Palos Verdes Shelf Superfund Site

Institutional Controls Program

Implementation Plan

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1. Executive Summary

The Palos Verdes Shelf Superfund Site is among the most contaminated sediment sites in the nation as a result of historic DDT and PCB deposits. In 2001 the U.S. Environmental Protection Agency (EPA) issued an Action Memorandum (EPA 2001a), discussing the actions to take place to address the risks posed by the site, under its Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) "Superfund" statutory authority. EPA selected the Institutional Controls Program as non-engineering measures to stop immediate risk exposures from eating contaminated fish related to the site. EPA issued a draft Implementation Plan (EPA 2001b) for the Institutional Controls Program in December 2001, laying out its expectations and detailed activities within the scope of the Action Memorandum. This document is a natural progression from the Action Memorandum and the 2001 draft Implementation Plan. It details the Institutional Controls EPA has implemented since 2001, and what EPA anticipates carrying out from 2008 and beyond.

The heart of this document is Section 4, the Palos Verdes Shelf (PVS) Institutional Controls (ICs) Implementation Plan. It is divided into four (4) subsections: the three components that make up the ICs, and an evaluation plan. The ICs program components are (1) Public Outreach and Education, (2) Monitoring and (3) Enforcement. The three components are inextricably linked. Public Outreach and Education consists of efforts carried out by the Fish Contamination Education Collaborative (FCEC), which entails angler outreach, outreach to at-risk ethnic communities and outreach to commercial fish operations. Monitoring 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 enforcing market protocol under the California Health & Safety Code. The evaluation section details how the success of the program as a method for reducing risks from consuming DDT and PCB contaminated fish will be quantified.

2. Introduction

Since July 1996, the EPA has been evaluating risks to human health and the environment, as well as potential cleanup actions, for the contaminated sediments on the Palos Verdes Shelf near Los Angeles, CA. On September 28, 2001, EPA issued an Action Memorandum, selecting specific institutional controls (outreach & education, monitoring and enforcement) as interim actions to address existing human health risks associated with the consumption of contaminated fish from the Palos Verdes Shelf. This document describes the anticipated scope of those activities in more detail and outlines EPA's current strategy for their implementation.

EPA has involved a variety of federal, state and local agencies, along with community-based organizations (CBOs), in the development and implementation of the outreach and education, monitoring and enforcement activities. Their participation is, in fact, critical to the success of the Institutional Controls program. A number of these entities have been involved in previous site-related activities, such as the EPA-sponsored pilot outreach and education project conducted by the California Department of Health Services (CDHS), and EPA continues to build on the success and strength of those existing partnerships.

In addition to providing more detail on the various program implementation elements, this document is also intended to serve as a discussion piece for refining the organizational framework and administrative structure that is needed to implement the Institutional Controls program. As described in the Action Memorandum, EPA has authorized the expenditure of $7.8 million for carrying out these actions over a 10-year period. EPA expects that, during this time period, the organization structure may change, the focus or nature of activities may shift, and the roles of agencies/organizations may evolve. However, the goal of the program will continue to remain the same – reducing risk exposure from eating contaminated fish related to the Palos Verdes Shelf site.

2.1 Background

The Palos Verdes Shelf (PVS) is located within the Southern California Bight (an area of the coastal Pacific Ocean between Point Conception and San Diego, California). The site consists of contaminated sediments that are present on both the continental shelf and continental slope, in a 43 square kilometer area about 1-3 miles offshore between Point Fermin and Point Vicente on the Palos Verdes peninsula.

The Joint Water Pollution Control Plant (JWPCP) outfalls operated by the Los Angeles County Sanitation Districts (LACSD) discharge treated municipal and industrial wastewater at depths of approximately 60 meters on the PVS, offshore from White Point. From 1947 to 1982, the Montrose Chemical Corporation of California, Inc., (Montrose) manufactured the pesticide dichloro-diphenyl-trichloroethane (DDT) at its plant near Torrance. Wastewater containing significant concentrations of DDT was discharged from the Montrose plant into the sewers, flowed through the JWPCP and was discharged to the ocean waters of the PVS through the LACSD outfalls.

Polychlorinated biphenyls (PCBs) from several industrial sources were also discharged into the sewer system. The DDT and PCBs that passed through the treatment plant mixed with the suspended solids in the discharge flowing out of the White Point sewer outfalls and settled to the ocean floor to form a large sediment deposit. This deposit covers a large area of the ocean floor between Point Vicente in the northwest and Point Fermin in the southeast.

The presence of elevated DDT and PCB concentrations in surface sediments, overlying waters and in fish from the PVS demonstrates that site contaminants are mobile, susceptible to transport, and available for biological uptake. Consequently, current conditions represent a potential source of risk to organisms that inhabit the site or are linked via the food web to those organisms. These risks include acute and chronic toxicity, reproductive impairment, and biological transfer and contaminant accumulation in the marine food web. Potential risks to humans are associated with consumption of seafood that contains DDT and PCBs.

In 1985, the State of California issued an interim health advisory recommending limitations on the consumption of certain sport fish and discouraging consumption of white croaker caught in Santa Monica Bay, on the Palos Verdes Shelf, and in the Los Angeles/Long Beach Harbor area because of DDT and PCB contamination. The draft advisory was finalized by the State of

California Office of Environmental Health Hazard Assessment (OEHHA) in 1991 based on a subsequent study on seafood contamination (Pollock et al., 1991). The advisory recommends that recreational anglers not consume white croaker caught in most areas offshore of Los Angeles County and Orange County and that anglers greatly limit consumption of a number of other fish species caught on or in the vicinity of the Palos Verdes Shelf due to the level of DDT and PCBs in the fish. Following the health advisory, warning signs were posted by Los Angeles County Department of Public Health (LACDPH) and City of Long Beach at several fishing locations. The state's fish consumption advisories have been included in the California sport fishing regulations since March 1992. The State of California has produced and distributed related informational booklets.

In 1990, the CDFG closed commercial fishing of white croaker on the PVS because of the threat to human health posed by the DDT and PCB contamination in these fish. The closure extends from Point Vicente and Point Fermin and from the shoreline out three miles.

In July 1996, USEPA determined that the presence of the contaminants DDT and PCBs represented a threat to human health, welfare or the environment, and initiated what the Agency refers to as a non-time-critical removal action under the Superfund program to further investigate these threats and evaluate possible cleanup actions (EPA 1996).

In March 1998, CDFG established the white croaker bag limit of 10 fish per day for sport fishermen. Placing the bag limit of 10 on white croaker allowed a reasonable sport use statewide, while discouraging illegal harvesting under a sportfishing license for commercial purposes.

As part of the Montrose Superfund Site work, a cleanup action was completed in February 1999 to remove and dispose of DDT-contaminated sediment from a 3,600-foot reach of the LACSD sewer immediately downstream of the former Montrose facility. More than 165 tons of sediment were removed and incinerated off-site. In addition, LACSD previously removed additional sediment (with much lower levels of DDT) from downstream segments of the sewers as part of their ongoing sewer maintenance program. These actions were undertaken in large part to prevent the further release of DDT-contaminated sewer sediments into the ocean.

In July 1999, CDHS began work on an EPA-funded pilot public outreach and education program regarding the health risks associated with consumption of contaminated fish from the Palos Verdes Shelf area. Working in cooperation with several community-based organizations and other agencies, a variety of informational and training materials were developed and distributed. At this time, LACDPH posted new warning signs at various fishing locations to replace those that were damaged or missing. In addition, the City of Long Beach posted similar signs at several fishing locations along the City's waterfront. The efforts of the pilot public outreach and education program was initially called the Seafood Contamination Task Force and came to be known as the Fish Contamination Education Collaborative (FCEC).

In March 2000, EPA issued for public review a proposed plan that recommended the use of Institutional Controls as an initial step to address the existing human health risks posed by the contaminated sediments at the PVS site (EPA 2000a). Institutional controls refer to non-engineering actions, such as legal measures, that help reduce human exposure to contaminants.

Following review of public comments, EPA selected the proposed actions (increased enforcement of existing commercial and recreational fishing restrictions, public outreach and education, and monitoring) but with a change in emphasis (from enforcement to outreach and education) relative to the proposed plan. The final decision is reflected in the Action Memorandum (EPA 2001a). These activities are being carried out while EPA continues to evaluate potential long-term cleanup actions, such as capping, for the site.

EPA conducted a pilot capping project at the Palos Verdes Shelf in the summer of 2000 as part of the ongoing evaluation of potential remedial actions. The pilot capping project provided useful information for the evaluation of capping as a response action. EPA is in the process of completing its feasibility study of remedial actions and recommendations on the engineering controls (e.g. physical clean up) for the Palos Verdes Shelf site, at the time of document. EPA expects the Institutional Controls program will continue to play a significant role in the overall site cleanup strategy.

In addition to the activities described above, the Natural Resource Trustee agencies[1] (referred to herein as the Trustees), through the Montrose Settlements Restoration Program (MSRP), has developed a restoration plan and programmatic environmental impact statement/environmental impact report to restore natural resources injured by DDTs and PCBs in the Southern California Bight, including the Channel Islands National Park (MSRP 2005). Some of the activities anticipated by the MSRP, such as fish sampling and public information, are very similar in nature to those which EPA will be implementing, although the MSRP's focus is slightly different. EPA expects to continue to collaborate with the MSRP on these activities when appropriate.

3. Institutional Controls

EPA defines Institutional Controls as "non engineering instruments, such as administrative and legal controls, that help to minimize the potential for human exposure to contamination and protect the integrity of the remedy." ICs work by limiting land or resource use and by providing information that helps modify or guide human behavior at properties where hazardous substances prevent unlimited use and unrestricted exposure (EPA 2004). They are often used at Superfund sites as a supplement to active remediation measures, such as soil/sediment excavation and treatment, capping, groundwater pump and treat, etc., to address risks to human health.

The National Contingency Plan (NCP), implementing regulations for the Superfund Program, clearly states, however, that ICs should not be used as a substitute for active remediation measures as the sole remedy unless such active remediation measures are determined not to be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selection of remedy (NCP §300.430(a)(1)(iii)(D)). Currently, EPA is evaluating remediation options for the site, and has determined that ICs will play a key role in protecting public health

[1]For the Palos Verdes Shelf, the Natural Resource Trustee agencies are the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish & Wildlife Service, the National Park Service, CDFG, the Calif. State Lands Commission, and the Calif. Dept. of Parks and Recreation.

due to the location and amount of contaminated sediment. The following categories of activities have been selected as ICs for the PVS:

- **Public Outreach and Education** – to increase awareness and understanding of the existing fish consumption advisories and fishing restrictions;

- **Monitoring** – to evaluate and track contaminant concentrations in fish (primarily white croaker) caught at or near the site as well as those sold in retail fish markets and served in restaurants; and

- **Enforcement** – based on the existing commercial and recreational restrictions on white croaker fishing established by the California Department of Fish and Game (CDFG).

Elements of these activities have been implemented in the past to varying degrees, as described in the following sections. Additionally, portions of this document provide a detailed description of what EPA anticipates will be the types of activities to be implemented as part of the selected ICs for the next five years. The last section also discusses how the program will be evaluated to determine the success of the ICs program.

This ICs Implementation Plan has been developed to detail the non-engineering approach EPA is taking to address the PVS contamination. Reviewers' comments on the content of this document are encouraged and are necessary in order to ensure that the subsequent response actions are effectively implemented in a technically sound and administratively feasible manner, and will achieve significant, cost-effective reductions in risks to human health.

4. Palos Verdes Shelf Institutional Controls Implementation Plan

This ICs Implementation Plan for the PVS was developed based on the following:

- December 2001 Institutional Controls Implementation Plan Draft (EPA 2001b);
- Contracts/Cooperative Agreements established between EPA and various agencies (EPA 2008a-d); and
- Palos Verdes Shelf Institutional Controls Program Road Map (developed in collaboration with stakeholders from 2006 to 2008) (EPA 2008e);
- Palos Verdes Shelf Institutional Controls Strategic Planning Meeting Discussion Notes (products of strategic planning efforts with stakeholders from 2005 to present) (EPA 2005a, 2005b, 2006, 2007 and 2008f).

EPA is responsible for conducting the PVS investigation under the authority of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to determine the nature and extent of contamination of the PVS, to assess effects of the contamination on the environment and human health, and to select and implement appropriate response actions to address the risks posed by contamination at the site.

The purpose of the PVS ICs program is to protect the most vulnerable populations in Los Angeles and Orange Counties from the health effects of consuming contaminated fish related to the Palos Verdes Shelf Superfund Site. Substantial consumption of contaminated fish over many years can lead to health problems that affect the nervous, immune, endocrine, and reproductive systems, infant development and cancer. Particularly at risk are women of childbearing age, pregnant and nursing women and young children from ethnic and angling communities.

To protect public health from the PVS contamination, it is necessary to focus on how contaminated white croaker is introduced into community diets. The ICs program has identified and is targeting the two routes of exposure for DDT and PCBs: consumption of contaminated fish bought at commercial outlets and consumption of contaminated fish caught by local anglers. Addressing these routes of exposure, it is the long-term objective of the ICs program to accomplish the following:

1. **Commercially Caught Fish**: Eventually eliminate contaminated white croaker from being available commercially (fish markets, grocery stores, restaurants, etc.)
    - Ensure catch ban area boundaries are updated based on the latest monitoring data and consistent with state regulations
    - Ensure adherence to bag limit (currently 10 white croaker) caught by anglers

2. **Angler Caught Fish**: Promote the adherence to and awareness of the bag limit for angler-caught white croaker and the local fish advisory from Malibu to Dana Point
    - Ensure fish consumption advisories are updated based on the latest monitoring data
    - Reduce risk from consumption of contaminated fish (i.e. white croaker) caught by anglers

The ICs program will accomplish these objectives through an integrated program of public outreach and education, monitoring and enforcement led by EPA and carried out as a concerted effort by a combination local, state and federal agencies along with community organizations in Los Angeles and Orange counties. Since the inception of the ICs program, one of the cornerstones has been inter-agency collaboration among more than 20 different agencies and organizations to address the local fish contamination issue.

Some of the participating organizations include National Oceanic and Atmospheric Administration (NOAA) as a part of the MSRP, California Department of Fish and Game (CDFG), Cal-EPA Office of Environmental Health Hazards Assessments (OEHHA), California Department of Health Services Environmental Health Investigations Brand (EHIB), County of Los Angeles Public Health, Orange County Healthcare Agency, Santa Monica Bay Restoration Commission (SMBRC), City of Long Beach, Heal the Bay, Cabrillo Marine Aquarium and Korean Resource Center. Additionally, other agencies and community-based organizations have been involved at various points in the ICs program.

The following sections will detail the activities carried out by specific organizations with the goal of protecting public health. ICs program activities have been carried out since 2001 when

EPA issued the Action Memo. The following sections will discuss what has been done in the past and what will be carried out in the future through 2013.

4.1 Public Outreach and Education

The public outreach and education component of the PVS ICs program has been dubbed the Fish Contamination Education Collaborative (FCEC), a consortium of federal, state and local agencies along with community organizations collaborating to address the public health risks associated with eating contaminated fish related to the PVS. FCEC provides public outreach and education through three main programs: angler outreach, family/community outreach and commercial outreach.

Public outreach and education activities are generally developed to provide a specific audience with information necessary to make sound, safe choices and/or decisions related to a particular issue. Typical public outreach and education activities/materials include warning signs, brochures, fishing restrictions and regulations, various media (including broadcast, online and print) campaigns, and development and delivery of educational programs. With respect to contaminated fish issues, one of the primary goals is to ensure that anglers and fish consumers are aware of and understand the State's fish consumption advisories.

Since EPA selected ICs as an initial response to the risk posed by the PV Shelf site, FCEC has created a solid foundation of awareness within targeted communities. From 2001 to 2007, FCEC's emphasis was on raising awareness about fish contamination to angling populations and ethnic minority communities, populations deemed the most at risk due to disproportionate exposure to contaminated fish. FCEC had reached thousands of fishermen and community members with fish contamination information. However, the program did not evaluate what these populations were doing with the outreach information provided by FCEC, and particularly, how the public was using the information to protect their health.

Beginning in 2007, FCEC began to look at the fish consumption and fishing behaviors target populations engaged in before and after outreach interventions in an effort to evaluate risk reduction. In particular, outreach efforts were developed to promote specific behaviors that would protect the public from DDT and PCB-contaminated fish consumption. As the program moves forward, FCEC is shifting the emphasis of outreach programs away from awareness and towards behavior change. However, the program will continue to pursue opportunities to raise awareness about local fish contamination as well as health risks associated with consuming potentially contaminated white croaker. FCEC understands that while awareness does not lead to changes in behavior, lack of awareness could be a barrier preventing community members from engaging in desired behaviors.

4.1.A Public Outreach and Education: Looking Back

One of the key activities of FCEC has been to convene meetings along with update and input opportunities with the group of key stakeholders that comprise FCEC. The primary purpose of

FCEC meetings and update opportunities is to provide a forum to share information among participants, establish program goals and schedules, discuss roles and responsibilities, and address any issues or constraints encountered. FCEC is not expected to reach consensus on program issues, rather FCEC serves to facilitate stakeholder input. Venues to update and engage partners include convening in-person meetings, organizing conference calls and developing a newsletter for the program. The collaboration of this group has resulted in the development of program messages, materials and direction. Additionally, individual member organizations are responsible for carrying out various activities for the ICs program.

Angler Outreach

The Angler Outreach Program has been historically carried out by Heal the Bay and Cabrillo Marine Aquarium and has targeted anglers at selected piers, shorelines and bait shops. The program's primary aim has been the education of pier and shoreline anglers in Los Angeles and Orange County on the risks of consuming DDT and PCB-contaminated white croaker. Secondary goals were to educate anglers on other locally caught fish with regards to catch limits and consumption guidelines concerning DDT, PCBs, and mercury.

The outreach has been carried out on piers, shorelines and bait shops selected due to their proximity to the PVS site. Pier outreach has been conducted at the following piers: Santa Monica, Venice, Hermosa, Redondo, Cabrillo Pier J, Belmont, Seal Beach and Huntington Beach. Pier outreach is conducted year-round on a weekly basis, with outreach workers visiting piers at various times to allow for the greatest temporal variability. In addition to the piers, eight shoreline locations along the Palos Verdes Shelf were also targeted: Malaga Cove, Bluff Cove, Lunada Bay, Long Point, Point Vicente, Abalone Cove, Royal Palms and White Point.

The outreach sessions with anglers on piers and at shorelines consisted of addressing the location of contamination, health effects, red and yellow zone advisories, white croaker as fish of concern, and ways to reduce chemical exposure. Anglers were also provided with take-home materials such as the tri-fold with the fish advisory. The Angler Outreach Program has collected data from anglers reached regarding their fishing habits, intended behaviors, information retention and demographic information.

The data collected showed that the majority of anglers reached through the outreach program had an increased awareness of local fish contamination and *intended* to reduce their exposure to DDT and PCB-contaminated white croaker. Outreach participants were asked “Which fish off the Los Angeles and Orange County coast has the highest level of DDTs and PCBs?” Following the educational session, outreach participants were able to identify white croaker as the fish of concern. The data also showed that when asked what steps participants would take to reduce exposure to contaminants in fish, most respondents indicated they would throw the white croaker back or discontinue eating it (intent to change behavior based on the outreach information).

The Angler Outreach Program found that the shoreline outreach efforts were not as successful as the pier outreach efforts due to the high cost of conducting outreach in the field for a limited number of anglers reached. Anglers along the Palos Verdes Peninsula shoreline were too few and far between to conduct an effective outreach program on a limited budget.

For the bait shop outreach, the program visited 30 bait shops selected within proximity to the outreach piers. Bait shops were defined as any business that sold fish bait or fishing equipment. Each store visit included a short presentation on FCEC and the Angler Outreach Program to store staff and dispensation of materials for distribution to anglers. This element of the program was evaluated for effectiveness and continuance for the 2008 program year and beyond.

Community Outreach

In addition to the Angler Outreach Program, FCEC has carried out the Community Outreach Program to reach community members who may consume contaminated fish made available through commercial means as well as through angling family and friends. The goal of the Community Outreach Program has been to build local capacity to address fish contamination issues through training and education, and to raise awareness of local fish contamination resulting from the Palos Verdes Shelf contamination.

Community outreach efforts have resulted in reaching more than 100,000 community members in different languages with fish contamination information and distributing more than 110,000 in-language program materials. This type of effort was made possible by working closely with a number of community-based organizations serving different communities and with public health nurses from Los Angeles County, Orange County and the City of Long Beach.

The Community Outreach Program has worked with CBOs to reach ethnic minority communities including the Latino, Chinese, Vietnamese, Korean, Filipino and Pacific Islander communities. Some of the CBOs FCEC has worked with in the past has been the Chinatown Service Center (CSC), Multicultural Area Health Education Center (MAHEC), Guam Communication Network (GCN), Korean Resource Center (KRC), Vietnamese Community of Orange County (VNCOC), People Community Organized for Reform and Empowerment (PCORE), and the Filipino American Service Group (FASGI). In addition to reaching the ethnic groups embodied by these CBOs, collaboration with these groups have resulted in a variety of in-language materials developed to reach these various ethnicities.

FCEC has worked with the CBOs to reach their constituents with fish contamination information through a variety of means. This has included reaching community members through in-language workshops, presentations, one-on-one sessions and booths/tabling. Venues for these outreach tactics have spanned school presentations, English as a Second Language classes, churches and health fairs. During all types of outreach the following topics were covered: short history of the problem, red and yellow zones, health effects and populations at-risk, white croaker identification/reasons for concern, and cleaning and cooking methods to reduce exposure.

Public health nurses from Los Angeles County, Orange County and City of Long Beach have also been involved in raising awareness among community members about the local contamination. Los Angeles County has trained more than 400 Public Health Nurses and Environmental Health Inspectors on the fish contamination education messages. In addition, the Toxics Epidemiology Program collaborated with a variety of internal programs that target the most vulnerable population (e.g. pregnant women, women of child bearing age and children) to

develop effective ways to address fish contamination issues. The collaborated Los Angeles County Department of Public Health programs are Maternal Child and Adolescent Health program (MCH), Comprehensive Perinatal Services program (CPSP), Child Health and Disability Prevention program (CHDP) and the Nutrition Program. Through various collaborative efforts, over 360 obstetricians and more than 1,200 pediatricians were reached throughout Los Angeles County. These physicians provide medical care to pregnant women and children which are the populations most vulnerable to effects from fish contamination. The goal of this effort has been for these professionals to pass this information along to the patients that they care for to raise awareness.

Through evaluation tools used in various outreach sessions, FCEC found that people reached through the community outreach program became increasingly aware of the local contamination. Additionally, a majority of community members indicated their *intention* to change their behaviors in two ways: by asking where fish comes from prior to consumption and by changing fish preparation methods (such as cooking and cleaning). By working through community-based organizations and local public health agencies, FCEC laid a solid foundation of awareness among community members.

Commercial Outreach

The purpose of the Commercial Outreach Program is to provide outreach and education to those retail and wholesale establishments within Los Angeles and Orange Counties that may purchase and/or distribute contaminated seafood associated with the PVS to customers. This purpose is closely tied in with the long term program objective to eliminate commercial availability of contaminated white croaker.

The commercial establishments targeted for this effort have been fairly narrow in scope, focusing primarily on ethnic markets that serve specific communities. This is based on a 1997 study by Heal the Bay that found levels of DDT and PCBs in some white croaker purchased in retail markets (primarily Asian markets) were similar to those in white croaker caught by the Los Angeles County Sanitation District (LACSD) on the PV Shelf in the commercial catch ban area.

To accomplish this, the Commercial Outreach Program has implemented a community-based intervention to provide market owners and customers with information and resources about local fish contamination. In this community-based approach, members of CBOs working with FCEC have reached out to local markets to inform markets about the local contamination and protocols markets should follow when purchasing their fish. Three key points, based on consumer protection laws, are conveyed during commercial outreach:

- Buy fish only from approved sources, such as licensed fish wholesalers, distributors or commercial fishermen;
- Know where your fish was caught;
- Keep and file all invoices when fish is purchased.

The Commercial Outreach Program efforts are inextricably linked to the Monitoring and Enforcement efforts carried out by local health inspectors.

4.1.B Public Outreach and Education: 2008 and Beyond

As mentioned earlier, the early focus of the Public Outreach and Education program was to primarily raise awareness of the local contamination resulting from the Palos Verdes Shelf Superfund Site. While FCEC still seeks to raise awareness, another goal of the program is to evaluate behavior change. That is, the program records target audience behaviors before and after educational interventions to assess whether community members are protecting themselves from the hazards of consuming contaminated fish.

While this new emphasis on behavior change is being incorporated into the program, other program mainstays will remain. One such mainstay will be convening the FCEC collaborative group through meetings, conference calls and additional update opportunities. The cooperative effort of the group has been invaluable and instrumental in the success of the PVS ICs program. As such, EPA will continue to use FCEC as resource to discuss program progress, direction, materials and messages. Additionally, the following specific programmatic elements are being and will be carried out:

Angler Outreach

In moving the program forward, EPA and stakeholders have identified the following as tactics that will be used and implemented over the next five years to help the ICs program protect public health:

- Create new educational materials based on OEHHA and/or EPA risk assessment and risk management recommendations (e.g. advisory update)
- Update fish advisory signage based on the updated assessment
- Utilize the pier outreach program to educate pier and shore-based anglers in Los Angeles and Orange County on the risks of consuming contaminated white croaker and other locally-caught fish
- Ensure all local anglers receive fish advisory information when obtaining a fishing license by distributing local advisory information in a simple tip card at the time of license purchase
- Outreach to angler organizations to educate pier and shore-based anglers in Los Angeles and Orange County on the risks of consuming contaminated white croaker and other locally-caught fish

Advisory Update. Essential in carrying out the Angler Outreach Program is updating the fish consumption advisory, as the advisory is the key message conveyed during outreach. The current fish consumption advisory was created in 1991 based on a study on seafood contamination (Pollock et al., 1991). More recently, in 2007 EPA and MSRP completed a comprehensive ocean fish sampling effort to assess current fish contamination levels (EPA/MSRP 2007). The fish consumption advisory will be updated based on the recent data in an effort to provide anglers and community members with the most updated information. Based on stakeholder discussions and programmatic importance, this tactic was identified as a priority.

Signage Update. When the State of California initially issued the interim health advisory in 1985, Los Angeles County supported the advisory by posting warning signs at several fishing locations. In 1999 the County replaced damaged and missing warning signs. The City of Long Beach also placed warning signs at various points along the waterfront. When the new fish consumption advisory is developed, Los Angeles County will update fishing signage to be consistent with the new advisory.

Signage is a relatively simple way to alert anglers about certain contaminated fish. In some areas, signage will be used to supplement the efforts of the Angler Outreach Program. In previous years the Angler Outreach Program noted the lack of signage at outreach piers and recommended increasing signs at popular fishing piers. The Program noted that Pier J and Cabrillo were the only locations adequately stocked with signs.

In other areas, for example shoreline fishing sites along the Palos Verdes Shelf, signage may be the only mechanism alerting the angling public about the local contamination. In the early program years, the Angler Outreach Program explored regular outreach to shoreline fishing spots in the red zone. This effort was discontinued, however, due to the high cost of staffing compared to the handful of anglers reached. When the Angler Outreach Program discontinued the shoreline outreach, it was recommended that signs be erected in these locations due to the locale's proximity to the red zone.

Given this, an inventory of signage should be taken at the nine outreach piers: Santa Monica, Venice, Hermosa, Redondo, Cabrillo, Pier J, Belmont, Seal Beach and Huntington Beach. Additionally, new and old locations should be evaluated for placement of signage such as Rainbow Harbor, Malaga Cove, Bluff Cove, Lunada Bay, Long Point, Point Vicente, Abalone Cove, Royal Palms and White Point. Based on the inventory and evaluation, signs with the updated advisory information should be erected at these locations.

Pier Outreach. Consistent with the past, Heal the Bay and Cabrillo Marine Aquarium will continue to carry out the pier outreach activities, with the program's primary aim continuing to be the education of pier and shoreline anglers on the risks of consuming DDT- and PCB-contaminated white croaker. Secondary goals are to educate anglers on other locally caught fish with regards to catch limits and consumption guidelines concerning DDT and PCBs. The fish consumption advisory is essential in carrying out this program, as the advisory is the key message conveyed during outreach.

It is important for FCEC to continue with pier outreach efforts as data collected from the program and analyzed in 2008 indicate that outreach has a positive effect on awareness of local fish contamination and behavior. To gauge knowledge, anglers were asked, "Which fish off the LA and Orange County Coast has the highest levels of DDT and PCBs?" Among anglers who were not exposed to outreach, only 35 percent knew that the white croaker contains the highest levels of DDTs and PCBs. Among anglers exposed to outreach, 88 percent answered white croaker.

A similar pattern emerges when behavior is evaluated. Anglers were asked, "Have you taken any steps to reduce exposure to chemicals in fish caught off the Los Angeles and Orange County

coasts?" Reinforcing the effectiveness of the Angler Outreach Program, 97 percent of anglers who received outreach said they caught and released white croaker or stopped eating white croaker. However, 64 percent of anglers who did not receive outreach answered the same.

Initially, Heal the Bay and Cabrillo Marine Aquarium will carry out the pier outreach components at the following nine piers: Santa Monica, Venice, Hermosa, Redondo, Cabrillo, Pier J, Belmont, Seal Beach and Huntington Beach. New piers, such as Rainbow Harbor, may be added based on program recommendations.

Outreach efforts will be split between Education and Monitoring. The purpose of the Education sessions are purely to educate anglers on the local contamination, white croaker as a species of most concern, ways to avoid exposure to contaminants and to provide anglers with take-home materials. The purpose of the Monitoring sessions are to collect data from anglers to discern angler habits and behaviors associated with fishing, such as cooking methods, consumption patterns and frequency of fishing. The data collected will be fed back into the program to evaluate its efficacy and appropriately structure future efforts.

Yearly analysis of data is anticipated, with program adjustments made along the way. Anticipated changes include increasing outreach efforts in summer months to mirror an increased angler audience and reach out to anglers when white croaker is more abundant; and decreasing efforts when there are less anglers and less white croaker. Additionally, locations where outreach is conducted may be reassigned based on monitoring data, proximity to the red zone, and complementary efforts being carried out by California Department of Fish and Game.

Fish Advisory Information and Fishing Licenses. Another tactic that emerged from stakeholder discussions was to ensure all local anglers receive fish advisory information when obtaining a fishing license by distributing local advisory information in a simple tip card at the time of license purchase. This tactic is another way to increase awareness of the advisory and the local chemical contamination. This would ensure that anglers who purchase fishing licenses are exposed to the advisory information. Additional discussions with stakeholders would be appropriate to obtain input on the best way to carry out this task.

Fishing Organizations. Finally, the last tactic to emerge from stakeholder discussions was reaching out to angler organizations to educate pier and shore-based anglers in Los Angeles and Orange County on the risks of consuming contaminated white croaker and other locally-caught fish. The emphasis here is on increasing awareness by using existing organizations to spread the word about local contamination to their membership bodies. This tactic would entail working with partnering agencies such as NOAA, California Department of Fish and Game, Heal the Bay or Cabrillo Marine Aquarium to reach the angler organizations. Some of these organizations have mentioned existing efforts to reach out to the angling organizations. In this way FCEC could tap into burgeoning or established relationships to promote additional awareness about local fish contamination.

Community Outreach

EPA and stakeholders have identified the following as tactics that will be used and implemented over the next five years to move the Community Outreach Program forward:

- Create new educational materials based on OEHHA or EPA risk assessment and risk management recommendations (e.g. advisory update)
- Utilize community organizations to educate at-risk families and communities about the health risks related to white croaker consumption, and provide them with best practices for preparing and eating locally caught fish
- Utilize health professionals and community clinics to educate at-risk families and communities about the health risks related to white croaker consumption, and provide them with best practices for preparing and eating locally caught fish
- Directly outreach to fish consumers to educate at-risk families and communities about the health risks related to white croaker consumption, and provide them with best practices for preparing and eating locally caught fish

Advisory Update. As mentioned in the previous Angler Outreach section, updating the fish consumption advisory is important to the Community Outreach Program as well, since the advisory is the key message point conveyed during outreach. The current fish consumption advisory was created in 1991 based on a study on seafood contamination (Pollock et al., 1991). More recently, in 2007 EPA and MSRP completed a comprehensive ocean fish sampling effort to assess current fish contamination levels. The fish consumption advisory will be updated based on the recent data in an effort to provide anglers and community members with the most updated information. Based on stakeholder discussions and programmatic importance, this tactic was identified as one of the leading priorities to be addressed.

Utilize Community Organizations. Utilizing community organizations to educate at-risk families and communities about the health risks related to white croaker consumption is a tactic historically employed by FCEC that the program will continue to use. As mentioned earlier, there will be a slight shift in emphasis for this program: while the program will continue to raise awareness, the program will also look at behavior change among target populations to determine risk reduction.

In previous years a number of different minority communities were targeted, as discussed in section 4.1.A. In 2007, FCEC decided to hone in on the communities particularly at risk and conducted the Fish Consumption Attitudes and Beliefs (CAB) Surveys. Women from the African American, Chinese, European American, Filipino, Korean, Latino, Pacific Islander and Vietnamese communities were surveyed on fish consumption behaviors. The CAB survey helped to define populations most at risk from the health effects of consuming DDT- and PCB-contaminated fish. For example, FCEC was able to rule out African American and European American women as at-risk communities. The CAB survey showed a higher risk level for Asian communities that consume fish at a much greater rate: Vietnamese, Chinese and Filipino communities.

CAB survey results, as well as market monitoring data identifying areas where commercially available contaminated fish have been found, identified the Vietnamese community to be most at risk. By incorporating this information into the program, FCEC was able to focus resources at those most at risk and develop an initial outreach phase targeting the Vietnamese community. Dubbed Phase 1 of community outreach, this effort was carried out in 2008 with the assistance of

two CBOs serving the Vietnamese community, St. Anselm's Cross Cultural Community Center and Boat People SOS. The main individual appointed by the CBO to work with FCEC is referred to as the community liaison.

The success of Phase 1 has resulted in a large-scale implementation of outreach to the Vietnamese community in the 2008-2009 program year. Concurrently, FCEC will initiate a small-scale outreach program to the Chinese community in the 2008-2009 year. Both the Vietnamese and Chinese community outreach programs will involve three in-language components: 1) one-on-one outreach at health clinics, 2) group outreach through educational workshops and 3) awareness opportunities at community-focused events. The program also uses a survey tool to evaluate program effectiveness.

Based on the success of Phase 1, the future Community Outreach Programs will promote the following "best practices" guidelines that protect public health from the effects of eating white croaker potentially contaminated with DDTs and PCBs:

- Eat the fillet of the fish
- Remove and throw away the head, guts, kidneys, liver and fatty parts such as the skin and belly flap before cooking
- Bake, broil, steam or grill fish, allowing fatty juices to drip away

Focusing on the above best practices, community liaisons will conduct individual outreach to patients in the waiting room of community health clinics and medical groups. In this setting community members will be engaged on a one-to-one ratio and given the health message when they already have health on their mind. After conducting a mini-presentation to each patient, the liaison will ask follow-up questions to measure the participant's immediate information retention and behavioral intentions. Additionally, liaisons will request demographic information, including the participant's phone number (for the follow-up).

In the workshops, community members will be reached in a group setting (helping to establish a sense of community norms) and will be given a food sample (prepared using the fish fillet) and recipes to promote the best preparation practices. The workshops will utilize an existing flow of community members seeking out the CBO's services, such as citizenship classes, English as a second language classes and car seat classes. After the presentation on fish contamination, workshop participants will complete the survey, which asks about information retained, behavioral intentions and contact information.

The Community Outreach Program utilizes baseline and follow-up surveys to evaluate program success. The initial survey serves as the baseline, establishing the behaviors community members engage in prior to any fish contamination information. The follow-up surveys show any behaviors modified after the intervention. Both surveys work in tandem to measure outcomes of the outreach activities.

This approach to community outreach is being taken based on results obtained from the 2008 Vietnamese outreach efforts. Evaluation results indicated that the program was successful in showing measurable risk reduction by reducing undesired fish consumption behaviors such as consuming stew or soup made with the whole fish, fried fish consumption and fish head

consumption. The program was also successful at increasing the desired behavior of consuming skinless fish fillets. Additionally, the program was successful in affecting overall fish consumption rates: exhibiting a gradual decrease in overall fish consumption for those who eat fish two or more times a week and an increase for those who eat one fish meal per week.

Health Professionals/Health Clinics. Another priority tactic to come out of stakeholder discussions is to utilize health professionals and community clinics to educate at-risk families and communities about the health risks related to white croaker consumption, providing them with best practices for preparing and eating locally caught fish. FCEC will pursue this through Los Angeles County Public Health efforts and through the planned community outreach program activities.

Los Angeles County Department of Public Health will regularly present fish contamination information to public health professionals such as public health nurses. LACDPH has been presenting fish contamination information to newly hired public health nurses at quarterly orientations since 2004 and will continue to do so. LACDPH also provides educational materials and resources for the nurses to distribute to patients and other interested clientele. LACDPH will also offer lectures to medical providers specifically targeting obstetricians and pediatricians. Additionally, Los Angeles County Public Health identifies and pursues opportunities to educate health professionals about local fish contamination at health fairs and environmental events.

As discussed earlier, the planned community outreach program includes a component for outreach at health clinics. While outreach staff primarily target community members at this venue, each time outreach staff visits clinics they also discuss the local fish contamination with clinic staff as well.

Direct Outreach to Fish Consumers. Finally, the last prioritized tactic to address community members is directly reaching out to fish consumers to educate at-risk families and communities about the health risks related to white croaker consumption, providing them with best practices for preparing and eating locally caught fish**.** This will be an awareness opportunity that provides FCEC materials to ethnic markets visited by the inspectors that could be distributed to their fish consuming customers. FCEC envisions working with the CBOs to carry this out, as the CBOs are familiar with the local markets, and the local markets are very likely to be familiar with the CBOs.

Commercial Outreach

In moving the Commerical Outreach Program forward, EPA and stakeholders have identified the following as the tactic that will be used and implemented over the next five years to help the ICs program protect public health:

- Reinforce health inspectors' efforts to educate markets on "Best Practices" in purchasing white croaker (and possibly other fish), resulting in markets signing commitments to voluntarily implement "Best Practices"

The Commercial Outreach tactic listed above will work jointly with existing commercial outreach efforts being carried out by the inspectors program. In the past, FCEC experimented

with CBOs carrying out the commercial outreach efforts to markets. However, CBOs expressed discomfort in playing this role, as their voice carried no weight with the markets. As such FCEC worked with the inspectors to conduct the outreach, which turned out to be a more successful venture.

Moving forward, environmental health inspectors from the City of Long Beach, Los Angeles County and Orange County Healthcare agency will carry out the commercial outreach efforts, building on past efforts to convey the following points to markets:

- Buy fish only from approved sources, such as licensed fish wholesalers, distributors or commercial fishermen;
- Know where your fish was caught; and
- Keep and file all invoices when fish is purchased.

Markets Sign "Best Practices" Commitment. A next step proceeding from the outreach information is to have the markets make a commitment to voluntarily implement the "Best Practices" outlined by the inspectors in purchasing white croaker (and possibly other fish). This will reinforce the outreach conducted by the inspectors and encourage market owners to act on the information they are given. Research has shown that obtaining written commitments from target groups is more likely to bring about long-term change (McKenzie-Mohr, 1999)

FCEC will determine the agency or organization best suited to work with the markets to sign these voluntary pledges to implement "Best Practices." Inspectors, EPA, CBOs or FCEC could carry out this tactic, as there are clear benefits and drawbacks to each. Inspectors and EPA carry more weight in terms of authority, however, markets could feel coerced into signing the commitments (as opposed to the commitments being voluntary), especially as the inspectors have the authority to take corrective actions against the markets. If CBOs and FCEC were to carry this program out, the commitments obtained would be more voluntary in nature, as CBOs and FCEC could be seen as friendlier entities to the markets. Conversely, this could result in less market participation because of the voluntary nature of the program. Prior to implementation, FCEC will develop a program protocol that clearly identifies who will carry out the program, steps that should be taken and messages.

4.2 Monitoring

The purpose of the Monitoring Program is to evaluate and track contaminant concentrations in fish (primarily white croaker) caught at or near the PVS site as well as those sold in retail fish markets and served in restaurants. The Monitoring Program involves ocean, fish and commercial market monitoring. EPA evaluates the status of the contaminated sediments and contamination levels of fish commonly caught in the area. Ethnic markets are also monitored for the sale of contaminated white croaker.

This section discusses what the Monitoring Program has carried out in the past and what will be done in the future. From 2001 to 2007, monitoring involved evaluation of contaminant levels in fish samples taken directly from select locations in the ocean and from ethnic markets. Moving the program forward, past efforts will continue and new efforts, such as evaluating contaminant levels in fish procured off piers and commercial landing locations, will be pursued. It is

important to note, again, the inter-related nature of the ICs program. That is, how the efforts discussed here in the Monitoring Program work in tandem with what was discussed for the Public Outreach and Education Program and what will be described in the Enforcement Program.

4.2.A Monitoring: Looking Back

From 2001 to 2007, monitoring efforts have been carried out in two main ways: an extensive study of contaminant levels in fish taken from the ocean ("Fish in Ocean Monitoring") and through continuous monitoring of white croaker in markets.

Fish in Ocean Monitoring. In 1991, OEHHA released the results of a study of seafood contamination levels in Southern California (Pollock et al., 1991). Based on the results of the 1991 OEHHA study, OEHHA issued a fish consumption advisory and CDFG enacted the existing white croaker commercial fishing ban. While there had been several fish-in-ocean monitoring programs conducted by various organizations since 1991, there had not been a study focused on assessing the adequacy of the commercial fishing ban and reevaluating OEHHA's fish consumption advisory.

In 2002, EPA and MSRP began a comprehensive, updated survey of marine fish along the Southern California coast to provide reliable information on the current status of contamination in the area, with particular emphasis on fish commonly caught by subsistence and sport anglers (EPA/MSRP, 2007). Between 2002 and 2004, state and federal biologists collected over 2,500 fish from 30 locations targeting 23 of the most commonly caught recreational fish. Fish collected from Ventura to Dana Point included barred sandbass, black croaker, california corbina, california halibut, california sheephead, california scorpionfish (sculpin), chub (Pacific) mackerel, halfmoon, jacksmelt, kelp (calico) bass, Pacific barracuda, Pacific sardine, opaleye, queenfish, rockfishes, sargo, shovelnose guitarfish, surfperches, topsmelt, yellowfin croaker, yellowtail, white croaker and white seabass. Fish samples were analyzed for DDTs, PCBs, dieldrin, chlorade and mercury.

EPA and MSRP released its findings from the survey in 2007. EPA and MSRP found that DDT and PCB concentrations in fish remained higher in the Palos Verdes and San Pedro Bay areas, and relatively lower in Orange County, Santa Monica Bay and Ventura. In general, areas where sediments are more heavily contaminated, certain species of fish, especially white croaker, accumulated higher amounts of DDT and PCBs. Prior to this study, it had been more than 15 years since a survey of this kind had been conducted. EPA and MSRP subsequently provided the data to OEHHA, who is developing guidelines for consuming recreationally caught fish in California.

Market Monitoring. A 1997 study by Heal the Bay found that levels of DDT and PCBs in some white croaker purchased in retail markets (primarily Asian markets) were similar to those in fish caught by the Los Angeles County Sanitation District (LACSD) on the PV Shelf. As of March 1998, and in response to concerns about white croaker caught by sport fishermen being sold at commercial fish markets, the CDFG revised the white croaker bag limit from unlimited to a limit of 10 fish per day.

The Market Monitoring Program was created to: 1) assess the geographic extent and frequency with which contaminated white croaker are reaching retail establishments, 2) assess whether contaminated white croaker are reaching wholesale establishments and 3) determine the source of contaminated white croaker in retail and/or wholesale establishments.

Since Heal the Bay conducted their market study in 1997 to evaluate the commercial availability of contaminated white croaker, subsequent market monitoring has been carried out. A 2000 study by S.R. Hansen and Associates also found that commercial markets sold contaminated white croaker. From August 2004 through January 2005, as part of ICs Program market monitoring effort, USEPA went to 56 markets in Los Angeles and 12 markets in Orange County that primarily serve local Asian communities. USEPA was able to collect white croaker at six markets (four in Orange County and two in Los Angeles County) (CH2MHILL 2006). The white croaker were analyzed for DDTs and PCBs and the levels detected present potentially significant impacts to human health from fish consumption.

As mentioned previously, the monitoring aspect is heavily tied into the outreach and enforcement efforts. EPA procured the market samples of white croaker as a result of improper/incomplete documentation on the market's part. As a result, the health inspectors were able to seize the fish and analyze them for contaminant levels.

4.2.B Monitoring: 2008 and Beyond

In moving the program forward, EPA and stakeholders have identified the following as tactics that will be used and implemented over the next five years to help the ICs program protect public health:

- Assess the geographic extent and frequency with which contaminated white croaker are reaching fish markets
- Randomly sample white croaker landed at the two identified major landing areas: Huntington Beach and Terminal Island
- Evaluate market availability of other contaminated fish caught locally, in addition to white croaker
- Maintain/develop effective means of communicating with the regulatory agencies to ensure that all ICs components are effectively inter-coordinated and integrate new data/information as it's received
- Identify restaurants that regularly sell white croaker. Educate them on alternatives or ways to get clean fish

Continue Monitoring White Croaker in Markets. This tactic refers to the marketing monitoring program. EPA will continue to work with the City of Long Beach and Los Angeles County Environmental Health, as well as Orange County Healthcare Agency to evaluate commercial availability of contaminated white croaker. As health inspectors inspect markets, if they come across white croaker, they will purchase them and send them to EPA for analysis of contaminant levels.

Sample White Croaker from Commercial Landing Areas. As a new effort beginning in 2008, CDFG will assist EPA in dockside monitoring of white croaker at two landings: Huntington Beach and Terminal Island. Based on landing information provided by the CDFG, these two landings represent greater than 90 percent of white croaker landed in the area. With the assistance of a CDFG warden, EPA will collect white croaker from commercial operations at the dockside on a quarterly basis. The fish collection will be done on a voluntary basis by the commercial fishermen. Approximately 15-20 white croaker will be collected at each collection and will be analyzed for DDTs and PCBs concentration. The analysis results will be compiled by the EPA and transmitted to CDFG on a quarterly basis. Additionally, in-language outreach information targeting commercial fishing operations will be handed out by the CDFG wardens.

Sample White Croaker from Pier Fishing Areas. CDFG will assist EPA in collecting white croaker at Cabrillo Pier and Pier J. The purpose of this effort is to have a direct and updated risk measurement associated with the Palos Verdes Shelf pier fishing. Collection of other fish species and/or other locations may take place, should the need arise. The fishermen will provide the fish on a strictly voluntary basis. EPA will be responsible for fish handling and analysis for DDTs and PCBs and will provide the analytical results to CDFG and other interested parties.

Monitor Market Availability of Other Fish. White croaker has and continues to be a target fish for the PVS ICs program because this fish has been found to have the highest level of contaminants that far exceeds EPA's screening levels and the federal Food and Drug Administration's action levels. However, other fish have also been found to have harmful levels of DDTs and PCBs that may not be as high as white croaker, but nevertheless present a risk to public health.

The tactic of evaluating market availability of other contaminated fish caught locally, in addition to white croaker, would address the health risks posed by these other fish. To carry this effort out, the monitoring program will be expanded to target specifically identified fish. It would be most effective for the program to have the Environmental Health inspectors from Long Beach, Los Angeles County and Orange County carry this out. As inspectors come across the target fish during routine inspections, inspectors will be asked to purchase the fish and send them to EPA for analysis of contaminant levels.

Continue Effectively Communicating with Regulatory Agencies. This tactic involves maintaining effective means of communications with the regulatory agencies to ensure that all ICs components are effectively inter-coordinated and integrate new data/information as it's received. This essentially refers to the importance of the partnerships that have developed over the course of the years in carrying out the PVS ICs program. This tactic ensures that the ICs program, although made of a number of different moving parts, is carefully feeding the data back into the program, ensuring that the ICs are moving forward and working to accomplish the goals of the program. Additionally, this tactic commits the program to using the most recent data in carrying out efforts.

Create Monitoring Program for Restaurants. The markets are just one venue for at-risk populations to be exposed commercially to contaminated white croaker; restaurants are another route. To date, the ICs program has not focused on the availability of contaminated white croaker

in restaurants. This tactic will identify restaurants that regularly sell white croaker and educate them on alternatives or ways to get clean fish. Essentially, this tactic involves creating a restaurant monitoring program for contaminated white croaker. As with any new effort, a pilot program with a delineated protocol will be established for a specific community or geographic area. Based on the market monitoring program, it can be surmised that the health inspectors would again be the appropriate body to carry out this tactic as their voice carries weight. The pilot program will be developed with a measurement tool to gauge the success of the program. Based on the results of the restaurant monitoring pilot, EPA will decide to continue efforts on a small scale, roll the program out on a larger scale or discontinue the program.

4.3 Enforcement

The purpose of the ICs Enforcement Program is to ensure that applicable parties (such as commercial fishing operations, anglers and markets) are adhering to existing regulations established to safeguard public health. These regulations are based on the existing commercial and recreational restrictions on white croaker fishing established by CDFG and under the California Health and Safety Code. Enforcement efforts are carried out by state and local agencies and include the daily catch limit for white croaker, the commercial no-take zone for white croaker and inspections of retail food facilities.

This section discusses what the Enforcement Program has been carried out in the past and what will be done in the future. From 2001 to 2007, CDFG's regulations curbing commercial and recreational procurement of white croaker were not enforced. Inspections of retail food establishments were carried out and questionable white croaker impounded during the pilot market inspection program in 2005-2006. Moving the program forward, past efforts targeting retail food establishments will continue and CDFG will increase enforcement of existing white croaker regulations.

4.3.A Enforcement: Looking Back

Historically, implementation of the PVS Enforcement Program has been limited to the existence of the catch-ban area, bag limit for white croaker and the market inspection program.

Commercial Catch-Ban for White Croaker. In 1990, CDFG closed the area between Point Vicente and Point Fermin, out to three miles from shore, to commercial fishing for white croaker due to the threat to human health posed by the DDT and PCB contamination in these fish. At the onset of the ICs program, it was not possible for CDFG to provide ocean patrols of the offshore area included in the white croaker commercial fishing ban due to lack of personnel. As such, although the commercial catch-ban existed, it was not enforced.

The effectiveness of the ban, as indicated by the presence of contaminated white croaker in Los Angeles and Orange county fish markets, was initially called into question in a 1997 study conducted by Heal the Bay. As a result, the daily bag limit for white croaker and the market inspections were developed. However, subsequently, a 2004 study found contaminated white croaker for sale to the public in Los Angeles and Orange County fish markets.

Daily Bag Limit for White Croaker. In March 1998, CDFG established a white croaker bag limit of 10 fish per day per person based on concerns that sport fishers were illegally selling contaminated white croaker to retail fish markets. Unlike the commercial fishing ban, the sportfishing restriction is not limited to any specific area. Placing the bag limit of 10 white croaker allows a reasonable sport use statewide, while discouraging illegal harvesting for commercial purposes under a sportfishing license.

Market Inspections of White Croaker. The market inspections targeting ethnic (particularly Asian) markets began after studies found contaminated white croaker for sale in markets despite the commercial fishing ban for white croaker and later the daily bag limit for white croaker. As mentioned earlier, the full scale market inspection program will be carried out by environmental health inspectors from the City of Long Beach, Los Angeles County and Orange County Healthcare Agency. Under the California Health and Safety Code, enforcement officers with local health agencies can enter and inspect retail food facilities and impound any food that is found to be or suspected of being contaminated or adulterated in a retail food facility.

As mentioned earlier, the market inspection program closely integrates outreach, enforcement, and monitoring efforts which encompass the following steps: 1) health inspectors educate markets on proper records maintenance for white croaker purchase, 2) health inspectors examine the paper trail of white croaker purchases, 3) inspectors notify EPA of markets selling white croaker without proper paperwork, 4) inspectors pass, warn, fine, confiscate product, etc. if appropriate (required under law) and 5) EPA analyzes contaminant levels of white croaker confiscated.

4.3.B Enforcement: 2008 and Beyond

In moving the program forward, EPA and stakeholders have identified the following as tactics that will be used and implemented, in addition to existing tactics, over the next five years to help the ICs program protect public health for the Enforcement Program:

- County health departments conduct targeted inspection, outreach and market surveillance of white croakers using a variety of tools (e.g. prop 65, existing program mandates and information kits developed by FCEC)
- Increase enforcement of existing bag limit for white croaker
- Develop creative ways to lay out regulations to commercial fishermen (i.e. "A Pocket Guide to CA Commercial Fishing") to increase access to and understanding of regulations
- Make catch-ban regulation easily accessible for commercial operations to increase access to and understanding of regulations
- Reestablish catch-ban area to correspond with commercial catch-blocks in order to increase understanding of regulations and enforce adherence to regulations

Commercial Catch-Ban for White Croaker. Prior to 2008, CDFG had not conducted ocean enforcement to make sure the catch-ban was adhered to. Beginning in program year 2008-2009, CDFG will conduct monthly ocean inspections within the existing commercial catch ban area.

Inspection activities will include: 1) verifying proper documentation (e.g. license and etc.), 2) checking whether the commercial fishing operations were violating catch ban regulations by catching white croaker in the ban area and 3) checking whether the commercial fishing operations were aware of the existing catch ban regulations. If white croakers are found, inspectors will record information on the potential buyers or next step handlers and procure a subset of the white croakers for EPA testing.

Daily Bag Limit for White Croaker. CDFG will increase enforcement of the existing bag limit for white croaker by conducting inspections for adherence to the white croaker catch limit on Cabrillo Pier in San Pedro and Pier J in Long Beach on a monthly basis. The inspection activities will include: 1) checking if the sports fishers are adhering to the 10 white croakers per day bag limit and 2) checking if the sports fishermen were aware of the existing bag limit. The CDFG wardens will record the above information and provide it to EPA. Upon mutual agreement between CDFG and EPA, additional pier locations could be included in subsequent years.

Market Inspections of White Croaker. As has been carried out in the past, health inspectors from the City of Long Beach, Los Angeles County and Orange County will continue to carry out the market inspections and ensure that markets are following the proper protocol when purchasing white croaker from wholesalers.

Develop Creative Ways to Lay out Restrictions. The purpose of this tactic, to develop creative ways to layout regulations to commercial fishermen (i.e. "A Pocket Guide to CA Commercial Fishing"), is to increase access to and understanding of existing regulations. EPA will develop the necessary materials, and the CDFG warden will hand out materials to the commercial fishing operations during ocean inspections whether they were catching white croaker or not.

Make Catch-Ban Regulation Accessible to Commercial Operations. The purpose of this tactic is to increase access to and understanding of regulations. The tactic may very well be carried out when EPA develops the above-referenced easy to understand regulatory material. Additionally, this tactic is meant to highlight the catch-ban information, as it is currently listed in a comprehensive book of regulations, where it could be easily lost on commercial fishermen. This tactic may also encompass periodic mailers to commercial fishing operations to remind them of the catch-ban, as well as highlighting the catch-ban via the CDFG website or by developing an enhanced insert to the regulation handbook.

Aligning Catch-Ban with Catch-Blocks. This tactic involves reestablishing the catch-ban area to correspond with commercial catch-blocks in order to increase understanding of regulations and enforce adherence to regulations. Currently the catch-ban area reflects the areas where the contaminants are located en masse, which does not align naturally with existing catch block areas. The fact that the catch-ban does not match directly with the catch-blocks may be a source of confusion and misunderstanding for commercial fishermen. This tactic would have to be carried out with CDFG's assistance, as CDFG is responsible for establishing the initial catch-ban.

4.4 Evaluation of Risk Reduction Resulting from the ICs Program

In order to evaluate and measure programmatic success of the ICs program, EPA and stakeholders developed the following numeric benchmarks that will be used to assess progress. The numerics are closely aligned with long-term objectives of the program to reduce health risks stemming from the key routes of exposure to contaminants from the Palos Verdes Shelf Superfund Site: consumption of contaminated fish bought at commercial outlets and caught by local anglers.

4.4.A Evaluation of Efforts: Commercially Caught Fish

The objective of this endeavor is to eventually eliminate commercially available contaminated white croaker at commercial outlets.

Baseline:
The following have been established as the baseline numbers that will be used to compare future efforts:

- In 1996 (September through October), Heal the Bay visited 12 fish markets in Los Angeles and Orange Counties. Contaminated white croaker was identified at 9 of the 12 fish markets. A total of 132 samples of white croaker were analyzed for total DDT and total PCBs. The total DDT FDA action level (5 ppm) was exceeded in 10 of 132 (7.5%) samples; the maximum total DDT concentration was reported at 32.6 ppm for whole fish. The total PCB FDA tolerance level (2 ppm) was not exceeded in any samples; the maximum total PCB concentration was reported at 1.47 ppm for whole fish.
- In 2004-2005, EPA inspected a total of 68 markets in Los Angeles and Orange Counties. During this inspection, white croaker was found at 6 of the 68 markets (9%) and 6 of 135 market visits (4%). The white croaker was collected for analysis of total DDT and total PCB in muscle tissue. The total DDT FDA action level (5 ppm) was exceeded in 1 of 30 (3%) samples; the maximum total DDT concentration was 11.8 ppm for muscle tissue. The total PCB FDA action level (2 ppm) was not exceeded in any samples; the maximum total PCB concentration was 0.97 ppm for muscle tissue.

Numeric Objectives:
Reduce markets found with contaminated White Croaker (sample of targeted Asian markets):

- 2010: 2-6% of markets are found to have white croaker with DDT and PCB contaminant levels above FDA action levels
- 2014: 0-4% of markets are found to have white croaker with DDT and PCB contaminant levels above EPA screening levels

4.4.B Evaluation of Efforts: Angler Caught Fish

The objective of this endeavor is to promote the adherence to the OEHHA local fish advisory for Point Dume to Dana Point.

Baseline:

- Advisory put in place in 1991. The draft advisory was published in 1986.
- Awareness – Advisory: 55% of anglers were aware of the advisory in 2002-2003, based on angler survey conducted by EPA/MSRP (CIC Research 2004).
- Behavior - White Croaker Consumption: 26% of anglers said they would eat white croaker if they caught it (1994 Santa Monica Bay Seafood Consumption Study)
- Behavior – Fish Preparation (1994 Santa Monica Bay Seafood Consumption Study):
    - 65% of anglers said they ate the fillets of fish
    - 33% of anglers said they ate their fish whole/gutted
    - 47% of anglers said they prepared their fish by frying
    - 17% of anglers said they prepared their fish by broiling or barbecuing
- Average number of fish caught per person for consumption within red zone areas
- Average number of white croaker caught per person for consumption within red zone areas

Numeric Objectives:

- 10% increase in awareness of local fish advisory by 2010 (Angler awareness of the local fish should be equal to or greater than 65% in 2010)
- Set numeric objectives for baselines
    - Decrease in anglers catching and consuming fish (from red zone) to within the advisory limits
    - Decrease in anglers catching and consuming white croaker (from red zone)
    - Decrease in anglers exceeding bag limit for locally caught white croaker
    - Increase in the knowledge and behavior of angler/angler families regarding adherence to "Best Practices" for preparing their caught fish

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