

To: Chairman Dan Burton, Subcommittee on Human Right and Wellness
From: President Parin Shah, San Francisco Commission on the Environment

RE: San Francisco's Dental Mercury Pollution Prevention Program

The purpose of this document is to provide written testimony on dental mercury reduction efforts in San Francisco, CA an to describe the program implemented by the City and County of San Francisco's Department of the Environment and Public Utilities Commission. Below is the list of the topics covered in this document:

- 1.0** Text of oral testimony by Parin Shah
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 - 5.2 ARE Rebate Program
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Attachments

- A. Chronology
- B. Program Overview Factsheet
Best Management Practices
Waste Water Discharge Permit Application
- C. City Approved Amalgam Separator Equipment List
Amalgam Separator Information Form
Amalgam Separator Installation Report Form
- D. Quarterly Monitoring Report Form
Wastewater Sampling and Analysis Method
- E. EPA Grant work plan
- F. Rebate Application Form
Rebates for Community Service
- G. Invitation to Amalgam Waste Management Vendor Expo
Completed Vendor Expo Survey Form

Website: http://www.sfwater.org/main.cfm/MC_ID/4/MSC_ID/85

OR

(<http://sfwater.org> > ENVIRONMENT > Dental Mercury Reduction Program)

1.0 Text of oral testimony by Parin Shah

Mercury is one of the most toxic elements known to man, yet it persists at dangerously high levels in San Francisco Bay, not to mention many of our mouths. The most prevalent, and preventable, commercial source of mercury contamination remains unregulated – and that's the dentist's office.

The most common type of dental filling is made from something called "silver amalgam," in reality these fillings are a mixture of metals and contain fifty percent mercury and should rightly be known as "mercury fillings". Each one contains about one half gram of mercury, enough to contaminate up to 5 million gallons of water, or 20 Olympic-sized swimming pools. A person with four fillings has enough mercury to make a 20-acre lake unfit for fishing.

Mercury from dental offices extracts a huge burden on the taxpayers. The cost to extract a pound of mercury from the water is \$21,000,000, according to the U.S. House Subcommittee on Wellness and Human Rights. The U.S. dental industry, admits the California Dental Association, used a colossal 48 tons – i.e., almost 100,000 pounds -- of mercury in 2001. If only 10% of that mercury is getting into the waterways, the clean-up costs exceed two hundred billion dollars. Dental offices could save taxpayers most of this projected astronomical clean-up bill by installing equipment to catch the mercury, equipment that costs a mere \$2000 per dental office.

Mercury used to be part of a variety of health medicines and devices, such as Mercurochrome (now banned), childhood vaccines (pulled recently), and contact lens solution (voluntarily withdrawn). Last year, the FDA even pulled a horse medicine off the market because it contained mercury. The American Dental Association stands alone as the only health group who advocates putting mercury into children and adults – based on the preposterous rationale that it's OK because they have done it for 150 years.

This year, the City came to an agreement with San Francisco dentists and the California Dental Association to reduce the amount of mercury leaving dental offices. Individual dental offices will choose to comply with a new permit by installing an approved amalgam separator device that takes the mercury out of the system before it can make its way to the Bay. The mercury is then collected and sent for proper disposal.

We hope our efforts will inspire similar programs across the nation, but the next major step for San Francisco is for dentists to phase out of mercury entirely. It's certainly doable: an estimated 27 percent of dentists nationwide have already taken this important step. Indeed, most middle-class adults no longer get "mercury amalgams". Sadly, children and low-income adults still do, which is something only the state legislature can change.

Mercury fillings are toxic before going into the mouth, and are considered hazardous waste the moment they are removed. It's time for dentists everywhere to recognize the inevitable: mercury has no place in the human body or in the environment.

2.0 History (see Attachment A)

- Results of a study during the 1990 of San Francisco's dental practice wastewater discharge showed that **dentists are the largest source of mercury in Publicly Owned Treatment Works** (POTW) influents.
- As a result of these findings, San Francisco Water Pollution Prevention Program (located at SF Public Utilities Commission) worked with the **dental community** over the last several years to **address mercury loadings into wastewater through voluntary programs**. Dental practices were urged to implement recommended Best Management Practices (BMP's) and install amalgam separator equipment (ARE).
- A survey that was done in **1999** to gauge effectiveness of the program found that only **1.5 % of SF dentists had installed amalgam separators**.
- After working with the dental community for 10 years, it was found that the **voluntary measures alone were not enough to produce sufficient reduction in mercury** and more aggressive measures were required to achieve significant changes.
- Under the **Federal Clean Water Act** the Southeast wastewater treatment plant, which handles approximately 80% of SF's wastewater was issued a National Pollutant Discharge Elimination System (NPDES) permit. The **limit for mercury set in the permit issued in 2002 was lowered from 210 ng/l to 87 ng/l**.
- The permit required that San Francisco implement a mercury source reduction program. **The current program using voluntary compliance was found to be inadequate**.
- Historical data from the Southeast treatment plant shows that from 1998 to 2003, discharges would have **exceeded** the current **allowable discharge limit** (87 ng/l) for mercury by at least **500%**.
- SF Commission on the Environment and the SF Department of the Environment (henceforth "SFE") expressed interest in assisting in the mercury reduction efforts.
- Commission Meetings and **public hearings** took place to discuss this issue, where dentists, advocates city staff and industry presented public testimony.
- The Commission and SFE established a program whereby a **mandatory mercury reduction permit** requirement was introduced to the SF dental community.

3.0 Permit Process – Nuts & Bolts (see Attachment B)

- By December 31, 2003, all dental offices that discharge wastewater to the City's sewer system must file an application for a wastewater discharge permit with the SFPUC, Bureau of Environmental Regulation and Management (BERM).
- **The permit requires that dental offices reduce their mercury discharges to the lowest practicable level.** The lowest practicable level or the highest concentration of mercury allowed in a dental office waste stream, set at 0.05 mg/L. This can be achieved in two ways:

OPTION 1 – Install ARE (amalgam separators) & Implement BMPs.

(see Attachment C)

AREs employ filtration, settlement, ion exchange and/or centrifugation to remove amalgam and its metal constituents from the office vacuum system. Chair-side traps and screens capture the largest particles, therefore, AREs focus on much smaller particles. **SFE maintains an approved separator database** that dental practitioners can choose from. In order for an ARE **to be approved**, the **unit must attain at least 95 % amalgam removal efficiency** when tested in accordance with the ISO 11143 by an ISO-certified testing laboratory. Different AREs are suitable for different offices depending on size, location (chair side vs. central vacuum), type of vacuum (wet or dry) and other factors.

- OPTION 2 – Implement BMPs and sample & test wastewater discharges to show mercury concentration lower than 0.05 mg/L. (see Attachment D)
Option 2 requires that dentists obtain a **contractor to install special sampling equipment and hire an approved laboratory to conduct the sampling & analysis of their wastewater discharge**. The sampling device called a Berglund device, must be configured, used & maintained in accordance with City specifications. The frequency of sampling and inspection could range from once a year to 12 times a year, depending on the results of the initial testing. Each sample collection & testing session lasts an entire week.
- OPTION 1 vs. OPTION 2
The offices that choose to install an ARE (**Option 1**) are **presumed to be compliance with the City’s mercury discharge limit** if the unit is installed correctly and the BMPs are implemented properly. Whereas, **Option 2 dental offices must continuously monitor and test wastewater discharge** in order to demonstrate compliance with the discharge limit.

The annual costs incurred by dental offices for the two options are below:

OPTION 1:

Purchase - \$600 average cost (\$150-\$2000 range)
Installation – \$200 average cost (\$50-\$500 range)
Maintenance -\$350 average cost/yr (\$250-\$600 range/yr)

OPTION 2:

Costs range from \$1000 (once a year testing) to \$12,000 (12 times/yr testing)

- EXEMPTIONS There are some exemptions from obtaining the discharge permit, available to certain types of dental practices that are not expected to release mercury into the wastewater system, like endodontics, oral & maxillofacial pathology, oral & maxillofacial radiology, oral & maxillofacial surgery, orthodontics & dentofacial orthopedics, pediatric dentistry, periodontics and prosthodontics. Exemptions are also available to practices that place or remove amalgam fillings less than 3 times/year.

4.0 Success of Mandatory Program

Below are the figures as of 1/22/04:

Total # of active dental offices that should be permitted: 644

of exemptions granted: 78 (~12 %)

of offices that chose Option 1: 461 (~71.6 %)

of offices that chose Option 2: 4 (~0.6 %)

of offices not yet responded (have not submitted application yet): 101 (~15.7%)

Note: The number of dental offices that "voluntarily" installed separators i.e. 1.5% of the total number of SF dentists, with the number of offices that installed separators when mandated, roughly 72% (and rising) for very little additional cost.

5.0 Key Program Elements

5.1 EPA Grant for Dental Mercury Reduction (see Attachment E)

SFE applied for grant funding from EPA's Source Reduction division to help achieve significant reductions in dental mercury. The main tasks under this grant work plan include:

1. Permit Application System set-up (not scope of EPA-grant)
2. ARE Subsidy or Rebate Program
3. Training & Outreach (workshops, vendor fairs, educational material, office visits)
4. Mercury Monitoring (measuring mercury in wastewater & comparing with baseline)
5. Effectiveness Measurement (mercury monitoring, surveys, tracking ARE installations)

5.2 ARE Rebate Program (see Attachment F)

In order to promote the installation of ARE, SFE issued cash rebates for the first 100 dentists that installed AREs. The cash rebates covered partial cost of purchase. This program was found to be very popular and widely successful. The first 100 rebates were issued within 2 months of the rebate announcement (with more applications still coming in).

The vendors, local distributors and installing technicians were working round the clock to meet the huge demand and race for the rebates!

SFE is now offering "rebates for community service" to dental practices primarily serving the underserved populations/communities within the City and County of San Francisco and/or practicing on a low-profit or non-profit basis.

5.3 Amalgam Separator Vendor Expo 2003 (see Attachment G)

SFE hosted a vendor expo, in collaboration with BERM & (San Francisco Dental Society (SFDS)), in order to help SF dentists make informed choices. Invitations were sent out to dentists, inviting them to attend for free. Neighboring City and County officials were also invited to learn more about the mercury reduction process; and expressed great interest in the program. There were many dental practitioners from neighboring jurisdictions/dental associations at the event.

Vendors were charged a fee of \$200.00 a booth to display their ARE unit(s); booth costs were used for supplying snacks/drinks at the event. Hazardous waste haulers were also invited to set up booths and advertise their hazardous waste hauling/collection services. They were not charged any fees.

The event was very successful, with a minimum of 300 attendees. All, but two, vendors manufacturing AREs approved by the City displayed their units. Many units (over 15) were sold during the event itself.

5.4 Mercury Monitoring

Current mercury handling practices by dentists will be assessed by surveying dentists regarding their practices and monitoring dental wastewater discharges. In order to gauge the effectiveness of the program, wastewater monitoring will be conducted on three levels: in the collection system, at selected side sewers, and at volunteer dental clinics.

Collection system monitoring will be done in selected trunk lines in the City to provide background data on ambient mercury concentration and temporal variations in the sewage collection system.

Selected side sewers will be monitored at medical-dental buildings where the concentration of dental practices is high. The sampling apparatus and test protocol will closely match the procedure adopted by Hampton Roads (VA) Sanitary District in their national, 5 POTW "AMSA" dental mercury study.

Volunteer dental practices will also be monitored to measure the effectiveness of amalgam removal equipment actually used in clinics. The sampling apparatus will closely match the "Berglund device" developed by the Metropolitan Council Environmental Services division (St. Paul, MN).

Prior studies of dental wastewater in San Francisco showed that approximately 20% of samples collected exceeded the City's Local Limit for mercury, 0.05 mg/l Hg (as total). It is hoped that by monitoring at three levels, fast, unambiguous improvements will be demonstrated, and that long-term reductions in dental mercury introduction will be readily discerned against other sources of mercury entering the sewer system.

6.0 Future Goals

For SFE, the focus will be on training the dental hygienists and other staff to implement the BMPs correctly. SFE is planning to organize workshops for dental staff and site-visits to train them in their own offices. There will also be a Regional Workshop aimed at passing on San Francisco's experience to the other counties of the Bay Area.

BERM will focus mainly on the permit issuance, compliance check and wastewater monitoring issues.

7.0 Highlights

- The implementation of the program in San Francisco was very simple. In that, the program was introduced to the community in September 03 and within the first 3 months, roughly 72% have installed separators and are assumed to be in compliance.
- The vendors/manufacturers of the ARE units played a very important role in the program implementation, with their aggressive marketing to the dental community, as soon as the program was announced. This helped in "spreading the word" to dentists that had not been targeted through the mailing.
- Between 2000-2001, consultant Tom Barron did a study to estimate the amount of mercury captured by a dental office through the implementation of BMPs only vs. the amount of mercury captured through installation of a separator and implementation of BMPs. The results are as follows (personal communication with Tom Barron):

Without implementation of BMPs & no separator, the loss to sewer = **90%**
(Remaining 10% is swallowed by the patient initially, lands up in sewer later)
With the implementation of BMPs & no separator, the loss to sewer* = **20%-30%**
With the implementation of BMPs & a separator, the loss to sewer* = **2%**

*(It is assumed that the implementation of BMPs is done properly & separator installation & maintenance is correct)

Maximum capture of amalgam particles can be achieved through the installation of separators.

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EPA – Environmental Protection Agency
ARE – Amalgam Removal Equipment OR amalgam separators
SFE – S F Environment
SFDS – San Francisco Dental Society
BERM – Bureau of Environmental Regulation & Management
POTW – Publicly Owned Treatment Works
NPDES – National Pollutant Discharge Elimination System
ISO – International Organization for Standardization
BMP – Best Management Practices
ng/l – nanograms/liter
mg/l – milligrams/liter