



SECTION 7

MERCURY POLLUTION PREVENTION ACTIVITIES

7. MERCURY POLLUTION PREVENTION ACTIVITIES

INTRODUCTION

Concentrations of mercury above natural background levels have been found in sediments in South San Francisco Bay and the Guadalupe River watershed. Some types of fish caught in the Bay contain mercury and other pollutants at concentrations that may threaten the health of humans consuming those fish. In response, the California Office of Environmental Health and Hazard Assessment issued an interim fish consumption advisory. The U.S. Environmental Protection Agency (EPA) has listed the Bay and the Guadalupe River Watershed (including the Guadalupe River, Alamos Creek, Guadalupe Creek, Calero Reservoir, and Guadalupe Reservoir) as impaired by mercury under Section 303(d) of the Clean Water Act. In accordance with Section 303(d), the Water Board is required to establish a Total Maximum Daily Load (TMDL) for mercury in the South San Francisco Bay and the Guadalupe River Watershed.

Permit Provision C.9.c. requires the Program to address the South San Francisco Bay impairment by developing and implementing a mercury pollution prevention plan. The Program developed a Mercury Pollution Prevention Plan (Mercury Plan) consistent with this Provision. The Mercury Plan was submitted to the Water Board on March 1, 2002 as part of the Program's FY 02-03 Work Plan. This section describes and evaluates Mercury Plan tasks completed during FY 08-09.

MERCURY POLLUTION PREVENTION PLAN

The Mercury Plan is based on the premise that a Bay area-wide approach (and coordination) in addressing mercury pollution prevention will be most successful. For this reason, many of the actions identified in the Mercury Plan are for Program-level participation in regional efforts. These efforts are supplemented by countywide and local efforts.

The Mercury Pollution Prevention Plan addresses five general goals:

- I. **Municipal Use of Mercury-Containing Products** – Eliminate all unnecessary municipal use of mercury-containing products and establish proper disposal methods for products that cannot be eliminated.
- II. **Household Hazardous Waste Collection** – Provide mercury-containing product disposal services through household hazardous waste (HHW) collection programs for residents and small businesses, and encourage use of these programs.
- III. **Monitoring and Science** – Participate in coordinated monitoring efforts to support mercury TMDL development and implementation, including assessment of air pollution sources of mercury and concentrations of mercury in sediment.
- IV. **Regional, State, and Federal Coordination** – Actively participate in regional, state and federal coordination efforts to achieve a reduction in the amount of mercury in urban runoff and air emissions.
- V. **Public Education and Outreach** – Increase awareness of proper disposal of mercury-containing products and available non-mercury containing alternatives.

The Mercury Plan identifies actions that will be implemented at the Program level, municipality level, or both; and provides the schedule for initiation and/or completion of Program-level actions. The details of municipality actions and schedules are included in the individual Co-permittee work plans and/or annual reports, as appropriate.

FY 08-09 MERCURY POLLUTION PREVENTION ACTIVITIES

The status of the Program's FY 08-09 Mercury Plan tasks is summarized in Table 7-1. Highlights of Program accomplishments, as developed and/or implemented by the Mercury Pollution Prevention Plan AHTG, PIP AHTG, Program staff and municipalities are provided below.

Guidelines for Reduction and Management of Mercury-Containing Products

During FY 02-03, the Mercury Pollution Prevention Plan AHTG and Program staff developed guidelines for the reduction and management of mercury-containing products identified for virtual elimination. The goals of the *Guidelines for Mercury-Containing Products Reduction and Management* are to work towards the virtual elimination of mercury from controllable sources that may affect urban runoff due to agency operations; and establish proper recycling and disposal methods for products that cannot be eliminated due to technological, safety or economic factors. Co-permittees continued implementing the *Guidelines for Mercury-Containing Products Reduction and Management* in FY 08-09.

Mercury Pollution Prevention Outreach Workgroup

In December 2002, Program staff established a new Work Group called the Mercury Pollution Prevention Outreach Work Group. This Work Group implements the Public Education and Outreach elements of the Mercury Plan by organizing a public education, outreach and participation program designed to reach residential and commercial users of mercury-containing products.

FY 08-09 Tasks

Since FY 03-04, the Program has been coordinating its mercury outreach with the County Household Hazardous Waste (HHW) Program. The Program provided funds to develop and conduct media advertising to meet the requirements of a \$300,000, three-year California Integrated Waste Management Board (CIWMB) grant awarded to the County HHW Program. Under this grant, the County HHW Program developed partnerships with local hardware stores for collecting spent fluorescent lamps. The Grant ended in March 2006; however, the store partnership program continued.

In FY 08-09 the Program's Watershed Watch Campaign ran the "Watch Out for Mercury Pollution" advertisements in local newspapers to educate people on the proper disposal of fluorescent bulbs, and to inform them of fluorescent bulb drop-off locations.

Details of the outreach campaign are in the FY 08-09 detailed Watershed Watch Campaign and Media Report included within Appendix B-3.

Mercury Monitoring Activities (Provision C.9.c)

Permit Provision C.9.c. requires the Program to develop and implement a mercury pollution prevention plan. In response, the Program developed a Mercury Pollution Prevention Plan (Mercury Plan) consistent with the Provision. The Mercury Plan was submitted to the Water Board on March 1, 2002 as part of the Program's *FY 02-03 Work Plan*. The Mercury Plan identifies actions that will be implemented at the Program level, municipality level, or both; and provides the schedule for initiation and/or completion of Program-level actions. The details of municipality actions and schedules are included in the individual Co-permittee Work Plans and/or Annual Reports, as appropriate.

During FY 08-09, a variety of mercury-related monitoring activities occurred. They included studies designed to further quantify contributions of mercury from small tributaries to the Bay, evaluation of methyl-mercury loading from various pathways, identification of geographical areas and processes in the Bay that disproportionately contribute to mercury in fish tissue; and assessment of mercury bioavailability from various sources and pathways. The following paragraphs briefly summarize mercury-related monitoring activities conducted by the RMP, SCVURPPP and the Santa Clara Valley Water District (SCVWD) which are not described in Section 4 or within specific Co-permittee (e.g., SCVWD) Annual Reports.

Mercury Isotope Source Study (RMP)

In 2007, the RMP developed a "Mercury Strategy" to direct future mercury-related studies. As part of the strategy, the RMP funded a two-year study designed to "fingerprint" sources of mercury (Hg) to the Bay. The study uses Hg isotopes to isotopically fingerprint the various sources of Hg to the Bay and determine their relative importance as sources to the food web. Nine sites have been identified for study, geographically located throughout the Bay, where samples of sediment, water and at least two species of fish are collected annually as part of the RMP monitoring program. Sources of mercury that will be sampled include urban runoff, waste water, industrial point sources, moss/lichen and sediments from the Guadalupe, San Joaquin, and Sacramento Rivers. In addition to these samples two atmospheric particulate and reactive gaseous Hg collectors (one in the North Bay and one in the South Bay) will be deployed to collect low level Hg.

Once necessary data have been acquired, the researchers will use a combination of graphical and statistical comparisons between potential sources and Hg at each of the nine sites to ascertain which sources of Hg to the food web are possible and which may be eliminated from consideration. Because this will be the first study of its kind it is difficult to predict the results. However, the researchers expect to be able to eliminate some sources as major contributors and implicate others as major contributors. The study will be completed in late 2009 and a report is expected in May 2010.

Diffusive Gradient in Thinfilm (DGT) to Identify Sources of Bioavailable Mercury (RMP)

This study is also designed to answer specific high priority management questions included in the RMP Mercury Strategy. In background, monitoring ongoing methylmercury (MeHg) discharge into San Francisco Bay with biosentinels (e.g., fish or birds) is desirable to predict potential impacts of mercury on biota. However, in practice the utility of fish sentinels is limited. Alternatively, contaminant sorption devices such as Diffusion Gradient in Thinfilm (DGT) are currently being developed as comparable sentinels for mercury and methyl-mercury.

This RMP study will test the hypothesis that different pathways contribute differently to overall methylmercury in the Bay. DGTs as indicators for potential methyl-mercury bioaccumulation will be deployed at relevant field sites over a range of time periods (up to 28 days). This will provide information about short-term (i.e. day-to-day) fluctuations in methyl-mercury concentrations as well as long term time averaged concentrations (i.e. month-to-month), which are often more valuable for management decisions than spot samples. The selected sites will cover all potential methyl-mercury inputs, including tributaries, industrial discharge, wetland and marshes with high net methylation activity (e.g. Point Isabel and Alviso Slough), and known contaminated areas. The deployment sites will be coordinated with, and linked to the RMP Small Fish Biosentinel Project. A final report is expected in December 2009.

Methyl-mercury Budget for the San Francisco Bay Estuary (RMP)

In 2008, the RMP began developing a preliminary methylmercury budget for the San Francisco Bay Estuary. The draft budget was presented to the RMP Contaminant Fate Work Group in July 2008. Based on the presentation, results indicate that methyl-mercury in the Bay is dominated by the in-Bay methylation processes, as opposed to external loads via POTW discharges, air deposition, or stormwater runoff. A Draft Report, in review as of in August 2009, suggests that there may be management approaches that could control methyl-mercury in shorter time frames, compared to reductions in total mercury, which may take decades. A final report is expected to be completed in late 2009.

Guadalupe River TMDL for Mercury (SCVWD and SCVURPPP)

The Santa Clara Basin Watershed Management Initiative (SCBWMI) served as the stakeholder forum for the development of the Guadalupe River TMDL Report for Mercury. The Guadalupe River Watershed encompasses parts of San Jose, Los Gatos, Campbell, Monte Sereno and the unincorporated Santa Clara County. The SCVWD took the lead role in the TMDL development process by funding a \$900,000 study of mercury sources, fate and transport. The Program is also a stakeholder and participated in the Guadalupe River TMDL development.

A Basin Plan amendment was adopted October 8, 2008 that establishes TMDLs for the Guadalupe River Watershed and includes an implementation plan. The implementation plan continues successful past and ongoing efforts to reduce mercury loads and anticipates development of new methyl-mercury control methods. It also encourages a coordinated watershed approach for monitoring and the simultaneously reductions the mercury loads to the South Bay Salt Pond restoration Project.

Monitoring required by the TMDL (e.g., fish tissue and loading) is currently being funded by the SCVWD and the County of Santa Clara (see Co-permittee specific Annual Reports). Although Guadalupe River loads monitoring was not conducted during FY 08-09, it is planned to reconvene in fall 2009 in accordance with the Guadalupe River TMDL.

U.S. Department of Energy (DOE) Office of Building Technology's Vision 2020 Lighting Technology Roadmap

Since the Mercury Plan's first year of implementation, Program staff has been tracking the progress made by the U.S. Department of Energy (DOE) office of Building Technology's Vision 2020 Lighting Technology Roadmap in accordance with Mercury Plan Action IV.F. DOE's Building Technologies Program continues to move forward on their Vision 2020 Roadmap. Progress includes seven strategies to address the challenges of transforming the lighting marketplace and developing new technologies that enhance lighting quality, efficiency

and cost effectiveness. The Draft Multi-Year Program Plan was completed in August 2005, updated in January 2007 and July 2008. The plan, along with other information resources, is available at www1.eere.energy.gov/buildings/.

EVALUATION OF PROGRAM EFFECTIVENESS AND NEXT STEPS FOR MERCURY PLAN

All of the one-time, specific tasks identified in the Mercury Plan have been completed. The Program continues to implement the ongoing activities in the Mercury Plan. During FY 08-09, there was progress made on tasks related to public outreach and regional partnerships. Significant outcomes from the FY 08-09 Work Plan and the primary mercury pollution prevention activities planned for FY 09-10 include:

Guidelines for Reduction and Management of Mercury-Containing Products: In FY 03-04, Co-permittees began strategizing on how to implement the Program's Guidelines for reducing and managing mercury-containing products identified for virtual elimination and began implementation in FY 04-05. Implementation will continue in FY 09-10.

Mercury Pollution Prevention Outreach:

The mercury outreach media campaign included radio ads to promote the County HHW retail store collection locations as described in Appendix B-3.

During FY 08-09, the County HHW Program collected 418,196 feet (104,549 pounds¹) of fluorescent bulbs at 32 retail drop-off locations within Santa Clara County². This is a slight decrease from FY 07-08. In FY 07-08, the County HHW Program collected 496,484 feet (124,121 pounds) of fluorescent bulbs. A reason for this decrease could be that for more than half of FY 08-09, the County HHW Program piloted a project where the retail partners were responsible for recycling the collected compact fluorescent bulbs. The project began in December 2007 and required the retail partners to pay the recycling cost of compact fluorescent lamps (CFLs). The goal was to transition some of the collection and recycling responsibilities to the partners. However, after some time, many of the partners no longer wanted to participate in the pilot project because of the cost associated with recycling. Some stopped taking CFLs from residents. As a result, the pilot program ended in February 2009 and the County HHW Program now collects and recycles all universal wastes collected at the retail partners. The County HHW Program does not have plans to continue the pilot project. The retail partners collected 2,704 feet of fluorescent lamps from July 2008 to February 2009.

It is estimated that approximately 1.22³ kilograms of total mercury was diverted (i.e., discharge to the environment was avoided) to recycling from fluorescent lamps collected by the County HHW Program and retail partners during FY 08-09. In addition, the HHW Program also collected the following during FY 08-09:

¹ Since fluorescent light bulbs come in different sizes, quantities are reported in terms of the total length (feet) of tubes collected. One four-foot light tube weighs approximately one pound.

² Information regarding the collection of mercury containing products (e.g., fluorescent bulbs, thermostats, thermometers and other products) during FY08-09 obtained from a memorandum *entitled Fiscal Year 2008-2009 HHW Program Update* (dated July 28, 2009). This memorandum was prepared by Wendy Fong, Household Hazardous Waste Program, County of Santa Clara.

³ Based on a 1999 National Electrical Manufacturers Association survey entitled *Environmental Impact Analysis: Spent Mercury-Containing Lamps, January, 2000 (Fourth Edition)*, the average four-foot fluorescent lamp contains about 11.6 milligrams (mg) of mercury. For the sake of estimating the amount of mercury sent for recycling, approximately 104,549 four-foot fluorescent lamps were collected. As a result, 1.22 kilograms of total mercury diverted (i.e., discharge to the environment was avoided) to recycling is a rough estimate.

- 570 pounds of thermostats, thermometer and other products which contain elemental mercury;
- 113,490 pounds of household batteries, an increase of 52% over FY 06-07; and
- 362 mercury-containing thermometers at five thermometer exchange events.

In FY 09-10, the Program will continue to conduct advertising to promote the fluorescent bulbs drop-off locations, as municipal budgets/resources permit.

Coordination Efforts with Regional Organizations: The RMP Steering Committee and RMP Technical Review Committee meetings and Program staff review of several draft products are recent highlights of the Program's coordination efforts with local and regional organizations. Program staff will continue to attend Regional Monitoring Program (RMP) Steering Committee and Technical Review Committee meetings.

SCVURPPP Co-permittees, San Jose, Palo Alto and Sunnyvale fund and support activities implemented by the Bay Area Pollution Prevention Group (BAPPG). In FY 08-09, BAPPG conducted the following activities for mercury pollution prevention outreach:

- Thermometer Exchange Event Coordination – Coordinated a group-buy of thermometers for conducting thermometer exchanges during Pollution Prevention week. In September 2008, twenty nine agencies and organizations collected more than 2,311 thermometers, at one-day and ongoing events.
- Update Amalgam Separator List – Updated the list of ISO-certified amalgam separators for use by Bay Area agencies in implementing their Mandatory Amalgam Separator Programs in May 2009. The list is available on the SFPUC P2 website for all members.

**Table 7-1
Status of FY 08-09 Mercury Pollution Prevention Tasks¹**

<u>Task</u>	<u>Status</u>
<u>I. Municipal Use of Mercury-Containing Products</u>	
I.F. Implement guidelines developed under Action I.E.	On-going - Co-permittees began implementation in FY 03-04.
<u>II. Household Hazardous Waste Collection</u>	
II.A. Provide mercury-containing products disposal services for residents and small businesses.	On-going - Disposal services are provided by the County HHW Program, Palo Alto Regional Water Pollution Control Plant and the Sunnyvale Materials Recovery and Transfer (SMaRT®) Station.
II.C. Implement guidelines developed under Action II.B.	On-going - Co-permittees began implementation in FY 03-04.
II.F. Work with HHW collection agencies to develop and help publicize fluorescent light recycling program. ²	<p>Completed/Ongoing – Began effort in FY 02-03. The Mercury Pollution Prevention Outreach Workgroup collaborated with the Santa Clara CoHHW Program for implementing the outreach component in the Program’s two-phase fluorescent light tube (FLT) recycling campaign. The first phase of the campaign, which was developed in FY 02-03, targeted residents. The second phase, completed in FY 03-04, targeted small businesses. The main objective of both phases was to show the negative health and environmental impacts of mercury and the methods available to the public for the proper disposal of FLTs.</p> <p>Since FY 04-05, the Program has been conducting outreach to promote the free fluorescent bulb drop off locations provided by the County HHW Program.</p>

¹ Completed Mercury Pollution Prevention Tasks are described in previous Annual Reports (Table 7-1).

² Action II.F. is being conducted in conjunction with Public Education and Outreach Actions.

**Table 7-1
Status of FY 08-09 Mercury Pollution Prevention Tasks¹**

<u>Task</u>	<u>Status</u>
<u>III. Monitoring and Science</u>	
III.A. Continue financial support of the Regional Monitoring Program (RMP). Continue to actively participate in the RMP Steering Committee (SC) and Technical Review Committee (TRC).	<p>On-going - Program and Co-permittee staffs actively participated in RMP TRC and SC meetings and provided meeting summaries to Management Committee. Staff reviewed available reports and provided comments. Draft reports included <i>2009 Draft RMP Monitoring Plan</i>.</p> <p>Both Program and Co-permittee staff were actively involved with the CEP technical and management committees; and review of proposed Work Plans and study scopes. Program and Co-permittee staffs also participated in the CEP Mercury Work Group. The CEP was disbanded in 2008. Staff will continue to participate in regional collaborative projects through BASMAA.</p>
The City of San Jose will continue to provide in-kind services for the maintenance of the Mercury Deposition Network site near San Jose.	The City of San Jose continued this activity beyond the December 2005 compliance date and into FY 05-06. The City decided not to continue this effort into FY 06-07.
III.B. Provide financial and staff support for a coordinated regional plan to collect data for the mercury TMDL, as defined in the CEP MOU.	Completed - The Program participated in CEP activities (formerly TMDL MOU) until the group was disbanded in 2008.
<u>IV. Regional, State, and Federal Coordination</u>	
IV.A. Participate in the activities of the Bay Area Stormwater Management Agencies Association, the California Storm Water Quality Task Force, and the San Francisco Estuary Institute and communicate Program efforts.	On-going - Program staff continue to attend BASMAA, CASQA and SFEI RMP meetings. Meeting information and participation is provided in the Program's <i>Review of FY 08-09 Program Management Services</i> within Appendix A-2).

**Table 7-1
Status of FY 08-09 Mercury Pollution Prevention Tasks¹**

<u>Task</u>	<u>Status</u>
IV.B. Collaborate in technical studies to support TMDL development and implementation including the Santa Clara Basin WMI Guadalupe River Mercury TMDL Workgroup.	On-going - Program and Co-permittee staffs actively participate in the Guadalupe Mercury TMDL Watershed Work Group and Stakeholder group. Program and Co-permittee staff reviewed the draft Basin Plan Amendment and supporting Staff Report released February 2008. The TMDL was adopted by the Water Board in October 2008 and is awaiting approval by the State Board, OAL and U.S. EPA.
IV.E Support, participate in, and advocate increased regional collaboration with the RWQCB and the Bay Area Air Quality Management District (BAAQMD).	Ongoing - The Program will support the RWQCB in collaborating with the BAAQMD but will not directly work with the BAAQMD. The Program supports the RWQCB in their efforts. Mercury air deposition is being addressed regionally. Program staff will continue to track the progress of the State Water Board Air Board meetings. The first meeting was held in February 2006.
IV.F. Support and track the progress of the U.S. Department of Energy (DOE) Office of Building Technology's Vision 2020 Lighting Technology Roadmap. ³	In Progress - DOE's Building Technologies Program continues to move forward on their Vision 2020 Roadmap. Progress includes seven strategies to address the challenges of transforming the lighting marketplace and developing new technologies that enhance lighting quality, efficiency and cost effectiveness. The Multi-Year Program Plan, updated in July 2008, is available on their website.

³ DOE's Vision 2020 Lighting Technology Roadmap includes this goal for the year 2020, "Highly efficient, reduced-mercury fluorescent sources will come to market." Sustainable Conservation's September 27, 2000 report entitled *Reducing Mercury Releases from Fluorescent Lamps: Analysis of Voluntary Approaches* concluded that "we do not believe that starting a new collaborative approach with manufacturers to create mercury-free fluorescent lamps is the most effective use of resources at this time." Sustainable Conservation recommends focusing on voluntary recycling of mercury-containing lamps as an alternative approach.

**Table 7-1
Status of FY 08-09 Mercury Pollution Prevention Tasks¹**

<u>Task</u>	<u>Status</u>
<u>V. Public Education and Outreach</u>	
V.A. Develop various outreach programs to educate target audiences about proper disposal of mercury-containing products and alternative non-mercury containing products. Outreach programs will include, but may not be limited to, the following:	Completed/Ongoing⁴ - In FY 08-09, the Mercury Pollution Prevention Outreach Work Group continued its mercury pollution prevention outreach.
<ul style="list-style-type: none"> Develop and begin to implement a fluorescent light recycling outreach program to educate residential users and encourage proper disposal of fluorescent lights. 	<p>Completed/Ongoing⁴ - Phase I outreach of the two year, two phase Work Plan was completed in FY 02-03. This phase focused on residential outreach. Additional annual outreach is continuing, as appropriate.</p> <p>The County HHW Program has continued to develop partnerships retail stores to provide free fluorescent lamps drop-off sites for residents. The Program's Watershed Watch Campaign conducted media advertising to inform residents about these locations. (See Section 7 of this Annual Report for additional details).</p>
<ul style="list-style-type: none"> Develop and begin to implement a fluorescent light recycling outreach program to educate small businesses and conditionally exempt small quantity generators and encourage proper disposal of fluorescent lights. (For example, the small business outreach program might include coordination with local chapters of the Building Owners and Managers Association [BOMA] or the National Association of Industrial and Office Properties [NAIOP].) 	<p>Completed/Ongoing⁴ - In FY 03-04, the Work Group implemented Phase II of the two-year, two-phase Work Plan. Phase II outreach efforts were focused on small businesses and CESQGs. Additional annual outreach is continuing, as appropriate.</p>

⁴ These tasks were marked as Completed and Ongoing since the specific public education and outreach task was completed but outreach is ongoing. Articles will continue to be posted and updated, as appropriate. The Program will continue to assist the CoHHW with public outreach activities as resources allow.

**Table 7-1
Status of FY 08-09 Mercury Pollution Prevention Tasks¹**

<u>Task</u>	<u>Status</u>
<ul style="list-style-type: none"> Coordinate with municipal inspectors to integrate mercury outreach to industrial businesses into their existing routine pretreatment, source control, and/or hazardous materials inspection processes 	<p>Ongoing - Co-permittees began coordination efforts in FY 03-04.</p>
<p>V.B. Develop or adapt existing mercury outreach materials, as needed, for outreach programs.</p>	<p>Completed/Ongoing⁴ - As part of the Outreach Work Plan for Action V.A, development of materials began in FY 02-03. To date, the following outreach pieces have been developed by the Outreach Work Group:</p> <ul style="list-style-type: none"> Two fact sheets for the worldwide web (one for residents and one for businesses); Two newsletter articles (one for residents and one for businesses); One press release; One video public service announcement for broadcast on local city cable channels; Four newspaper ads, three radio ads, two transit (bus poster) ad; and Signage (posters and decals) for promoting the fluorescent drop-off locations. <p>All outreach pieces aim to show the negative health and environmental impacts of mercury and the methods available to the public for the proper disposal of FLT's. The Program did not develop any new outreach materials in FY 08-09.</p>
<p>V.C. Attend community events and distribute outreach materials.</p>	<p>Completed/Ongoing⁴ - As part of the Outreach Work Plan for Action V.A, distribution of outreach materials continued during FY 08-09.</p>