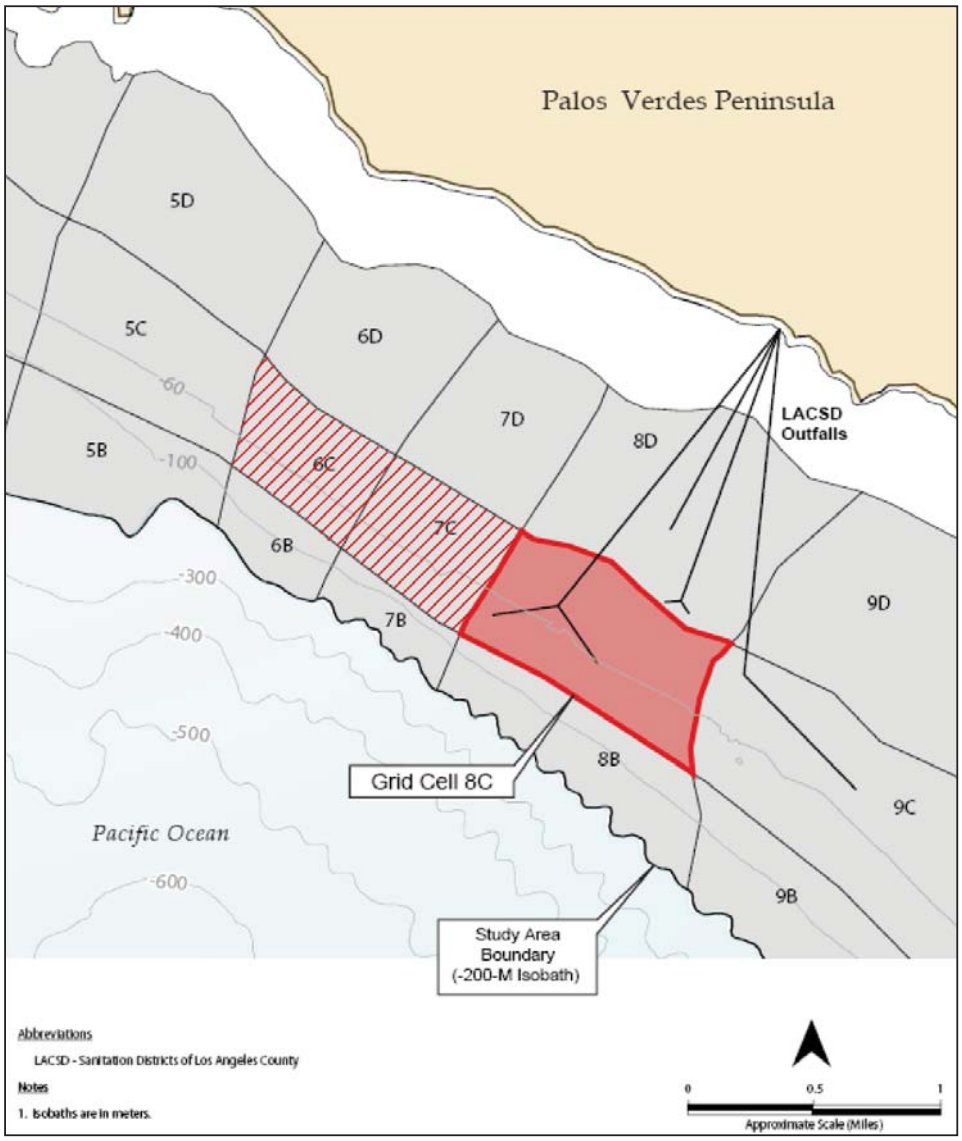

Figure 7: Alternative 3 would cap grid cell 8C. Alternative 4 would cap grid cells 8C, 7C, and 6C.

- Reducing exposure and uptake of contaminants by benthic organisms by replacing effluent-affected sediment with a clean layer for recolonization.

Alternative 4 would use low-impact techniques to prevent resuspension of the soft, silty contaminated sediment that covers the PV Shelf at the 150 to 220 ft. depth. Studies to verify effectiveness of low-impact engineering techniques and to characterize accurately the geotechnical properties of the proposed capping area would precede construction.

Under this alternative, the surface water quality criteria for DDT of 0.22 ng/L is estimated to be reached in 2019. The sediment cleanup level of 230 µg/kg DDT is estimated to be reached in 2031. This alternative would achieve immediately the PCB sediment cleanup level of 7 mg/kg PCBs OC for the shelf, but not the slope, of PV Shelf. The ICs program would continue to protect human health until fish reach remediation levels.

Evaluation Of Alternatives

The NCP requires the use of nine criteria to evaluate the different remediation alternatives individually and in comparison to each other. These criteria are *threshold criteria,* which are requirements that each alternative must meet in order to be eligible for selection. *Primary balancing criteria* are used to weigh major trade-offs among alternatives, and *modifying criteria* are state and community acceptance.

The two *threshold criteria* are 1) overall protection of human health and the environment and 2) compliance with applicable or relevant and appropriate requirements. The five *primary balancing criteria* are 3) long-term effectiveness and permanence; 4) reduction of toxicity, mobility or volume through treatment; 5) short-term effectiveness; 6) implementability; and 7) cost. The two *modifying criteria* are 8) state acceptance, and 9) community acceptance. EPA assesses public comment on the Proposed Plan to gauge community acceptance.

This section of the Proposed Plan discusses the relative performance of each alternative against the nine criteria and the rationale for selecting the Preferred Alternative. The Feasibility Study contains a detailed analysis of each alternative against the criteria and a comparative analysis of how the alternatives compare to each other.

Threshold Criteria:

1. Overall Protection of Human Health and the Environment

Alternatives 2, 3, and 4 protect human health through reduction of contaminants in surface sediment combined with a robust institutional controls (ICs) program. They fund angler and community outreach and a comprehensive enforcement program to prevent consumption of fish that may contain unsafe levels of DDT and PCBs. Alternatives 3 and 4 accelerate reduction of surface sediment concentrations of DDT and PCBs by capping areas of the shelf with the highest contaminant concentrations and the greatest potential to erode. The preferred alternative would cap half the area capped under Alternative 4, which would cause less resuspension of sediment and fewer loss of worms and crustaceans living in the sediment.

2. Compliance with ARARs

The preferred alternative is an interim measure and will become part of a total remedial action that will attain the applicable or relevant and appropriate federal requirements (ARARs). All alternatives would waive the PCB ambient water quality criteria (AWQC) for human health. EPA will determine if the PCB AWQC can be achieved after further investigation of PCBs flux and background concentrations. Under the Preferred Alternative, the DDT AWQC for human health, 0.22 ng/L, and ecological receptors, 1 ng/L, would be achieved 14 years sooner than under Alternative 2. Alternative 4 would achieve the DDT AWQC four years sooner than the Preferred Alternative. The PCB AWQC for ecological receptors has been met.

Primary Balancing Criteria:

3. Long-term Effectiveness and Permanence

This Proposed Plan is for an interim action that includes studies to determine what further remedial actions can provide additional, permanent risk reduction. Alternative 3 and 4 (capping), would limit contaminant migration and uptake by invertebrates. Monitoring would be necessary to ensure the long-term effectiveness and permanence of the cap(s). Alternative 3 caps only the part of the buried contaminated sediment deposit that appears to be eroding. This is less disruptive to the environment since it caps only about 1.6 percent of the PV Shelf, but covers an estimated 44 percent of the total mass of DDTs. The timeframe for PCB in sediment and water to attain RAOs would be calculated after gathering and analyzing additional data on PCB loss.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

None of the alternatives reduces contaminants through treatment. Capping does have the potential to reduce mobility of the contaminated sediment. Natural recovery has the potential to reduce the toxicity and volume of contaminants. Studies of enhanced reductive dechlorination may lead to treatment as part of the final remedy.

5. Short-term Effectiveness

Alternatives 2, 3 and 4 rely on the ICs program to protect human health in the short-term. Placement of capping materials will have an adverse short-term effect on the existing benthic organisms present in the surface sediments, but less so under the Preferred Alternative than under Alternative 4. Cap placement could resuspend the surficial soft sediment, exposing the deeper, more contaminated sediment. Alternative 2 would reach surface sediment levels of 230 µg/kg by 2053. The Preferred Alternative would reach target sediment levels by 2039. Although Alternative 4 would achieve sediment levels sooner than Alternative 3, by 2031 vs. 2039; however, less disturbance of sediment and destruction of benthic organisms makes Alternative 3 preferable. Although PCB loss rates have not been modeled, PCBs are co-located with the DDT; therefore, reductions of PCBs in water and sediment would be similar under each active alternative.

6. Implementability

Capping is a proven technique for remediation of contaminated sediment; however, capping in the open ocean over soft sediments at the depth of PV Shelf is unique. Fine-grained sediment, with high water content and low shear strength can be easily displaced or resuspended during cap placement. Cap stability after placement is also critical to assure contaminants in the pore water stay within the cap. For these reasons, Alternatives 3 and 4 would be more difficult to implement than the non-capping Alternative 2. To ensure proper cap installation, modeling and treatability studies to perfect an effective capping technique will be part of the remedial design for both Alternatives. Since the Preferred Alternative covers a smaller area and begins at the edge of the contaminated sediment deposit, it will be easier to implement than Alternative 4. Alternative 3 requires less than half the amount of capping material that Alternative 4 requires.

7. Cost

The cost of the alternatives was calculated for a 10-year period, under the assumption that a final ROD will be in place within 10 years. The estimated net present value of Alternative 3 is $49 million. For Alternative 2, the net present value is $15.5 million over 10 years, and Alternative 4 has a net present value of $76.7 million.

Modifying Criteria

8. State Agency Acceptance

In preparing this Proposed Plan, EPA has consulted with the CalEPA, Department of Toxic Substances Control (DTSC) as well as state, local and federal agencies that form the Montrose Settlement Restoration Program and the PV Shelf Technical Information Exchange Group. These agencies support a phased approach to remediation and agree with the need for additional studies.

DTSC supports the Preferred Alternative 3, with the understanding that this is an interim action. DTSC raised questions about the physical characteristics of the sediments, and the seismic impact on sediment transport and will continue to work with EPA through the remedial design process.

9. Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period and will be described in the Interim ROD, as well as documented in the Responsiveness Summary. EPA has been meeting regularly with community and environmental organizations to discuss the FS and the alternatives presented in the Proposed Plan. This has helped EPA become aware of the issues and concerns held by the public.

Summary Of Preferred Alternative

The Preferred Alternative for cleaning up the Palos Verdes Shelf Superfund Site is continuation of the existing ICs program, monitored natural recovery and placement of a 320-acre cap over the most contaminated sediments that are in an area that appears to be eroding. As part of the monitored natural recovery component of the remedy, EPA will undertake additional studies, discussed on pages 6 and 7. After these studies are completed, but no later than five years after completion of the Interim Remedial Action, EPA will decide whether additional capping or other measures are warranted in a Final Record of Decision.

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 and modifying criteria. EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment; (2) comply with all ARARs except the PCB AWQC for human health, which will be waived until PCB flux data can be collected and analyzed to determine if the AWQC can be met; (3) be cost-effective; and (4) utilize permanent solutions and alternative treatment technologies to the extent practicable. This interim action does not meet the preference for treatment because the size, depth, and complexity of the EA deposit render the identified treatment options infeasible.

Palos Verdes Shelf Superfund Site

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Request Comments

Contacts

Carmen White, SFD-8-2
Remedial Project Manager
(Remedial Investigation and Cleanup)
(415) 972-3010
white.carmen@epa.gov

Sharon Lin, SFD-8-2
Remedial Project Manager
(Institutional Controls)
(415) 972-3446
lin.sharon@epa.gov

Jackie Lane, SFD-3
Community Involvement Coordinator
(415) 972-3236
lane.jackie@epa.gov

U.S. EPA Region 9
75 Hawthorne Street
San Francisco, CA 94105
Toll Free Hotline: (800) 231-3075

Websites:
http://www.epa.gov/region09/features/pvshelf/
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United States Environmental Protection Agency
Region 9
75 Hawthorne Street (SFD-6-3)
San Francisco, CA 94105
Attn: Jackie Lane (PVS 6/09)

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