Bay Area Clean Water Agencies

2008 Mercury Watershed Permit Group Report

April 1, 2009

Prepared by Oakley Water Strategies, Inc.

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Introduction

On November 1, 2007 the San Francisco Bay Regional Water Quality Control Board (Regional Water Board) adopted the mercury watershed permit, NPDES permit No. CA0038849, Regional Water Board Order No. R2-2007-0077. The purpose of the watershed permit was to implement requirements associated with the mercury Total Maximum Daily Load (TMDL), which was adopted by the Regional Water Board in August 2006 and approved by the State Water Resources Control Board (State Water Board) in July 2007. The mercury watershed permit established limitations and requirements on the discharge of mercury from current municipal and industrial NPDES permittees which discharge treated wastewater to San Francisco Bay or its tributaries. This group report is for municipal permittees associated with the watershed permit.

The mercury watershed permit became effective on March 1, 2008 after the approval of USEPA, and superceded all existing mercury requirements in existing individual wastewater permits to ensure consistent, complete, and coordinated implementation of the TMDL's requirements.

Watershed Permit Group Reporting Requirements

One of the requirements indicated in the watershed permit was for agencies to report mercury mass loads and source control activities on an annual basis. The permit allowed permittees to report this information either individually, or as part of a group. The Bay Area Clean Water Agencies (BACWA) opted to form a group and invite municipal permittees to participate. If permittees desired to participate in a group process, they needed to notify the Regional Water Board by February 1, 2009 (deadline for annual Self-Monitoring Report, or SMR) of this intent. Since February 1, 2009 was a Sunday, annual SMRs were allowed to be submitted on Monday, February 2, 2009.

Electronic forms for BACWA group participants were prepared to facilitate the reporting process for both participants and the organizer. These electronic forms were developed in MS Excel based on the forms in the watershed permit, and were emailed to potential group participants with a readily available email address on January 15, 2009. The due date for submittal of data under the group reporting program was February 15, 2009. However, since February 15 fell on a Sunday and February 16 was a holiday, the forms were allowed to be submitted on Tuesday, February 17, 2009.

Data Collection and Compilation

As indicated in the mercury watershed permit, the annual reporting forms were organized into three parts as follows:

- Part 1 – Basic Information
- Part 2 – Mercury Data
- Part 3 – Source Control Information

Completed forms were received from 34 agencies participating in the BACWA group, or 92 percent, of the 37 municipal agencies listed in the mercury watershed permit. An additional two entities are listed in the permit as serving domestic customers but are not municipal government agencies. Data were received from group participants by email, fax, and regular mail. Data received by email were in one of the following formats: PDF, MS Excel, or MS Word. Signed certification pages (in Part 1) were received from all participating agencies. The forms received are shown in **Appendix A**. The distribution of participating municipal permittees in the BACWA group is shown in **Table 1**.

Table 1. BACWA Group Participants

Municipal Permittees Participating in BACWA Group		Municipal Permittees **Not** Participating in BACWA Group
• American Canyon, City of • Benicia, City of • Calistoga, City of • Central Contra Costa Sanitary District • Central Marin Sanitation Agency • Delta Diablo Sanitation District • East Bay Dischargers Authority • East Bay Municipal Utilities District • Fairfield-Suisun Sewer District • Las Gallinas Valley Sanitary District • Marin County (Paradise Cove), Sanitary District No. 5 • Marin County (Tiburon), Sanitary District No. 5 • Millbrae, City of • Mt. View Sanitary District • Napa Sanitation District • Novato Sanitary District • Palo Alto, City of • Petaluma, City of	• Pinole, City of • Saint Helena, City of • San Francisco, City and County of, SF Int'l Airport (sanitary plant) • San Francisco (Southeast Plant), City and County of • San Jose/Santa Clara, Cities of • San Mateo, City of • Sausalito-Marin City Sanitary District • Sewerage Agency of Southern Marin • Sonoma Valley County Sanitary District • South Bayside System Authority • South San Francisco and San Bruno, Cities of • Sunnyvale, City of • US Naval Support Activity, Treasure Island • Vallejo Sanitation and Flood Control District • West County Agency • Yountville, Town of	• Burlingame, City of • Crockett Community Services District • East Brother Light Station, Inc. • Rodeo Sanitary District • Seafirth Estates Company

Although most Bay Area municipal permittees normally report data electronically through the Electronic Reporting System (ERS), most agencies provided monthly flow data, mercury concentrations, and computed the estimated annual mass emission, rather than checking the box on the form that data are reported through the ERS without supplying data.

Data submitted by BACWA group participants included all mercury concentration data collected from March through December of 2008, which was also averaged by month, as well as daily flowrates for sampling days, and a computed annual mass emission. All computations for group participants were checked for accuracy and usage of proper formulas for calculations at a minimum. As indicated in the watershed permit, only mercury data for the months of March through December were submitted. However, an annual mass emission was computed by normalizing the data from March through December over the entire 12 months of 2008, to arrive at an estimated annual mass emission.

Estimated Mercury Mass Loads for 2008

The estimated annual mercury mass emission was determined for all municipal permittees listed in the mercury watershed permit. For agencies not participating in the BACWA group, ERS data were used for the computation if those data were available. If no ERS data were available, then the individual permittee mass limit from the watershed permit was used as a conservative estimate of the actual mass emission. These mass limits were used for three very small permittees, namely the Crockett Community Services District (previously Contra Costa County Sanitation District No. 5 at Port Costa), East Brother Light Station, Inc., and the Seafirth Estates Company. Results for each permittee, as well as the sum for the group, are shown in **Table 2**.

Table 2. Estimated Weighted Annual Mass Emission for Municipal Permittees

Municipal Permittee	Weighted Annual Mass Emission [1] (kg/yr)	Notes on Computations Conducted for This Report
American Canyon, City of	0.0060	Used agency data and calculations
Benicia, City of	0.0228	Used agency data and calculations
Burlingame, City of	0.0314	Used ERS data
Calistoga, City of	0.0003	Didn't use submitted Jan. & Feb. data
Central Contra Costa Sanitary District	0.721	Computed weighted annual mass emission from data provided
Central Marin Sanitation Agency	0.0546	Used agency data and calculations
Crockett Community Services District	0.0072	Used agency mass limit since no data readily available
Delta Diablo Sanitation District	0.0944	Used agency data and calculations
East Bay Dischargers Authority	0.8738	Used agency data and calculations
East Bay Municipal Utilities District	0.5460	Used agency data and calculations
East Brother Light Station, Inc.	0.00001	Used agency mass limit since no data readily available
Fairfield-Suisun Sewer District	0.0673	Used agency data and calculations
Las Gallinas Valley Sanitary District	0.0292	Used agency data and calculations
Marin County (Paradise Cove), S.D. No. 5	0.0000528	Used agency data and calculations
Marin County (Tiburon), S.D. No. 5	0.002918	Used agency data and calculations
Millbrae, City of	0.01840	Used agency data and calculations
Mt. View Sanitary District	0.0347	Used agency data and calculations

Municipal Permittee	Weighted Annual Mass Emission [1] (kg/yr)	Notes on Computations Conducted for This Report
Napa Sanitation District	0.0226	Computed weighted annual mass emission from data provided
Novato Sanitary District	0.0234	Used agency data and calculations
Palo Alto, City of	0.0900	Used agency data and calculations
Petaluma, City of	0.0322	Computed weighted annual mass emission from data provided
Pinole, City of	0.0715	Used ERS data
Rodeo Sanitary District	0.0137	Used ERS data (not j-flag data)
Saint Helena, City of	0.0000	Used agency data, but no flow
San Francisco, City and County of, SF Int'l Airport	0.0047	Didn't use submitted Jan. & Feb. data
San Francisco (Southeast Plant), City & County of	0.5056	Used agency data and calculations
San Jose/Santa Clara, Cities of	0.2826	Used agency data and calculations
San Mateo, City of	0.141	Used agency data and calculations
Sausalito-Marin City Sanitary District	0.0263	Used agency data and calculations
Seafirth Estates Company	0.00036	Used agency mass limit since no data readily available
Sewerage Agency of Southern Marin	0.0518	Used agency data and calculations
Sonoma Valley County Sanitary District	0.0025	Computed weighted annual mass emission from data provided
South Bayside System Authority	0.1792	Used agency data and calculations
South San Francisco and San Bruno, Cities of	0.0939	Used agency data and calculations
Sunnyvale, City of	0.0636	Used agency data and calculations
US Naval Support Activity, Treasure Island	0.0063	Used agency data and calculations
Vallejo Sanitation and Flood Control District	0.2335	Used agency data and calculations
West County Agency	0.1587	Used agency data and calculations
Yountville, Town of	0.0043	Computed weighted annual mass emission from data provided
TOTAL	**4.5**	

[1] The weighted annual mass emission for each agency was calculated based on daily flow and mercury concentration data from March 2008 through December 2008, except as noted.

Interpretation of Estimated Mass Load Results

The estimated, weighted annual mass emission is 4.5 kg/yr, which is lower than the mass limit in the watershed permit of 17 kg/yr. In reviewing the information, several possibilities arise for why the estimated, weighted annual mass emission was lower for 2008. Reasons for a reduction of mercury in municipal discharges are as follows:

- Dental amalgam programs are having an effect. – Many agencies have started implementing dental amalgam programs, as shown in the next section. In addition, it is known that dentists are reducing use of mercury amalgam generally. It seems likely that the dental amalgam being prevented from entering the sewer is having a measurable effect on mercury mass loads.

- Increased sewer cleaning is removing mercury deposits in sewers. – With the advent of Sewer System Management Plans (SSMPs), the more than 100 sanitary sewer collection agencies in the Bay Area are getting more sophisticated about sewer cleaning of sediment deposits in sewers. These deposits, which probably contain mercury, are being removed from sewers as

communities get closer to completing the first round of cleaning 100% of sewers.

- Mercury source control activities have had an effect. – Another contributing factor for the low estimated annual group mercury mass emission is the many mercury source control activities that have occurred over the last ten years, some of which are described in the next section of this report. It may be that these activities have had a measurable effect in keeping mercury-containing products or their contents from entering the sewers.

- More treated wastewater was used as recycled water for irrigation and other uses. – BACWA agencies recycled more water in 2008 than ever before, and this water reduced the flow to San Francisco Bay, and therefore the mercury load.

- There were no mercury slug loadings reported in 2008. – No permittees reported slug loadings of mercury during the reporting period. From time to time, agencies have measured very high concentrations in both the influent and effluent, for a very short period of time, but the source was never identified. There were not events of this type reported for the group during 2008.

- Low flow devices are reaching critical mass. – Wastewater agencies have documented that dry weather influent flows have begun to decrease. A key contributing factor to this phenomenon is the installation of low flow devices that have been installed in communities around the Bay Area as part of successful water conservation programs that have been implemented over the last decade, and more recently due to statewide drought.

- Improvements to treatment facilities have had an effect. – In recent years, some permittees have implemented capital improvements, including replacement or upgrades to aging equipment and unit processes. These capital expenditures have resulted in achievement of higher pollutant removal efficiencies.

- Agencies are now skilled at clean sampling. – In the year 2000, clean sampling techniques for mercury were just beginning for many agencies. It is believed that more and more agencies have become skilled at the clean hands-dirty hands sampling techniques and that the results are more accurate now, with less contamination.

- The wet months of January and February are not accurately represented. – January and February, which are normally the wettest months of the year with higher than average flows in comparison to the other ten months, were not accurately represented by normalizing the data from March through December. If January and February 2008 data were used, then it is expected the group mass emission would have been higher. This issue will be addressed in future reports, when the municipal permittees report the full year of discharge data beginning in 2009.

- 2008 was another drought year. – 2008 was another drought year in a series of drought years, so flows were down for the year as a result. Since wastewater flows contribute directly to the computation of mass loads, a low mass emission would result from drought conditions.

Source Control Activities

Permittees participating in the BACWA group conducted numerous source control activities during the reporting period, as shown in **Table 3** on the following page. Highlights of the source control activities are as follows:

- Dental Amalgam Programs
- Thermometer and/or Thermostat Exchanges
- Fluorescent Light Recycling
- Household Hazardous Waste Collection
- Public Outreach/ Education
- Controls for Vehicle Service Facilities
- Battery Recycling
- Public School Pollution Prevention Audits and Other Source Reduction Programs
- Reduction Of Mercury in Laboratory Waste
- Hospital/Medical Clinic Mercury Inspections And/Or Related Source Reduction Activities
- Support Of Mercury Thermostat Legislation

Some agencies did not specifically report a public outreach or education program, but one could be inferred from the other activities. For example, in order to collect mercury thermometers, the agency would need to advertise the collection program. In addition, many agencies in the Bay Area recycled their wastewater for irrigation of turf and landscaping, industrial uses, and agriculture. This recycled water does not enter San Francisco Bay, yet agencies didn't consider this specifically a source control program in their individual reports.

Most agencies reported that the amount of mercury reduced from waterways from source control programs was not known, since it is very difficult, for example, to estimate how many mercury thermometers collected would not have made it into the sewer. However, agencies that were involved in the collection of household hazardous waste were generally able to quantify the mass of mercury collected, which ranged from 0.14 pounds (0.06 kg) to 160 pounds (73 kg), during 2008. In addition, the City of Palo Alto estimated that 11.2 pounds (5.1 kg) were prevented from entering the sewer in 2008 based specifically on their new comprehensive and mandatory dental amalgam program, which includes Best Management Practices for dentists and amalgam separators installed in dental offices.

Indeed, it is believed that these continuing activities have contributed to the reduction in mercury mass loadings entering the sewer system as exhibited by the data presented earlier in this report. A large amount of public education also occurred during the period throughout the Bay Area. As a result, BACWA believes it is likely that if you ask any person in the San Francisco Bay Area on the street today who keeps up with current events, they will probably be aware that mercury is an issue in our environment. This would not have been the case 10 years ago, before so many communities in the Bay Area began implementing a series of mercury source control activities, including critical public outreach. It is believed that BACWA participating agencies as a whole have been the pre-eminent environmental stewards for public awareness about mercury in the Bay Area.

It is recommended that for next year's group report, a checklist of possible source control activities be provided to group participants. This approach would allow for more accurate and consistent reporting for all participating agencies, it would make the reporting easier for agencies, and it would also provide ideas to agencies for other activities that they could be doing to further reduce mercury in our environment.

Table 3. Mercury Source Control Activities By Agency

Municipal Agency Listed in Watershed Permit	Mercury Source Control Projects Underway or Planned, as Reported by Agencies to BACWA **(a = project was completed or underway in 2008, b = project is planned for the near future)**						
	Dental Amalgam Program	Fluorescent Light Recycling	Household Hazardous Waste Collection	Public Outreach/ Education	Thermometer and/or Thermostat Exchange	Vehicle Service Facilities	Other
American Canyon, City of	a, b	a, b		a, b	a, b	a, b	
Benicia, City of	(2), b	a, b	a, b	(4) a		a	
Burlingame, City of							
Calistoga, City of	a, b						
Central Contra Costa Sanitary District	a, b	a, b	a, b	a, b	a, b	a, b	(3,4,5,6) a, b
Central Marin Sanitation Agency	b	a, b	b	a, b		a, b	(4) a, b
Crockett Community Services District (previously Contra Costa County Sanitation District No. 5, Port Costa)							
Delta Diablo Sanitation District	b	a, b	a, b	a, b			
East Bay Dischargers Authority	a, b	a, b	a, b	a, b	a, b	a, b	(5, 6) a, b
East Bay Municipal Utilities District	a, b			a, b	a, b		(6, 3) a, b
East Brother Light Station, Inc.[1]							
Fairfield-Suisun Sewer District	b		a, b	a, b			
Las Gallinas Valley Sanitary District	b	a, b		a	a		(4) a, b
Marin County (Paradise Cove), Sanitary District No. 5 of				a, b			
Marin County (Tiburon), Sanitary District No. 5 of				a, b			
Millbrae, City of	a, b						
Mt. View Sanitary District	a, b	a, b	a, b	a, b	a, b		
Napa Sanitation District	a, b		a, b	a, b	a, b		
Novato Sanitary District	a, b	a, b	a, b	a, b		a, b	(4) a
Palo Alto, City of	a, b	a, b		a, b	a, b	a, b	
Petaluma, City of	b						(7) a
Pinole, City of	a, b	b			b		
Rodeo Sanitary District							
Saint Helena, City of							
San Francisco (Airport), City and County of							
San Francisco (Southeast Plant), City and County of	a, b	a, b		a, b	a, b		(6, 3) a
San Jose/Santa Clara, Cities of	a, b	a, b	a, b	a, b	a, b		(8) a

Municipal Agency Listed in Watershed Permit	Mercury Source Control Projects Underway or Planned, as Reported by Agencies to BACWA **(a = project was completed or underway in 2008, b = project is planned for the near future)**						
	Dental Amalgam Program	Fluorescent Light Recycling	Household Hazardous Waste Collection	Public Outreach/ Education	Thermometer and/or Thermostat Exchange	Vehicle Service Facilities	Other
San Mateo, City of	a, b	a, b			a, b		
Sausalito-Marin City Sanitary District	b	a, b	b	a, b			(4) a, b
Seafirth Estates Company and Property Owners within the Seafirth Estates Subdivision[1]							
Sewerage Agency of Southern Marin	b	a, b	b	a, b			(4) a, b
Sonoma Valley County Sanitary District	a, b						
South Bayside System Authority	a, b			a, b	a		(7, 9) a
South San Francisco and San Bruno, Cities of	a, b	a, b		b	a, b		
Sunnyvale, City of		a, b		a, b	a, b		(5) a, b
US Naval Support Activity, Treasure Island		a			b		(3) a
Vallejo Sanitation and Flood Control District	a, b	a, b		a, b	a, b		
West County Agency (West County Wastewater District and City of Richmond Municipal Sewer District)	a, b		a, b	a, b	a, b		
Yountville, Town of	b						

[1] This Permittee serves domestic customers but is not a municipal government agency.

[2] Dental office inspections were conducted prior to 2008.

[3] Public school pollution prevention audits or other source reduction program

[4] Battery recycling

[5] Reduction of mercury laboratory waste

[6] Hospital/medical clinic mercury inspections and/or related source reduction activities

[7] Recycled water program reduces mercury discharges

[8] Support of mercury thermostat legislation

[9] Hired additional personnel to conduct mercury source reduction efforts

Summary and Conclusions

The weighted annual average mercury mass load for all municipal permittees to San Francisco Bay for 2008 is calculated to be 4.5 kg/yr. Agencies participating in the BACWA group conducted many mercury source control programs, and in some cases quantified their reductions. For example, the City of Palo Alto estimated that 11.2 pounds (5.1 kg) were prevented from entering the sewer in 2008 based specifically on their comprehensive and mandatory dental amalgam program.

There are potentially many reasons the total mercury mass load is lower than the 17 kg/yr limit, some of which are indicated as follows:

- Dental amalgam programs are having an effect
- Increased sewer cleaning is removing mercury deposits in sewers
- Mercury source control activities have had an effect
- More treated wastewater was used as recycled water for irrigation and other uses
- There were no mercury slug loadings reported in 2008
- Low flow devices are reaching critical mass
- Improvements to treatment facilities have had an effect
- Agencies are now skilled at clean sampling
- The wet months of January and February are not accurately represented
- 2008 was another drought year

In 2009, BACWA will be working with its member agencies to continue development of the dental amalgam programs around the San Francisco Bay Area, and further contributing to mercury reductions through other activities in the years to come.