



# **The Environmentally Responsible Dental Office**

A Guide to Best Management Practices of Dental Wastes

**March, 2004**

## Office Practices to Avoid

- **NEVER** use bulk mercury for amalgam;
- **NEVER** pour bulk elemental mercury waste in the garbage, red bag or down the drain;
- **NEVER** place amalgam waste of any kind (including extracted teeth with amalgams) in the biohazard (red) bag. Many biohazard bags are incinerated and/or treated and placed in conventional landfills that do not have liners. Both types of disposal can lead to mercury entering the environment;
- **NEVER** rinse traps, filters, or screens over or down the drain or into a waste basket;
- **NEVER** disinfect teeth or any item containing amalgam with any method that uses heat;
- **NEVER** dump spent fixer down the drain;
- **NEVER** throw lead foil from x-rays in the trash (for liability reasons, it is not recommended that lead foil be given to patients, staff or others).

## Oregon Dental Waste BMPs

1. Use **precapsulated alloys** only (do not put capsules in red bag)
2. Salvage, store and recycle **non-contact amalgam** (amalgam left over from a capsule not used in restoration)
3. Recycle/dispose of **extracted teeth with amalgam** in one of the following ways:
  - Disinfect (in bleach) and give to patient,
  - Check with other amalgam recycler/disposal services to see if they will accept teeth (store in sealed container following disinfection)-Check ODA recycling list on ODA website [www.oregondental.org](http://www.oregondental.org)

**DO NOT PUT EXTRACTED TEETH WITH AMALGAM IN THE RED BAG!**  
**DO NOT PUT EXTRACTED TEETH WITH AMALGAM IN THE STERILIZER!**
4. **Extracted teeth with no amalgam** can be put in the red bag!
5. Use **disposable chair side traps** to retain amalgam. Recycle.
6. Properly clean or replace **screens, traps, & vacuum pump filters** regularly – do not rinse traps and filters.
7. Handle chair-side traps and vacuum filters as **amalgam waste**.
8. Store amalgam wastes in **separate airtight, labeled containers**.  
**DO NOT PLACE AMALGAM UNDER FIXER! STORE DRY!**
9. Recycle **all** amalgam wastes through an **amalgam recycler**.
10. Train staff members in mercury/amalgam **spill clean up procedures**.
11. **Recycle used lead foil** (*Due to potential liability, we do not recommend giving lead to patients, staff or others*).
12. **Do not** dump spent fixer down the drain. **Recover and recycle**.

Visit [www.oregondental.org](http://www.oregondental.org) for a list of recycler/disposal services that includes statewide pick-up, mail disposal or offer drop-off services at their location.

## Definitions

- **AMSA:** Association of Metropolitan Sewerage Agencies
- **Bioaccumulation:** The concentration of a particular substance in the bodies of organisms, increasing with the animal's level in the food chain.
- **Bioavailability:** The degree to which or rate at which a substance is absorbed or becomes available at the site of physiological activity
- **Biosolids:** Solid or semisolid material obtained from treated wastewater, often used as fertilizer
- **Combined Sewer Systems:** Systems that carry sewerage from facilities/residences, as well as storm water
- **Indirect Dischargers:** Facilities that discharge wastewater to municipal sewer systems (rather than directly to a water body)
- **Life Cycle Costing:** Cost evaluation that takes into account both initial costs and future costs and benefits (savings) of an investment over some period of time
- **Mixing Zone:** The area in which a sewerage plant's discharge initially combines with the surrounding water
- **NPDES:** National Pollutant Discharge Elimination System (permits POTW discharges)
- **POTW:** Publicly Owned Treatment Works (your local wastewater and sewage treatment plants)
- **PPB:** Parts per billion: one pinch of salt in one thousand tons of potato chips
- **PPM:** Parts per million; a pinch of salt in one ton of potato chips is also one part (salt) per million parts (chips).
- **RCRA:** Resource Conservation and Recovery Act (governs handling of hazardous wastes)

## Oregon Dental Association's Guide to Best Management Practices (BMP's) of Dental Wastes

- I. **Introduction.** The following recommendations were developed in 1998 by the ODA Office Safety Committee in cooperation with the City of Portland Bureau of Environmental Services and other water/environmental agencies throughout the state of Oregon. The ODA and its component dental societies are asking all Oregon water/environmental agencies to accept these recommendations in lieu of regulation and permitting requirements.

ODA expresses many thanks to the City of Portland, the Association of Clean Water Agencies and the Oregon Department of Environmental Quality for working with the ODA on voluntary management of dental office hazardous waste. We also wish to thank the principal authors of this document: Beryl Fletcher, ODA Director, Professional Affairs, John G. Colasurdo D.M.D., and Murray Bartley DMD, Ph.D., Chair, Office Safety Committee. Additional thanks are extended to the Western Lake Superior Sanitary District for resource information provided to our authors.

- II. **Background.** The Oregon Dental Association has developed this guide to assist dentists in how best to manage the disposal of dental office wastes. Reduction of toxic substances at the source is the pollution prevention goal of the U. S. Environmental Protection Agency and Oregon's Department of Environmental Quality (DEQ). Local city and county wastewater agencies are implementing programs to reduce toxic wastes from entering our streams, sewers and landfills. The Oregon Dental Association is asking these agencies to accept ODA's voluntary Best Management Practices Program for dental offices.

In late 1996, ODA began discussions with DEQ and the City of Portland Bureau of Environmental Services as they were reviewing local discharge limits for silver and other hazardous substances. Of key interest to these agencies was mercury including amalgam, (Federal EPA includes amalgam in the mercury category), x-ray fixer (silver) and lead foil. Also of interest, was the use and disposal of chemiclave materials. The agencies encourage the conversion from chemiclaves to autoclaves. (not mandatory and only as old equipment is needed to be replaced)

ODA and its component dental societies continue to work with Oregon wastewater agencies and dental offices to enter into mutual agreement whereby dentists will be encouraged to initiate a voluntary program, "Best Management Practices" (BMP's) for recycling of amalgam, lead foil and x-ray fixer. Historically, voluntary efforts achieve much higher compliance than mandates, and are less expensive to administer for all.

**ODA strongly encourages** all dental offices to recycle mercury, amalgam, lead foil and x-ray fixer. If dental offices recycle these materials there will be no need to enact further and more costly regulation of dental offices.

- III. **Recycling assistance.** Companies have been identified which will assist dental offices in recycling of these materials. ODA does not endorse or recommend any particular company.

A few suggestions to help dental offices to implement the BMP Program and where to look for recycling assistance include:

1. The attached list of recycling/recovery vendors.
2. Review the yellow pages of your local telephone book under “recyclers” or “hazardous waste.”
3. Contact your nearest DEQ hazardous waste station for collection events in your area. Outside the Portland Metro area, some events are sponsored by DEQ and in some areas they are sponsored locally. You may also want to check with your local county waste management department or local garbage hauler for events in your area. For DEQ events check the following website or call DEQ at the number below.
  - DEQ Technical Assistance Webpage <http://www.deq.state.or.us/wmc/hw/hwta.html>
  - Phone (general program number) 503-229-5913
4. METRO (in Portland, (503) 223-8133 or (503) 234-3000) is available for disposal. However, you MUST call first to set up an appointment to bring in the materials for recycling. There is a disposal fee charged. These hazardous waste stations are open Monday through Friday.

METRO's recycling stations are located at:

1. Central Transfer Station at 6161 N. W. 61st. Street in Portland or
2. Oregon City Transfer Station at 2001 Washington Street, Oregon City.

There will be a fee assessed to dispose of this material at both sites.

5. There are also mail-service recycling and other companies which may accept or pick-up your wastes. Make sure you follow guidelines from each company for packaging, preparation and/or mailing. Always keep a record of what, how much and when you ship.

**IV. Amalgam (Mercury) Waste.** In order to meet EPA's pollution prevention goal, the Oregon Dental Association's Best Management Practices (BMP's) prevent amalgam waste from entering the air, sewage system or the garbage. Amalgam wastes include:

- Amalgam particles are a potential source of mercury not only in the sewer, but ground water, streams and rivers. (EPA) Amalgam particles are created when old fillings are removed and new fillings are mixed. We recommend that dental offices recapture amalgam particles with screens or traps, and avoid disposal of amalgam down the drain, in the trashcan, or in the red bag.
- Unused amalgam in a capsule following a restoration being placed is another item to be recycled. Process the unused amalgam and store dry in a sealed container.
- Extracted teeth with amalgam also should be disposed of with other amalgam wastes.

For your reference, a list of recyclers is given in the appendix. You may wish to consult with the company of your choice, as to specifications for storage and disposal preparation of amalgam particles. ODA does not endorse or recommend any particular company.

Some simple techniques to properly collecting, storing and transporting amalgam include:

1. Install amalgam traps chair-side and in the suction line just before the vacuum pump. Every few months (or when necessary), clean the traps and bowl and recycle the amalgam waste. Many recyclers will take the whole trap. (Do not have staff pick through trap. This creates other exposure issues.) Do not put traps or filters in with red bag wastes. Replacing the traps and filters regularly will also improve the suction and extend the life of your vacuum pump.
2. Flush the vacuum system with line solution before changing the chair-side trap. (Does it before you go home, and then change the trap the first thing in the morning.) Check with your manufacturer for the type of line solution to be used. (If you have an amalgam separator that requires a specific solution be used, check with your chair/equipment manufacturer to see the solution suggested will not void any equipment warranty.)
3. Unused amalgam in a capsule following a restoration being placed is another item to be recycled. Process the unused amalgam and store dry in a sealed container. (Do not store under fixer.)
4. Extracted teeth with amalgam should not be put in the red bag or the sterilizer. Disinfect (with bleach) and either give to the patient, or check with amalgam recyclers that take traps and filters to see if they will accept. Store in sealed container following disinfection. Do not store under fixer. Check ODA's website for up-to-date recycling list for all BMP wastes.
5. Use barrier techniques such as gloves, glasses and mask when handling traps. (chair-side or vacuum pump) Use utility gloves for cleaning up and handling these wastes.
6. Disposal/ Recycling services
  - a. Some disposal/recycling services allow you to dispose of gloves, bags and paper towels used in collecting the used amalgam. If allowed, pull the cuff of the glove over the amalgam trap, and off hand and fingers, inverting the glove and collecting the amalgam trap inside. Tie a knot in the glove to secure the trap inside. If not allowed, you will need to check with recycling service to obtain information on what to do with contaminated gloves, paper towels etc. Many times if contaminated with human tissue and/or body fluid, this can be put in red bag. But traps and suction pump filters should never be put in red bag.
  - b. Some disposal/recycling services require that the amalgam waste be disinfected and also documented in some way that it was disinfected prior to disposal pick up. You may use your normal disinfectant solution. Check with your disposal/recycler for any special form to document the waste was disinfected or check to see if you may simply include a statement on your letterhead that the amalgam waste has been disinfected.
7. Keep all containers with recycled waste, in cool, dry area. Avoid sunlight and high humidity. **DO NOT KEEP AMALGAM STORED WITH FIXER.** Most recyclers of amalgam want the material as dry as possible. They do not want fixer (which contains silver) mixed with the amalgam. Contact recycler for their instructions.

8. Some recyclers pay for clean scrap amalgam, but may not pay for amalgam that is mixed with other wastes from traps. These recyclers request that clean scrap amalgam and mixed amalgam be kept separate to aid the ease of recycling. You can send waste amalgam to the recycler via common carrier (i.e. UPS) in a strong suitable container with proper labeling, storage, manifesting prior to shipping. You may also wish to contact:
  - a. Your local DEQ hazardous waste unit, DEQ directly at [DEQ Technical Assistance Webpage http://www.deq.state.or.us/wmc/hw/hwta.html](#). Phone (general program number) 503-229-5913. You must contact them in advance. DEQ has paperwork that must be completed prior to disposal.
  - b. METRO in Portland (503) 223-8133 or (503) 234-3000 for information on how to dispose of wastes at their facilities. You must contact to make an appointment for disposal.

Both DEQ and METRO charge a fee for disposal.

Some recyclers who accept other materials may also accept amalgam if using their service to dispose of x-ray fixer, gold or other dental wastes. (E.g. these same recyclers may also take extracted teeth with amalgam)

9. The American Dental Association recommends that small amounts of elemental mercury can be made into amalgam by reacting with alloy. This amalgam scrap should be placed in a sealed container and recycled. ADA no longer recommends that amalgam be stored under fixer. Store amalgam dry in a tightly sealed container.
10. Some recyclers of amalgam accept contaminated elemental mercury spills, and absorbents from cleaning up spills of mercury. This material should be managed as a hazardous waste, with proper labeling, storage, manifesting, and shipping. Check DEQ's website [www.deq.state.or.us](http://www.deq.state.or.us) or American Dental Association at [www.ada.org](http://www.ada.org) for spill clean up procedures.
11. The ODA and ADA recommend that all dentists use encapsulated amalgam vs. mixing restorative material from bulk sources.
12. Used (and empty) amalgam capsules have been determined to be non-hazardous, based on toxicity test results. Empty amalgam capsules may be placed in the garbage. If the used amalgam capsules are not empty, this amalgam should be recycled.

## V. X-ray Fixer

1. X-ray fixer is considered a hazardous waste because of its high silver content. However, fixer is easily recyclable. Recycling is the management method recommended by regulatory agencies. There are two suitable methods of managing fixer waste:
  - a. You may use a silver recovery unit<sup>1</sup> for your developing system; or

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<sup>1</sup> Silver recovery units only make economic sense if the flow is 2 or 3 gallons of fixer per week. These small recovery units have an operating life of only about six months. They are filled with iron wool and will rust over time. Once rusted, the unit does not pick up silver. The problem with silver removal equipment is most dental offices generate only small amounts of silver and the cost of the silver recovery equipment can be expensive. The smallest known unit was Kodak's Chemical Recovery Cartridge, Junior Model II. This model will most likely need to be changed out approximately every six months depending upon the flow volume and rust development. While this unit will treat up to 100 gallons in that time period, only a large dental office would generate such a large flow of fixer. The option to purchase a silver recovery unit might only be possible if several dentists found it feasible to collectively share a unit.

- b. You may give, sell, or pay someone that operates a silver recovery unit to take your fixer.
2. For your reference, a list of silver recyclers is included in the appendix. If you dispose of your fixer off-site, collect and store it in a closed plastic container labeled: Hazardous Waste— Used Fixer—Contains only fixer. Many recyclers want to be sure that the liquid does not contain developer. If it does, it could actually remove silver from the recycling equipment. The liquid that has run through a recovery unit can be disposed of down the drain.
3. Many local photo developing companies will accept x-ray fixer from dental offices. You may wish to check with those companies in your area.

**Note: The use of products that solidify x-ray fixer or other dental waste for subsequent disposal in regular trash for the landfill is *not* an acceptable Best Management Practice.**

**VI. X-ray Developer.** Developer solutions should not be mixed with fixer solutions. Waste developer can be washed down the drain, if it is not mixed with fixer. Flush the drain thoroughly as you discharge developer down the drain. Some units mix the fixer and developer after they are spent. The resulting solution is hazardous. However, you may purchase an adapter kit to keep the fixer and developer separate. Check with your equipment manufacturer for adapter kits. You may also wish to check with your local DEQ hazardous waste disposal site as to whether they also may take used developer.

**VII. Lead Foil or Lead Shields.** Lead foil that shields X-ray film or protective lead shields should not be disposed of in the garbage. These materials are hazardous waste unless they are recycled for their scrap metal content. Companies which recycle amalgam or fixer may also accept lead waste. Eastman Kodak has a special mail in program for dentists to recycle lead foil. A list of lead reclaimers is given in the appendix.

It is also noted that some dental offices use the lead foil themselves or give it to patients to melt down for fishing weights or make buckshot. This is not a recommended BMP. Dental offices are especially encouraged not to give the lead foil to staff, patients or other persons due to potential for liability for handling and/or disposal by those persons.

**VIII. Chemiclave Waste.** Normal use and discharge of chemiclave solutions is acceptable although discouraged. Agencies would like to encourage dentists to move away from chemiclave sterilization to autoclaves. Normal use and sewer disposal of solutions (in normal use) is acceptable. Flush following disposal with several gallons of water so that it does not sit in the sink trap or does not give a slug of material to the sewer system.

We recommend that dental offices buy only the amount of chemical sterilizer that they need; this will eliminate the need to dispose of the excess material.

If a dental office switches to an autoclave and has a supply of unused formaldehyde, they should give this to a dentist who still uses a chemiclave. The agencies would like to avoid a large “slug” of formaldehyde at any one time.

**IX. Labeling.** The container in which you store your hazardous waste must be labeled with the words “hazardous waste” with a description of the waste. Example: “Hazardous Waste - Used fixer - contains only fixer.”

The date you start filling the container should be written on the container or on a label. Standard labels are commercially available. Make sure you keep a written record of any material you send or deliver to a recycling entity. Be sure to request a “Certificate of Recycling or Disposal” . This could be simply a note on their letterhead that they received “x” gallons of fixer and that it would be processed in their silver recovery unit.

**You may wish to refer to labeling instructions in the appendix of the *ODA Dental Office Safety and Health Manual* and any OR-OSHA requirements for employee safety in handling or disposal.**

## Dental Waste Best Management Practices

Waste	Source	Management Practice(s)
Amalgam particles	Traps, Screens, Excess mix	<ul style="list-style-type: none"> <li>• Send to a recycler</li> <li>• Dispose of as hazardous waste</li> </ul>
Waste Mercury	Bottled mercury, spills, spill cleanup	Manage as hazardous waste - recycle ( <i>see ODA recycle list</i> ) Check ADA or DEQ web sites for clean up procedures
Extracted Teeth	Extracted teeth with amalgam	Manage as hazardous waste - Do not put in Red Bag. Disinfect (w/bleach). Store dry in sealed container (No Fixer) Check with trap and filter recyclers for disposal.
<i>Empty</i> Amalgam capsules <i>Partially filled</i> Amalgam capsules		<ul style="list-style-type: none"> <li>• Dispose of in the regular trash</li> <li>• Mix and recycle with an amalgam recycler; Dispose of empty capsule in regular trash</li> </ul>
Fixer	X-ray processing	<ul style="list-style-type: none"> <li>• Sell, give away (many photofinishers will take) or pay to have silver reclaimed</li> <li>• Buy silver recovery system</li> <li>• Recycle with hazardous waste disposal service or agency</li> </ul>
Developer	X-ray processing	<ul style="list-style-type: none"> <li>• Discharge to sewer system</li> </ul>
Combined fixer and developer	X-ray processing	<ul style="list-style-type: none"> <li>• Purchase adapter kit to separate and follow methods listed above</li> </ul>
X-ray Film Packets	Patient x-rays	<ul style="list-style-type: none"> <li>• Send lead foil to reclaimer. Do not give to patients, staff or others</li> </ul>
Chemiclave	Sterilizer	<ul style="list-style-type: none"> <li>• Replacement with autoclave recommended when needed; discourage use of formaldehyde</li> </ul>
	Chemiclave used chemicals	<ul style="list-style-type: none"> <li>• Discharge to sewer &amp; flush with several gallons of water.</li> </ul>
	Chemiclave unused chemicals:	<ul style="list-style-type: none"> <li>• Use hazardous waste disposal service or give to another office that uses a Chemiclave.</li> </ul>

## Questions to Ask Your Recycling or Disposal Company:

**1. What kind of amalgam waste do you accept?**

- Contact amalgam (traps, filters, gloves)
- Non-contact amalgam (scrap amalgam)
- Extracted teeth with amalgam:
  - Must decontaminate; or
  - Decontamination not necessary
- Empty amalgam capsules

**2. Do your services include pick up of amalgam waste from dental offices?**

- Yes    No   If 'No', can amalgam waste be shipped to you?    Yes    No

**3. Do you provide packaging for storage, pick up or shipping of amalgam waste?**

- Yes    No

**4. If packaging is not provided, how should the waste be packaged?**

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**5. What types of wastes can be packaged together?**

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**6. Do you accept whole filters from the vacuum pump for recycling?**

- Yes    No

**7. Is decontamination/disinfection required for amalgam waste?**

- Yes    No

**8. How much do your services cost?**

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**9. Do you pay for clean non-contact amalgam (scrap)?**

- Yes    No

**10. Do you accept empty amalgam capsules and/or extracted teeth with amalgam restorations?**

- Extracted teeth                       Yes    No  
Empty amalgam capsules         Yes    No

**11. What type of licenses or certifications (e.g. EPA) does your company hold to recycle or dispose of wastes?**

Type of License(s): \_\_\_\_\_

License #(s) \_\_\_\_\_

12. Does your company use the proper forms required by EPA and other state or local agencies for conducting business and disposal?

Yes  No

What forms (include agency and form #'s) are required? \_\_\_\_\_  
\_\_\_\_\_

13. What type of certification is provided to document that the material was properly recycled?

\_\_\_\_\_

14. Where does the waste collected from dental offices go?

\_\_\_\_\_

15. What type of contracts do you have with other waste recyclers/disposal services or landfills?

\_\_\_\_\_

\_\_\_\_\_

16. How long has your company been in business? \_\_\_\_\_

17. Where do you ship or dispose of mercury wastes for recycling or disposal?

\_\_\_\_\_

18. Where do you dispose of silver or lead wastes *(if you also accept these wastes)*?

\_\_\_\_\_

19. What do you do with extracted teeth waste (if you accept them)?

\_\_\_\_\_

20. What is the level of your environmental liability insurance?

\_\_\_\_\_

21. Can you provide customer references to us? Please list two or three?

\_\_\_\_\_

\_\_\_\_\_

22. Is proper protective equipment available and used by employees?

Yes  No