

# Broward County Water and Wastewater Services Best Management Practices for Mercury Waste Management in Dental Offices



Prepared by Broward County Water and Wastewater Services for the control of mercury waste discharged to the sanitary collection system by dental offices.

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## Introduction

The Broward County Water and Wastewater Services (BCWWS) Amalgam Best Management Practices (BMPs) for Dental Facilities are designed to comply with environmental regulations, prevent pollution, and assist dental offices in the proper management of mercury and amalgam waste in their day-to-day activities. This best management practices booklet contains a set of **required and recommended operating procedures and guidelines** designed to reduce the amount of mercury discharged to the BCWWS sanitary sewer system, a publicly owned treatment works. Proper implementation of these procedures is intended to protect Florida's natural environment from the discharge of hazardous mercury-containing compounds.



As part of the Clean Water Act, the National Pretreatment Regulation (40CFR 403) was established to protect publicly owned treatment works and the waterways into which they discharge. The Environmental Protection Agency (EPA) delegates this responsibility to the State of Florida Department of Environmental Protection (FDEP). In Broward County, within their wastewater service area and that of the BCWWS large users, the FDEP has delegated local authority to BCWWS (sewer utility). It is the responsibility of BCWWS's Industrial Pretreatment program to regulate non-residential discharges to the publicly owned treatment works.

This manual identifies certain practices that dental offices are required to follow. These requirements are summarized at the end of each topic as **BMP Summary Requirements**. In addition, guidance is given on optional practices that offer environmentally preferable practices for dental offices and may help save money through waste minimization. These will be summarized in each section under the heading, **“To take compliance to the next level, consider the following.”**

## **BMP #1 - DISPOSAL**

### **Elemental Mercury**

Although most dentists have adopted the use of pre-capsulated amalgam, some offices may still have supplies of elemental mercury tucked away in a storeroom. This supply, especially if it is forgotten or poorly managed, exists as a potential risk to employees and can be very expensive to clean up.



Recycle all unused free mercury.

Many hazardous waste haulers and dental amalgam recyclers will accept elemental

### **Amalgam**

Common dental amalgam is composed of approximately 49 percent mercury, 35 percent silver and the remainder is tin, copper and zinc. These heavy metals have the potential to adversely impact water quality. There are regulated limits for most of these metals in wastewater discharged to BCWWS's sanitary sewer system (see Appendix C).



**Contact Amalgam** is any amalgam that is left over from a procedure, collected in chair-side traps and filters or any unused amalgam from a procedure. It should be collected and stored in an airtight container labeled as "Contact amalgam – to be recycled."

**Non-Contact Amalgam** is any amalgam capsule that is defective or expired and has not been used in a procedure. It should be collected and stored in a separate container labeled, "Non-contact amalgam – to be recycled." Some recycling companies may pay for non-contact amalgam. If this is not the case, all recycled amalgam may be placed in the same container labeled "contact amalgam." Be sure to follow the requirements of a licensed amalgam handler or recycler for the storage, disinfection, labeling, packaging and shipping of scrap amalgam.

### **Amalgam Capsules**

Convert to pre-capsulated amalgam capsules and use the correct size needed for each procedure. A variety of amalgam capsule sizes should be stocked to minimize the amount of waste generated from each restoration. After mixing the amalgam, the empty capsules should be placed in an airtight container labeled "Non-contact amalgam – to be recycled." Unused amalgam and capsules with amalgam residue should also be placed in the non-contact amalgam container. Use standard personal protection equipment precautions.

For further information on amalgam recycling, see Appendix A.

### **BMP #1 Summary Disposal Requirements**

- **Never discard elemental mercury or amalgam in any sink or drain, sharps container, biohazard waste bag (red bag) or trash.**
- **Always recycle or dispose all mercury-containing materials through a licensed mercury waste recycler or handler.**

**To take compliance to the next level, consider the following:**

- ✓ **Discontinue using elemental mercury.**
- ✓ **Discontinue mixing your own amalgam.**
- ✓ **Use pre-capsulated alloy to reduce the risk of an elemental mercury spill.**
- ✓ **Stock a variety of capsule sizes to reduce waste.**
- ✓ **Use amalgam substitutes when clinically and ethically appropriate.**
- ✓ **Designate all sinks as “Sanitary Use Only – No Chemical or Amalgam Disposal” to eliminate cleaning of amalgam-contaminated instruments in the sink.**

## **BMP #2 - AMALGAM RETENTION EQUIPMENT AND MAINTENANCE**

Multiple levels of amalgam retention devices, when properly installed and maintained, can prevent up to 81 percent of amalgam waste from entering the sewer system. The combination of properly functioning chair-side traps and secondary vacuum filters provides the minimum required levels of amalgam retention necessary to comply with these BMPs. Additional retention (up to 99 percent) can be attained by installing an optional amalgam separator system.



The control of waste dental amalgam includes proper management of the traps and filters used in the dental office vacuum system. Because of the difficulty in effectively cleaning amalgam particles from the trap or filter without spilling debris into the drain or trash, disposable chair-side traps and secondary vacuum filters are required for compliance with this BMP. Finer screens are recommended due to increased effectiveness at trapping amalgam particles so consider using a smaller mesh size trap. Replacing a 40-mesh screen with a 100-mesh screen (if the vacuum system can function adequately) can greatly reduce the amount of amalgam particles that pass through the system and subsequently into the wastewater. Most dental amalgam recyclers will allow the combination of amalgam particles with used trap and filters in the contact amalgam waste container. Be sure to check the requirements prior to disposal.

### **Chair-side Traps**

Regularly maintained chair-side traps will best retain amalgam particles while maximizing system flow efficiency. When conducting any maintenance procedure, make sure to use appropriate personal protective equipment.



- A.** Replace chair-side amalgam traps as recommended by the equipment manufacturer or at least once per quarter.
- B.** Remove the trap from the chair-side equipment and place the entire trap into the airtight container labeled "Contact amalgam for recycling." Install a new trap. Do not rinse the trap as this could introduce amalgam into the drain.

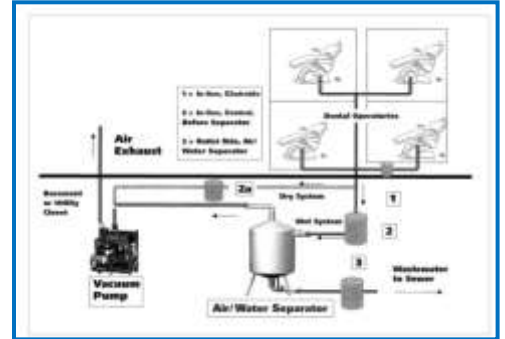
Please note that the chair-side trap from a dental chair dedicated to hygiene only can be disposed of as typical medical waste and is not regulated under this BMP.

## Secondary Vacuum Pump Filters (in the central vacuum)

- A. Replace vacuum pump filter as recommended by the equipment manufacturer or at least once per quarter.
- B. Remove the filter apparatus. Do not pour the liquid content into any sink or drain. While holding the filter container over a tray or other container that can catch spills, put the lid on the filter and place it (with liquid contents) into the contact amalgam container. When the container is full, it should be sent for recycling. Be sure to check with the amalgam recycler to ensure these filters are acceptable.

## Amalgam Separators (Optional)

Due to the superior amalgam removal capability of amalgam separators over chair-side traps and vacuum filters, the installation of a separator should be considered. These systems are designed to capture very fine amalgam particles. When a separator is used in conjunction with appropriately functioning chair-side traps and secondary vacuum filters, amalgam removal rates can increase to the 95 percent to 99 percent range.



### BMP #2 Summary Equipment and Maintenance Requirements

- Never rinse traps, filters or screens over the sink or drain.
- Install disposable-only chair-side traps and secondary vacuum system filters.
- Regularly maintain the filter system according to manufacturer recommendations or at least once per quarter.
- Dispose of trap, filter and separator waste through a licensed mercury waste recycler or handler.

### To take compliance to the next level, consider the following:

- ✓ Use the finest mesh disposable traps and secondary filters that the vacuum system can efficiently handle.
- ✓ Install an amalgam separator that is ISO 11143 compliant.

*The American Dental Association recommends that any dentist considering the purchase and installation of an amalgam separator read "Purchasing, Installing and Operating Dental Amalgam Separators: Practical Issues," K.R. McManus, P.L. Fan; J. American Dental Association 2003 (134:1054-1065), online at <http://jada.ada.org>.*

### **BMP #3 - STORAGE**

For small quantity generator offices, it may take a long time to generate enough amalgam waste to trigger a disposal event. Sometimes, dental offices will store waste amalgam under radiographic fixer or other solutions prior to disposal. These solutions may dissolve the mercury in the amalgam and thus are classified as mercury contaminated hazardous waste. These liquids are prohibited from being discharged to the BCWWS sanitary sewer.



For example, the silver in X-ray fixer can be reclaimed reducing cost and disposal liability. However, if it is used to store scrap amalgam, then the only option for disposal is as hazardous waste. Not only is the creation of this additional waste unnecessary, it is also costly for disposal and creates an additional source for potential spills. If this type of waste is present, contact a licensed dental amalgam recycler or hazardous waste hauler for more information on how to discard this material properly and begin to store the scrap amalgam in a dry, properly labeled, air-tight container.

Contact a mercury recycler/hauler to determine if any disinfection is required prior to shipment. If amalgam must be disinfected before shipment to the recycler, do so just prior to shipment. Do not use any bleach- containing chemicals that dissolve mercury, an autoclave, or any other method that uses heat for disinfection. The heat from an autoclave may cause the mercury to volatilize and be released to the air.

#### **BMP #3 Summary Storage Requirements**

- **Never store amalgam waste under any liquid.**
- **Store all amalgam waste dry in a properly labeled, air-tight container.**
- **Dispose of any liquids used to disinfect contact amalgam as hazardous. These cannot be discharged to the sewer system.**

**To take compliance to the next level, consider the following:**

- ✓ **If the mercury recycler/handler requires it, add a liquid disinfectant just prior to shipment. This liquid must be disposed of as hazardous waste.**



## **BMP #4 - ENVIRONMENTAL RELEASE**

### **Plumbing Replacement and Repairs**

After an office adopts its new amalgam management practices, it may be appropriate to clean or replace sink traps. Mercury from past activity often settles at low points such as sink traps and sumps. The slow dissolution of the mercury in a sink trap or sump can release mercury into the BCWWS sanitary sewer for years after past disposal practices have been corrected.



When plumbing parts are removed or cleaned, caution should be taken to avoid spilling the contents in case amalgam or mercury is present. Pour and brush out the sludge and handle it as if it were contact amalgam, or have it discarded as hazardous waste. Contact an amalgam or mercury recycler or a licensed hazardous waste handler (Appendix A) for further clarification. The plumbing parts can then be put back in place or recycled.

### **Disinfectants, Cleaners and Other Chemicals**

- Follow the label directions on the product container for guidance on the proper use, handling and disposal of used disinfectants and cleaners, along with the residue remaining in the product containers.
- Use only the amount of cleaning solution needed for the job.
- Flammable materials that release ignitable vapors must not be discharged to the BCWWS sanitary sewer. These materials are considered hazardous waste.
- Unused products should be discarded through a hazardous waste hauler or, if acceptable, send unused products back to the manufacturer or supplier.

*The American Dental Association offers more information on the effect of disinfectants and line cleaners on the release of mercury from amalgam:*

[http://www.ada.org/prof/resources/positions/statements/amalgam\\_plumbing\\_guidelines.pdf](http://www.ada.org/prof/resources/positions/statements/amalgam_plumbing_guidelines.pdf).

### **Spills**

Do not handle mercury or mix amalgam in carpeted areas because it is very difficult to collect all of the contaminants if there is a spill. In the event of a mercury spill, put on nitrile gloves (do not use latex gloves as mercury can penetrate latex) along with other appropriate proper protective equipment and clean it up immediately. Never clean up a mercury spill using a vacuum cleaner as this has the potential to spread mercury dust and/or vapor throughout the area in the vacuum exhaust. Mercury spill kits are available from companies that specialize in Occupational Safety and Health Administration compliance supplies, amalgam recyclers and dental product suppliers. Before purchasing a kit, make sure it includes complete instructions on how to perform a spill clean-up. Train staff members in proper spill cleaning procedures.



**BMP #4 – Summary Environmental Release Requirements**

- **Never use an autoclave or heat to disinfect amalgam.**
- **Never use disinfectants or line cleaners containing chlorine (bleach) to flush dental unit wastewater lines.**

**To take compliance to the next level, consider the following:**

- ✓ **Review “The effect of disinfectants and line cleaners on the release of mercury from amalgam” in the Journal of the American Dental Association (2006, Vol. 137, No. 10, 1419-1425), available online at <http://jada.ada.org>.**

## **BMP #5 - RECORDS REQUIREMENTS**

Retention of records is required to demonstrate compliance with required BMPs. Dental offices are required to maintain a written or electronic log of all maintenance performed on traps and vacuum system or plumbing. In addition, retain receipts, shipping manifests and other certified documentation from the recycler or hazardous waste hauler of all amalgam waste recycling and disposal shipments. These documents must be kept on file for at least three years, and must be made available to authorized BCWWS inspectors upon request.



### **BMP #5 Summary Records Requirements**

- **Retain the following records for three years:**  
**All waste amalgam recycle/disposal receipts and shipping manifests.**  
**All trap, filter and separator maintenance records**  
**BMP training documentation for all employees.**
- **Submit semi-annual certification of the dental amalgam waste handler certificates to BCWWS. Certifications are due on the 28<sup>th</sup> day of January and July each year.**

## **BMP #6 - TRAINING**

Proper knowledge and handling of amalgam is vital to preventing accidental exposure and release of hazardous materials into the environment. A proper training program must include all six of the BCWWS Best Management Practices included in this manual. Anyone who handles or has the potential to come into contact with mercury-containing materials must be trained in these BMPs for proper mercury/amalgam waste handling requirements.

### **BMP #6 Summary Training Requirements**

- **Use these BCWWS Best Management Practices to teach proper handling techniques to all staff who may come into contact with mercury-containing materials.**

**To take compliance to the next level, consider the following:**

- ✓ **Require all personnel who may come into contact with mercury-containing materials to review the Occupational Safety and Health Administration's proper mercury safe handling and disposal procedures at the OSHA Web site:**  
**<http://www.osha.gov/SLTC/mercury/standards.html>.**

## **Appendix A**

### **Amalgam & Mercury Recycling**

#### **Supplemental Guidance for Recyclers and Wastes**

Many waste handlers are licensed to receive, transport, and manage amalgam and mercury materials, along with other hazardous materials. However, only a limited number of facilities across the country are licensed to treat and/or recycle amalgam and mercury-containing materials. Be sure to obtain documentation that the hauler or recycler is appropriately licensed to handle mercury-containing materials and that they are disposing the materials appropriately. If the materials are improperly disposed in a landfill or elsewhere, the generating dental office may be responsible for any penalties and costs associated with remediation.

There are various companies that will provide recycling of amalgam and other mercury-containing materials. Contact any of these companies to negotiate this service and shipping arrangements. In addition, other environmental service companies can provide pickup of these materials. These companies are typically “go-betweens” that will eventually ship to one of the disposal companies. A licensed waste handler should take care of all administrative issues related to shipping and handling of potentially hazardous materials.

A list of dental amalgam recycling facilities reviewed by the Florida Department of Environmental Protection can be found at the following Web site -

[http://www.dep.state.fl.us/waste/quick\\_topics/publications/shw/mercury/AmalgamRecyclerList042507.pdf](http://www.dep.state.fl.us/waste/quick_topics/publications/shw/mercury/AmalgamRecyclerList042507.pdf).

The American Dental Association has also assembled a directory of dental waste transporters at the following Web site -

[http://www.ada.org/prof/resources/topics/topics\\_amalrecyclers.pdf](http://www.ada.org/prof/resources/topics/topics_amalrecyclers.pdf).

## Appendix B

### PROHIBITED DISCHARGES AND WASTEWATER DISCHARGE LIMITS

***Prohibited discharge standards.*** No user shall contribute or cause to be contributed, directly or indirectly, any pollutant or wastewater that will pass through, or cause interference, with the operation or performance of the WWF. These general prohibitions apply to each user of the WWF whether or not the user is subject to national categorical pretreatment standards or any other federal, state, or local pretreatment standards or requirements. At a minimum, a user shall not contribute the following substances to the WWF:

(1) Any liquids, solids, or gases which by reason of their nature or quantity are, or may be, sufficient, either alone or by interaction with other substances, to cause fire or explosion or be injurious in any other way to the WWF or to the operation of the WWF. This includes, but is not limited to, all waste streams with a closed-cup flashpoint of less than one hundred forty (140) degrees Fahrenheit (sixty (60) degrees Celsius) using the test methods specified in 40 CFR 261.21.

(2) Solids or viscous substances which may cause obstruction to the flow in the WWF resulting in interference, such as, but not limited to: grease, garbage, animal intestines or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, wastepaper, wood, plastics, gas, tar, asphalt residues, car wash recirculation sludge, residues from refining or processing of fuel or lubricating oil, mud, glass grinding or polishing wastes, or any solids greater than one-half ( $\frac{1}{2}$ ) inch or 1.27 centimeters in any dimension.

(3) Any wastewater having a pH less than 5.0 or otherwise causing corrosive damage or hazard to structures, equipment, or endangering personnel of the WWF.

(4) Any wastewater containing toxic pollutants in sufficient quantity, either singly or by interaction with other pollutants, to injure or interfere with the WWF, constituting a hazard to humans or animals, creating a toxic effect in the receiving waters or effluent reuse of the WWF, exceeding the limitation set forth in a categorical pretreatment standard or local limit, or causing the WWF's effluent to fail a toxicity test. A toxic pollutant shall include but not be limited to any pollutant identified in Section 307(a) of the Act or in 40 C.F.R. 401.15.

(5) Any noxious or malodorous liquids, gases, solids, or other wastewater which, either singly or by interaction with other wastes, are sufficient to create a public nuisance, a hazard to life, or to prevent entry into the sewers for maintenance and repair.

(6) Any substance which may cause the WWF's effluent or any other product of the WWF, such as residues, sludges, or scums, to be unsuitable for reclamation and reuse or to interfere with the reclamation process.

In no case shall a substance discharged to the WWF cause the WWF to be in noncompliance with effluent criteria, effluent reuse criteria, or biosolids use and disposal criteria; or guidelines or regulations developed under Section 405 of the Act; or any criteria, guidelines, or regulations affecting effluent reuse or biosolids use and disposal developed pursuant to the SWDA, the Clean Air Act, the Toxic Substances Control Act, or state or local criteria applicable to the effluent reuse or the biosolids management method being used.

(7) Any sludges or residues from industrial process, including but not limited to, car wash sludges, catch basin residual, lint trap solids, and other similar waste, screenings, or other residues from the pretreatment of industrial wastes without Control Authority approval.

(8) Any wastewater that imparts color that cannot be removed by the treatment process, such as, but not limited to, dye wastes and vegetable tanning solutions, which consequently impart color to the treatment plant's effluent thereby violating the WWF's NPDES permit. The color of the wastewater (in combination with turbidity) shall not cause the treatment plant effluent to reduce the depth of the compensation point for photosynthetic activity by more than ten percent (10%) from the seasonally established norm for aquatic life.

(9) Any wastewater having a temperature greater than one hundred fifty (150) degrees Fahrenheit (65.5 degrees Celsius) or which inhibit biological activity in the WWF resulting in interference, but in no case wastewater which causes the temperature at introduction into the treatment plant to exceed one hundred four (104) degrees Fahrenheit (forty (40) degrees Celsius).

(10) Any pollutants, including oxygen demanding pollutants (BOD, etc.) released at a flow rate or pollutant concentration which, either singly or by interaction with other pollutants, will cause interference with either the WWF, or any wastewater treatment or sludge process, or which will constitute a hazard to humans or animals. In no case shall a slug load have a flow rate or contain a concentration or qualities of pollutants that exceed for any time period longer than fifteen (15) minutes more than five (5) times the average twenty-four (24) hour concentration, quantities, or flow during normal operation.

(11) Any wastewater containing any radioactive wastes or isotopes, except as specifically approved by the Director in compliance with applicable local, state, or federal laws and regulations.

(12) Any wastewater which results in the presence of toxic gases, vapors, or fumes within the WWF in a quantity that may cause acute worker health and safety problems or creates a public nuisance.

(13) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through.

(14) Any hauled wastes, except at the discharge point designated by the Control Authority in accordance with Section 34-140(e).

(15) Any storm water, surface water, ground water, artesian well water, roof runoff, subsurface drainage, swimming pool drainage, condensate, deionized water, noncontact cooling water, ground water remediation discharge, and unpolluted industrial wastewater, unless specifically authorized by the Director.

(16) Any medical wastes, except as specifically authorized by the Director in a discharge permit.

(17) Any wastes containing detergents, surface active agents, or other substances which may cause excessive foaming in the WWF.

(18) Any hazardous substance or waste.

(19) Any enzyme degreasers, unless specifically authorized by the Director or previously approved by the Control Authority.

(20) Wastewater causing, alone or in conjunction with other sources, the WWF's effluent to fail the toxicity test as defined in the WWF's NPDES permit.

(21) Fats, oils, or greases of animal or vegetable origin in concentration greater than 100 mg/l.

**BROWARD COUNTY  
COMPLIANCE AND ENFORCEMENT SECTION**

**INDUSTRIAL PRETREATMENT PROGRAM - LOCAL LIMITS Revised March 2021**

<b>Parameter</b>	<b>Current Local limit (mg/L)</b>
Arsenic, Total	0.10
Cadmium, Total	0.70
Chromium, Total	1.0
Copper, Total	2.0
Cyanide	0.25
Iron, Total	6.1
Lead, Total	0.4
Mercury	0.1
Nickel, Total	1.8
Oil & Grease	100
pH	5.0-10.0
Silver, Total	0.35
Zinc, Total	0.87

Units are milligrams per liter unless otherwise noted.



## Appendix D

### Acknowledgements



**Florida Department of Environmental Protection (FDEP)**  
FDEP Amalgam BMP

[http://www.dep.state.fl.us/waste/quick\\_topics/publications/shw/mercury/AmalgamBMPsBrochure.pdf](http://www.dep.state.fl.us/waste/quick_topics/publications/shw/mercury/AmalgamBMPsBrochure.pdf)



**Florida Dental Association (FDA)**

<http://www.floridadental.org/index.html>



**NorthEast District Dental Association (NEDDA)**

<http://www.nedda.org>



**American Dental Association (ADA)**

[http://www.ada.org/prof/resources/topics/amalgam\\_bmp.asp](http://www.ada.org/prof/resources/topics/amalgam_bmp.asp)

The ADA provides a document entitled, ADA Best Management Practices for Amalgam Waste, as well as a 10-minute video on handling waste amalgam. The document and video are available on the ADA Web site

[http://www.ada.org/prof/resources/topics/amalgam\\_bmp.asp](http://www.ada.org/prof/resources/topics/amalgam_bmp.asp)



**Virginia Dental Association (VDA)**

<http://www.deq.state.va.us/p2/mercury/documents/manual.pdf>



**Virginia Department of Environmental Quality (VDEQ)**

<http://www.deq.state.va.us/>