



SAN FRANCISCO DENTAL AMALGAM REDUCTION PROGRAM

How Dental Offices Can Comply with Local Regulations for Office Wastewater Discharged Into the Sewer System

SEPTEMBER 2003

PROGRAM OVERVIEW TOPICS

Why is a Dental Amalgam Reduction Program being implemented now?	1
Do dental offices have to obtain wastewater discharge permits?	2
How do local wastewater discharge limits apply to dental offices?	2
How can dental offices comply with local discharge limits?	3
OPTION 1 (Install Amalgam Separator)	4
OPTION 2 (Monitor Wastewater Discharge)	5
Summary of Mandatory Best Management Practices (BMPs)	6
Choosing the Right Amalgam Separator	7
Additional Resources	Back



Why is a Dental Amalgam Reduction Program Being Implemented Now?

The City and County of San Francisco is implementing a Dental Amalgam Reduction Program for several reasons:

- San Francisco's Southeast Water Pollution Control Plant is issued a State discharge permit (called an NPDES permit) that limits how much mercury, silver, and other pollutants can be released to the Bay. In the 2002 revision of this permit, the allowable discharge level for mercury was reduced significantly. Additionally, the permit requires that the City implement a mercury source reduction program.
- Historical data from this plant shows that from 1998 to 2003, discharges would have exceeded the current allowable discharge limit for mercury at least 5 times.
- Beneficial uses of San Francisco Bay are impaired due to high levels of mercury in fish, water and sediment.

Although the 30 wastewater treatment plants in the San Francisco Bay Area in combination account for approximately 1% of new mercury entering the Bay, all sources of mercury nonetheless are being targeted for reduction, including dental amalgam which can contain from 40% to 50% mercury.



Map courtesy of USGS



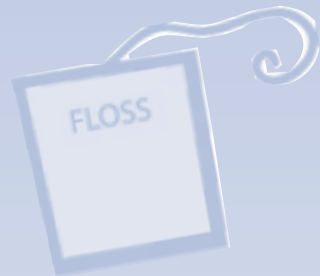
Do Dental Offices Have to Obtain Wastewater Discharge Permits?

Yes. By December 31, 2003, dental offices that discharge wastewater to the City's sewer system must file an application for a wastewater discharge permit with the San Francisco Public Utilities Commission, Bureau of Environmental Regulation and Management (SFPUC, BERM).



This permit will require that dental offices reduce their discharge of dental amalgam waste to the lowest practicable level.

Dental practices are one of the controllable sources of mercury in the City's sewage collection system, and therefore are part of the City's mercury reduction program. Over the past decade San Francisco has performed education and outreach to encourage dentists to voluntarily follow a series of dental amalgam best management practices (BMPs) to reduce introduction of amalgam particles to the sewer system and the environment. However, more action is needed because these voluntary measures alone have not produced a sufficient reduction of mercury in the sewer system.



How Do Local Wastewater Discharge Limits Apply to Dental Offices?

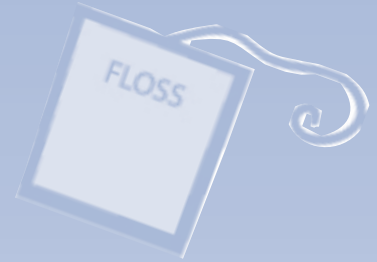
All commercial or industrial wastewater discharged into the City's sewer system must comply with the provisions of the following regulations:

- San Francisco Public Works Code, Chapter X, Part II of the San Francisco Municipal Code, Article 4.1 (referred to as "Article 4.1" or the "Industrial Waste Ordinance"); and
- Department of Public Works Order No. 158170 (which cites local discharge limits).

The most common pollutants of concern in dental office wastewater are mercury and silver. The maximum concentration allowed to be discharged to the City's sewer system is 0.6 mg/L for silver (Ag, as total) and 0.05 mg/L for mercury (Hg, as total). For links to the complete text of these applicable regulations go to <http://pollutionprevention.sfwater.org>.

How Can Dental Offices Comply with Local Discharge Limits?

- 1 All dental offices are currently required to follow specific Best Management Practices (BMPs). These Best Management Practices are listed in this Program Overview and can also be found at <http://pollutionprevention.sfwater.org>.
- 2 By December 31, 2003 all dental offices already in operation must file a permit application that declares which of two options they intend to implement to achieve compliance:
OPTION 1: Install an approved amalgam separator device **and** continue to follow all of the required Best Management Practices. This option is the less complicated route to compliance.
OPTION 2: Monitor wastewater discharge **and** continue to follow all of the required Best Management Practices. Dental offices that select this option will generally have a contractor install special sampling equipment and will need to hire an approved laboratory to conduct the sampling and analysis of their wastewater discharge.
- 3 After July 1, 2004, staff from the City will begin inspecting dental offices to ensure that they meet their permit requirements.
- 4 New Dental Offices Opening After January 1, 2004: All newly established dental offices must submit a permit application and a Best Management Practices Certification Form before opening for business.
- 5 Exemptions: Dental practices that place or remove amalgam fillings 3 days or fewer in a calendar year, and which generate minimal amalgam waste, may be exempt from the permit process. The determination as to whether or not a practice qualifies for an exemption will be made after the permit application information has been submitted and reviewed.



OPTION 1 (INSTALL AMALGAM SEPARATOR)

- Install an approved amalgam separator device on the office vacuum system and continue to follow all of the required Best Management Practices.
- A dental practice is presumed to comply with the City's mercury discharge limit if it follows all Best Management Practices and properly installs and operates an approved amalgam separator unit.

See <http://pollutionprevention.sfwater.org> for information on amalgam separator vendors and waste haulers.

TIMELINE: Option 1 is the less complicated route to compliance -- offices selecting this option must install an approved amalgam separator by July 1, 2004. A one-time extension of up to 6 months may be granted if the practice submits a written justification to the City. If an extension is granted, offices must be in compliance by January 1, 2005. Annual inspections will be performed by City staff to verify separator maintenance, implementation of BMPs, and required paperwork.

COSTS*: Costs will depend on the size of the practice and will include the cost of purchasing, installing, and maintaining the amalgam separator unit, and for proper removal and disposal of amalgam wastes collected. For the average practice, approved amalgam separators can range in purchase price from \$150 to \$2000; installation can range from \$50 to \$1000; annual maintenance can range from \$250 - \$600 (including the cost of waste disposal).

RECORD KEEPING: Dental practices must keep separator installation and maintenance records and amalgam waste disposal records on site for 3 years.

CHOOSING AN APPROVED SEPARATOR: Amalgam separators employ filtration, settlement, or ion exchange to remove amalgam and its metal constituents from the office vacuum system before it discharges to the sewer. Chair-side traps in a vacuum system capture the largest waste amalgam particles. Therefore, amalgam separators focus on removing the remaining, much smaller particles and also, in the case of ion exchange units, the dissolved or ionic silver and mercury that may be present.

Approved separators are those that meet the International Organization for Standardization's standard ISO 11143. To install amalgam separators that do not yet meet this standard, contact the City in advance and provide proof that the unit attains 95% or more amalgam removal when tested in accordance with ISO 11143 by an ISO-certified testing laboratory.

INSTALLING & MAINTAINING SEPARATORS: Separators should either be installed in the vacuum line at each chair or in a central location that receives vacuum line wastewater from all chairs. Dental practices that are served by a shared vacuum system may elect to have one amalgam separator installed at the central location. The City will consider centralized building amalgam separators that would establish compliance for all dental dischargers in that building.

Separators must be maintained according to the manufacturer's recommendation and disposal of amalgam wastes must be in accordance with applicable regulations.

**Disclaimer: Costs cited here are only estimated, based on review of vendor information, and are subject to change.*



OPTION 2 (MONITOR WASTEWATER DISCHARGE)

- Sample and analyze office wastewater discharge and continue to follow all of the required Best Management Practices.
- A dental practice would be in compliance with the City's mercury discharge limit if the practice follows all Best Management Practices for amalgam wastes, and demonstrates that the concentration of mercury in its wastewater discharge is less than 0.05 mg/L (Hg, as total).

See <http://pollutionprevention.sfwater.org> for information on monitoring device and required protocols.

TIMELINE: Option 2 will require that dental offices obtain a contractor to install special sampling equipment and hire an approved laboratory to conduct the sampling and analysis of their wastewater discharge. No later than 90 days after issuing a permit, City staff will visit the dental office to determine the location where sampling shall be done.

Sampling and analysis must commence within 30 days of this visit. Specialized sampling equipment is required. Within 30 days of sample collection, dental offices must submit a copy of the lab report, the signed certification statement, lab quality assurance/quality control report, and chain of custody documents.

The frequency of sampling and inspection (monthly, quarterly or annually) will vary depending on the results of initial sampling.

Inspections will be performed by City staff to verify sampling equipment maintenance, implementation of BMPs and required paperwork.

COSTS*: Costs for Option 2 are estimated to range from approximately \$1,000/year (annual monitoring) to \$12,000/year (in the event that sampling is required monthly based on the initial monitoring).

Costs include assembly and rental or purchase of the approved monitoring device, installation and maintenance of the device, sampling service and laboratory work.

Dental offices are responsible for all costs in contracting with an appropriate vendor to install and maintain sampling equipment and conduct sampling and analysis.

SAMPLING DEVICE DETAILS:

A specialized sampling device, informally referred to as a "Berglund device", must be used for this option. It must be configured, used and maintained in accordance with specifications defined by the City.

City staff will determine the location where sampling must be done. Pursuant to the provisions of Section 12, Article 4.1, the City may require the dental practice to construct a monitoring facility if a suitable sampling point of compliance is not readily available.

Samples will be taken daily during an entire process week. Dental offices selecting this option must follow the sampling protocols, field quality assurance/quality control steps, and analysis methodology defined by the City.

RECORD KEEPING: Dental practices must keep device installation and maintenance records, and all other wastewater monitoring and lab records, on site for 3 years.

NON-COMPLIANCE:

Offices discharging wastewater that exceeds allowable mercury discharge limits will be subject to BERM's Enforcement Response Plan (ERP). The names of businesses found to be in significant noncompliance are published in a newspaper display ad titled "NOTICE OF NONCOMPLIANCE with Pretreatment Standards and Requirements for Discharge to the Sewerage System." Public notification of noncompliant businesses is a requirement the City must follow under the General Pretreatment Regulations.

**Disclaimer: Costs cited here are only estimated, based on review of vendor information, and are subject to change.*



MANDATORY BEST MANAGEMENT PRACTICES (BMPs)

For Minimization of Mercury in Wastewater Discharges from Dental Practices

See <http://pollutionprevention.sfwater.org> for useful resources, such as hazardous waste haulers.

1 Eliminate all use of bulk elemental mercury (also referred to as liquid or raw mercury). Any bulk elemental mercury must be recycled or disposed of as hazardous waste. *It must **NEVER** be placed into the regular trash, placed with infectious waste (red bag), or poured down the drain.*

2 Limit the amount of amalgam used to the smallest appropriate size for each restoration. Keep a variety of amalgam capsule sizes on hand to more closely match the amount triturated to the amount needed in the restoration.

3 Install plastic disposable chair-side amalgam traps in both the vacuum system and cuspidor of each operatory where restoration work is done. Change these chair-side amalgam traps frequently. Never rinse these traps in the sink.

4 Refrain from using sodium hypochlorite (bleach) to disinfect vacuum lines, because it speeds the release of mercury from amalgam.

5 Change vacuum pump filters and screens at least once per month or as directed by the manufacturer. Carefully seal the vacuum screen in its plastic container, including any water that may be present, and store it in an airtight container with other amalgam waste.

6 If your practice has a dry turbine vacuum unit, then have a licensed amalgam recycler or hazardous waste disposal service pump out and clean the air-water separator tank at least once per 6 months. Perform this service more frequently if necessary to maintain suction or if so directed by the vacuum system manufacturer.

7 Have a licensed recycling contractor, mail-in service, or hazardous waste hauler remove your amalgam wastes. Recycling is the preferred method for dealing with amalgam waste. As an alternative, you may have a licensed hazardous waste hauler remove your amalgam waste for disposal. You may also transport small quantities yourself to the San Francisco Household Hazardous Waste Facility using the VSQG (“Very Small Quantity Generator”) program.

Amalgam waste includes:

- a. Non-contact amalgam (scrap);
- b. Contact amalgam (e.g., extracted teeth containing amalgam);
- c. Amalgam or amalgam sludge captured by chair-side traps, vacuum pump filters, screens, and other devices, including the traps, filters, and screens themselves;
- d. Used amalgam capsules; and
- e. Leaking or unusable amalgam capsules.

8 Maintain a written or computerized log of amalgam waste that you generate, and of amalgam waste that you remove from your vacuum system or plumbing. In addition, obtain receipts or other certified documentation from your recycler or hazardous waste hauler of all amalgam waste recycling and disposal shipments that you make. Keep these receipts on file for at least three years, and make them available to authorized City inspectors upon request.

9 Store amalgam waste in airtight containers. Follow recycler’s or hauler’s instructions, if any, for disinfection of waste and separation of contact and non-contact amalgam. Do not use disinfectant solutions with oxidizers, such as bleach, to disinfect the amalgam. Do not add water or waste fixer to the waste containers.

10 Use a licensed hauler for off-site recycling of spent fixer solution or for management as a hazardous waste.

11 Train staff in the proper handling, management, and disposal of mercury-containing material and fixer-containing solutions. Maintain a training log.



Amalgam waste must **NEVER** be placed in the regular trash, placed with infectious waste (red bags), or flushed down the drain. Amalgam-containing traps, filters, or screens must **NEVER** be rinsed over drains or sinks.

Choosing the Right Amalgam Separator

- Does the practice want individual chair-side separators or a central unit that will handle all the chairs?
- What type of vacuum pump services the office? Choose an amalgam separator that doesn't interfere with the practice's vacuum system. Some amalgam separators are approved only for chair-side use or for use with a particular type of vacuum pump.
- If a practice is in a building that contains many dental offices, it should check with the building manager or landlord before installing the unit, to make sure it will be compatible with the central vacuum. Potentially one central amalgam separator can be installed to serve all of the practices in the building.
- What maintenance is required? Ask whether the vendor provides regular maintenance for the unit or if it is the practice's choice. Questions include: How often does one need to dispose of accumulated waste sludge? Is the sludge collected in a canister that can be replaced or in one that must be emptied?
- If the vendor maintains the unit, find out the following: who the vendor contracts with to haul the waste away; where the contractor sends it, and what waste documentation the vendor provides as part of the service fee.
- Review the operation and maintenance manual for items one needs to keep track of while using the unit.
- Does your office use a wet vacuum or a dry vacuum system? Some amalgam separators may be compatible with one type of system, but not another. Check with your supplier for more details.
- What is the flow rate from your operatories during "peak" flow, such as when the vacuum system is flushed at the end of the day? Choose an amalgam separator that easily handles even your peak flow.
- What (if any) warranty requirements come with your vacuum system? Check the terms of your warranty agreement to ensure that amalgam separator installation work is conducted in a way that does not void the warranty provisions.
- Do you lease or own your office space? If leasing, what are the terms of your lease for maintaining and modifying vacuum, sewer line and electrical utilities?
- How many chairs are in your office? Make sure you choose a separator that can handle your current and future capacity. Also, if you operate chairside cuspidors that connect to your vacuum and drain lines, these volumes need to be included when sizing a proper separator system.
- Do you want to install an amalgam separator at chairs where restorative work is performed, or in one central location? The advantage to installing a central amalgam separator is that one unit will serve the entire office. Many separator systems for single offices are sized to handle 1-5 chairs. If chairs are used for hygiene work now, but may be used for general dentistry in the future, waste from such chairs should be routed to the separator.
- How much physical space is available for the equipment? If you are planning to remodel your office or build a new one in the near future, you should allow adequate space for amalgam separator equipment, and install such equipment at that time.
- Is there suitable access to 120V AC power for your separator installation? Some separators (utilizing pumps to remove collected wastewater) will need 120V AC power supply. Connections to existing electrical supplies should be done by a licensed electrician.
- Are dental personnel available to maintain the equipment? Some separators require more staff time than others. For example, daily decanting may be necessary with a batch settling system. If no one is available for this task, then a separator that uses a different technology may be a better solution.



The type of amalgam separator to choose depends on several factors. Many resources are available to help dental offices make an informed decision - see the questions to consider listed on this page and go to <http://pollutionprevention.sfwater.org> for more resources. Vendors will also be able to suggest units that will best serve your office configuration.





Additional Resources for Meeting the Local Dental Practice Wastewater Discharge Limits

ONLINE RESOURCES

Go to <http://pollutionprevention.sfwater.org> for:

- Permit application form and instructions
- The required Best Management Practices (BMPs)
- [Option 1: Install Amalgam Separators](#) - Information on selecting, purchasing, installing and maintaining an amalgam separator
- [Option 2: Monitor Wastewater Discharges](#) - Information on the Berglund monitoring device and the required monitoring protocol
- Amalgam waste hauler vendor information
- Links to useful reference materials
- [Informational Workshops listing](#) - The City will be holding periodic workshops that will offer the opportunity for dental practices to ask questions of City staff, obtain useful materials and meet with vendors.

PHONE RESOURCES

The above resources can also be obtained by contacting the San Francisco Public Utilities Commission (SFPUC), Bureau of Environmental Regulation and Management (BERM) at (415) 695-7310.



San Francisco
Public Utilities Commission

Bureau of Environmental
Regulation and Management

Water Pollution
Prevention Program

3801 Third Street, Suite 600
San Francisco, CA 94124

<http://pollutionprevention.sfwater.org>

(415) 695-7310

<http://pollutionprevention.sfwater.org>