

Questions About Dental Facility Issues

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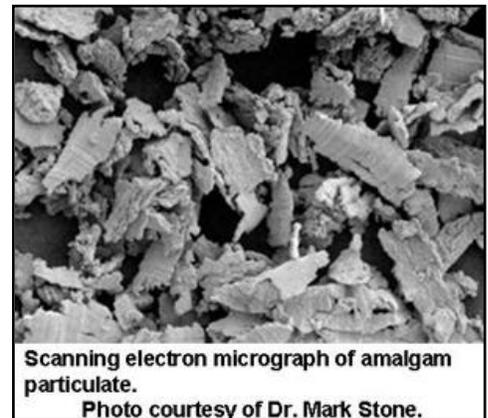
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Amalgam Separators (3/08) **UPDATED** (2/11)

Question: I've heard that some areas of the country are requiring amalgam separators to be installed in dental offices. What is an amalgam separator and why are they being installed?

Answer: Amalgam has many desirable properties as a dental material. Although its use is decreasing, amalgam remains one of the most widely used restorative materials in dentistry. While the safety of dental amalgam in patient care is well established, amalgam entering the sewage system by way of dental vacuum systems may be exposed to conditions that do not occur in the mouth such as incineration of wastewater treatment plant sludge. This can result in release of mercury to the environment. Mercury can be a problem for wastewater treatment plants as the sludge generated by the water treatment process is sometimes incinerated, sometimes disposed of in solid waste landfills, and sometimes applied to agricultural land as fertilizer. Also, a portion of the dissolved amalgam/mercury passes through the plant and is discharged to surface waters.



Most dental offices currently use some type of basic filtration system to reduce the amount of mercury solids passing into the sewer system (e.g., chairside traps, vacuum pump filters). However, the installation of amalgam separators and the use of best management practices have been shown to reduce discharges even further.¹ Amalgam separators are devices designed to remove amalgam particles from dental office wastewater through sedimentation, filtration, centrifugation, chemical removal by ion exchange or a combination of these mechanisms. An amalgam separator typically consists of a canister that is located either in the dental operator or in the mechanical room adjacent to the vacuum pump. Amalgam separators meeting the International Organization for Standardization (ISO) standard can capture over 95% of the amalgam discharged by dental offices into sewer systems. Just purchasing and installing an amalgam separator does not ensure compliance; amalgam separators require regular monitoring and maintenance to ensure they are functioning properly. This varies depending upon the amalgam separator you chose and your practice volume. For example, the collected amalgam may have to be removed daily with some units or in high-volume practices, while other units may only have to be serviced periodically (e.g., every three to 18 months). It is also important to plan how you will dispose of the amalgam waste and used parts of the amalgam separator (e.g., used cartridges and filters). Some amalgam separator companies offer disposal/recycling of the amalgam waste as part of a package when you purchase their product, while other companies leave it to the user to obtain disposal/recycling services.

Presently, there is no national requirement for amalgam separators. However, some individual states and localities require installation of separators. States which have initiated a state-wide requirement for separators include Connecticut, Maine, Massachusetts, Michigan, New Hampshire, New York, Oregon, Rhode Island, and Vermont. Various localities within other states (not state-wide) require separators including areas within California, Colorado, Kansas, Ohio, Washington, and Wisconsin. Additional states

and localities may be added to the list over time. The American Dental Association (ADA) has published Best Management Practices concerning amalgam waste and in 2007, the ADA updated their best management practices to include the purchase and proper use of an amalgam separator.² Recently the Environmental Protection Agency (EPA) announced changes to reduce mercury waste from dental facilities that will take effect in 2012.³ The American Dental Association supports this and as a result amalgam separators will have to be installed in dental settings. Previously, separators were only installed in United States Air Force (USAF) clinics where there was a local or state requirement, whenever vacuum systems were replaced, and in all new construction. However, in light of the forthcoming national changes, all USAF dental clinics should begin to prepare for the purchase and installation of an amalgam separator system by consulting with local facility managers, biomedical engineering technicians, and reviewing the Synopsis of Amalgam Separators on the DECS Web site.

References

1. Environmental Protection Agency, Notice of Final 2008 Effluent Guidelines Program Plan, 73 Fed. Reg. 53,219,53,234 (September 15,2008) (EPA Final 2008 Effluent Guidelines Plan FR Notice).
2. American Dental Association. Best Management Practices for Amalgam Waste. Available at http://www.ada.org/sections/publicResources/pdfs/topics_amalgamwaste.pdf. Accessed February 2011.
3. Environmental Protection Agency. *EPA Dental Amalgam Effluent Guideline*. Available at: water.epa.gov/scitech/wastetech/guide/dental/index.cfm. Accessed February 2011.

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Illumination Recommendations for Dental Treatment Rooms (Originally published in May 2002)

Question: The overhead illumination in our dental treatment rooms seems to be inadequate. What are the lighting standards for them?

Answer: Three factors should be considered regarding dental treatment room (DTR) lighting: intensity, color temperature, and color rendering index. With regard to intensity, most references recommend a range of from 150 to 200 footcandles (fc) when measured at a height of 30 inches off the floor. Military Handbook 1191 specifies that DTRs in new military facilities be designed to have 150 fc. This represents the ambient light produced by the ceiling lights and does **not** include the dental unit light. The other two considerations deal with optimum lighting conditions for shade selection. An attempt is usually made to produce DTR lighting characteristics similar to those seen with an average noon sky on a slightly overcast day. Color temperature relates to how "warm" or "cool" a light source appears. Lower color temperatures produce a "warmer" (yellow/red) light, while higher color temperatures produce a "colder" (more blue) light. Color temperatures in the range of from 5000 to 5500°K are desirable for DTR lighting. Color rendering index (CRI) rates the "color rendering" ability of a lamp. In other words, it describes the effect of a light on the color appearance of objects compared to a reference light source of the same color temperature. Typical cool white fluorescent lamps have a CRI of 62. Natural daylight has a CRI of 100, which is the highest possible value. A CRI of 90 or greater is preferred for fluorescent lamps used in DTRs. Most major lighting manufacturers offer "color correct" fluorescent tubes that meet these specifications.

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Dental Laboratory Renovations (10/04)

Question: We would like to renovate our dental laboratory. How should we proceed?

Answer: The following outline should help explain the sequence of events involved in a dental laboratory renovation. Before starting, realize that renovations are not generally quick, easy, or inexpensive projects and should only be initiated where a true need exists and where there are realistic expectations that funding will be available.

I. Planning

- A. Ensure that all parties are aware of the proposed project and agree that it is necessary. This includes the dental and medical group leadership, facility manager, and MAJCOM/SGD.
- B. Contact dental lab casework (cabinetry) manufacturers (ex: Kavo, Nevin) and DIS for help with concept planning.
 1. Casework manufacturer typically visits facility for preliminary survey.
 2. Casework manufacturer produces concept drawings and casework/equipment cost quotation.
 - a) Local facility and DIS work together with casework manufacturer to develop and refine concept drawings.
- C. Work with facility manager and Civil Engineering to obtain cost estimate for facility modifications required to accommodate proposed new casework layout.
 1. Facility modifications typically include plumbing and electrical relocation, wall refinishing, flooring replacement, etc. This will require the services of a construction contractor and, depending on the extent of the renovation, possibly an architect. The casework manufacturer's design should specify the desired plumbing and electrical locations.
 2. If the project will involve structural (relocation of walls) or functional (expansion into an area previously used for other purposes) changes, your regional Health Facilities Officer* should be informed of your intentions.
- D. Combine casework/equipment cost estimate with facility modification cost estimate to obtain total project cost estimate.



II. Approval

Per AFI 47-101 para 3.2.2, "The Dental Squadron Commander must request prior approval for structural or functional changes to dental facilities. The written request must be coordinated through MAJCOM/SGD to HQ USAF/SGD. The approved letter is returned to the facility, and maintained in the Dental Service Manager's File." If the project does not involve facility structural or functional changes (for example, projects involving casework replacement only), coordinate through MAJCOM level.

III. Funding

Renovations are O&M (Operations and Maintenance) projects, so funding must be obtained either locally or through MAJCOM O&M funds.

IV. Execution

- A. The facility manager or Civil Engineering should help secure the services of a contractor (and possibly an architect) to accomplish any required facility preparation (utility relocations, walls, flooring, etc). It is very important that you stress with the contractor the need to coordinate utility locations closely with the casework manufacturer before and during the facility preparation phase. Without close coordination the plumbing and electrical utilities may not be placed in the locations required when the casework is installed. Depending on the particular project, the casework manufacturer may have a representative meet with the contractor prior to or during the facility preparation process.
- B. Once the facility preparation is complete, casework installation is next. While some manufacturers will allow casework installation to be contracted out, due to the specialized nature of dental laboratory casework, the casework manufacturer typically accomplishes casework installation.

*Health Facilities Officer. Every medical facility has a Health Facilities Officer (HFO) assigned to help coordinate medical construction and renovation projects. These officers are not usually stationed locally,

but operate out of the Health Facilities Division regional offices in Atlanta and San Francisco. Your facility manager should know who the HFO responsible for your facility is. If not, DIS can research to find out who is assigned as your facility's HFO. Your HFO should be informed of any project that will involve structural or functional changes to the facility. While the HFO typically will not become very involved in smaller projects, they should be informed of all projects (involving structural or functional changes), whether small or large.

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DTR Casework Renovations (10/04) **UPDATED** (5/12)

Question: We would like to replace our DTR casework (cabinetry). How should we proceed?

Answer: The following outline should help explain the sequence of events involved in replacing DTR casework. Before starting, realize that renovations are not generally quick, easy, or inexpensive projects and should only be initiated where a true need exists and where there are realistic expectations that funding will be available.

I. Planning

- A. Ensure that all parties are aware of the proposed project and agree that it is necessary. This includes the dental and medical group leadership, facility manager, and DECS.
- B. Contact dental casework (cabinetry) manufacturers and DECS for help with concept planning. DTR casework replacement may range in complexity from fairly simple (ex: replacing old casework with new in the same layout/configuration), to very complex (ex: relocating utility center floor boxes, relocation of sinks/plumbing, new flooring etc). Whether simple or complex, all casework renovations should take into account the need to place computers in the DTR and, where indicated, allow wall space for potential installation of an x-ray head in the DTR.
 1. Casework manufacturer typically visits facility for preliminary survey.
 2. Casework manufacturer produces concept drawings and casework/equipment cost quotation.
 - a) Local facility and DECS work together with casework manufacturer to develop and refine concept drawings.
- C. If the proposed design will require facility modifications (plumbing or floor box relocation, new flooring, etc), work with your facility manager and Civil Engineering to obtain cost estimates for these facility modifications.
 1. If the project will involve structural (relocation of walls) or functional (expansion into an area previously used for other purposes) changes, AFMSA/SG8F* should be informed of your intentions.
- D. Combine casework/equipment cost estimate with facility modification cost estimate to obtain total project cost estimate.

II. Approval

Per AFI 47-101 para 3.2.2, The CDS must consult DECS on all facility projects. DECS provides assistance when initially planning minor construction or military construction program projects. If the project does not involve facility structural or functional changes (for example, projects involving casework replacement only), coordinate through DECS and AFMOA/SGD.

III. Funding

Renovations are O&M (Operations and Maintenance) projects, so funding must be obtained either locally or contact AFMOA/SGD for funding options.

IV. Execution

- A. If plumbing or utility relocations are required, the facility manager or Civil Engineering should help secure the services of a contractor. It is very important that you stress with the contractor the need to coordinate utility locations closely with the casework manufacturer before and during the facility preparation phase. Without close coordination the plumbing and electrical utilities may not be placed in the locations required when the casework is installed. Depending on the complexity of the particular project, the casework manufacturer may have a representative meet with the contractor prior to or during the facility preparation process.
- B. Once the facility preparation is complete, casework installation is next. Dental casework manufacturers typically can supply references to contractors in the area who have experience installing dental casework.

*AFMSA/SG8F is the Planning, Design & Construction Branch Air Force Medical Support Agency, San Antonio, TX. Your facility manager should know how to contact them, if not, contact DECS.

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Central Instrument Processing Renovations (10/04)

Question: We would like to renovate our central instrument processing area. How should we proceed?

Answer: The following outline should help explain the sequence of events involved in an instrument processing area renovation. Before starting, realize that renovations are not generally quick, easy, or inexpensive projects and should only be initiated where a true need exists and where there are realistic expectations that funding will be available.

I. Planning

- A. Ensure that all parties are aware of the proposed project and agree that it is necessary. This includes the dental and medical group leadership, facility manager, and MAJCOM/SGD.
- B. Contact DIS for help with concept planning.
 1. If a copy of your floor plan is not already on file at DIS, contact your base Civil Engineering to obtain an electronic floor plan copy and e-mail it to DIS. The electronic floor plan will typically be in AutoCAD format.
 2. The local facility and DIS work together to develop and refine concept drawings for the new instrument processing area layout
- C. Submit concept drawing to casework (cabinetry) manufacturer (ex: Fisher-Hamilton). The casework manufacturer will fit their casework to the design and provide the clinic with a casework cost quotation.
- D. Obtain cost quotations for any other planned large equipment purchases (sterilizer, washer-disinfector, etc).
- E. Work with facility manager and Civil Engineering to obtain a cost estimate for facility modifications required to accommodate the proposed new layout.
 1. Note that instrument processing areas have specific recommended ventilation specifications and modifications to the HVAC (heating, ventilation, air conditioning) system may be required. Other facility modifications typically include plumbing and electrical relocation, wall refinishing,

flooring replacement, etc. This will require the services of a construction contractor and, depending on the extent of the renovation, possibly an architect.

2. If the project will involve structural (relocation of walls) or functional (expansion into an area previously used for other purposes) changes, your regional Health Facilities Officer* should be informed of your intentions.

F. Combine casework, equipment, and facility modification cost estimates to obtain total project cost estimate.

II. Approval

Per AFI 47-101 para 3.2.2, "The Dental Squadron Commander must request prior approval for structural or functional changes to dental facilities. The written request must be coordinated through MAJCOM/SGD to HQ USAF/SGD. The approved letter is returned to the facility, and maintained in the Dental Service Manager's File." If the project does not involve facility structural or functional changes (for example, projects involving casework replacement only), coordinate through MAJCOM level.

III. Funding

Renovations are O&M (Operations and Maintenance) projects, so funding must be obtained either locally or through MAJCOM O&M funds.

IV. Execution

- A. The facility manager or Civil Engineering should help secure the services of a contractor (and possibly an architect) to accomplish any required facility preparation (utility relocations, walls, flooring, etc). It is very important that you stress with the contractor the need to coordinate utility locations closely with the casework and large equipment (sterilizers, washers) manufacturers before and during the facility preparation phase. Without close coordination the plumbing and electrical utilities may not be placed in the locations required when the casework and large equipment are installed.
- B. Once the facility preparation is complete, casework and large equipment installation is next. If a new floor-standing sterilizer or washer/disinfector has been purchased, the manufacturer will typically install the unit. Casework for the instrument processing area is fairly straightforward and is typically assembled and installed by the construction contractor, but, if you prefer, you may request that the casework manufacturer perform the installation (for additional cost).

*Health Facilities Officer. Every medical facility has a Health Facilities Officer (HFO) assigned to help coordinate medical construction and renovation projects. These officers are not usually stationed locally, but operate out of the Health Facilities Division regional offices in Atlanta and San Francisco. Your facility manager should know who the HFO responsible for your facility is. If not, DIS can research to find out who is assigned as your facility's HFO. Your HFO should be informed of any project that will involve structural or functional changes to the facility. While the HFO typically will not become very involved in smaller projects, they should be informed of all projects (involving structural or functional changes), whether small or large.

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Silver Recovery from Used Fixer Solution (Updated December 2007)

Question: Why should I be concerned about recovering silver from used fixer solution?

Answer: Silver should be recovered from used fixer solution in dental x-ray processors for economic, resource conservation, and environmental reasons. Silver is considered a hazardous waste. If the concentration of silver entering a sewer system becomes too high, the facility could be in violation of

standards set by the publicly owned treatment works (POTW) which receives and processes solutions from the sewer system.

Question: How does the silver recovery process work?

Answer: When radiographs travel through an automatic processor, the fixer solution removes unexposed silver halide crystals from the film. Silver builds up in the fixer solution, typically reaching concentrations in the low thousands of parts per million (ppm). This silver-rich fixer solution exits the processor through a tube leading to a silver recovery cartridge. After the solution passes through the silver recovery cartridge, it typically passes down the drain and into the sewer system. When operating properly, silver recovery cartridges typically used in dental clinics can reduce the silver concentration of used fixer to approximately 5 ppm. There are several technologies available to remove silver from fixer solutions. These technologies include metallic replacement, electrolysis, and precipitation.

Question: How do I obtain silver recovery cartridges?

Answer: The best source for information about silver recovery cartridges is Defense Reutilization and Marketing Service (DRMS). DRMS operates a precious metals recovery program and is the parent organization for local DRMOs (Defense Reutilization and Marketing Offices) located at each base. DRMS will make a recommendation regarding the type of silver recovery unit that a clinic should use based on the quantity of fixer they generate. DRMS may even supply the silver recovery cartridges to the dental clinic for no charge if the clinic generates enough used fixer to participate in the program. Once the cartridge is used, it is turned in to the local DRMO for recycling. Think of DRMS as the supply point for new cartridges and DRMO as the deposit point for used cartridges.

To obtain information on silver recovery cartridges for your facility, visit the silver recovery page of the DRMS Web site (<https://www.drms.dla.mil/turn-in/scrap/precemetsilverrecovery.shtml>). An online equipment survey is available for new customers. A request form for replacement supplies is also available for existing customers. Using information supplied on these forms, DRMS will recommend a specific silver recovery cartridge. Depending on the amount of fixer generated, DRMS may provide the cartridge to the clinic free of charge. If the clinic is eligible for cartridges at no cost from DRMS, the clinic can contact DRMS for a new cartridge each time a replacement is needed. As mentioned earlier, spent cartridges are turned in to the local DRMO for silver recovery.

Question: What are the environmental considerations? Is there a requirement for the silver concentration in the solution exiting my silver recovery cartridge to be below 5 ppm?

Answer: Your local bioenvironmental engineering and civil engineering monitor environmental considerations, but here is some background information. Processing of dental radiographs results in the discharge of silver-rich fixer solution. Silver and silver-bearing materials are regulated by the United States Environmental Protection Agency (USEPA). The two primary federal regulations concerning this topic are the Resource Conservation Recovery Act (RCRA) and the Clean Water Act. RCRA regulates hazardous waste from the time it is generated to the time of its disposal. Liquid wastes (such as used fixer solution) that contain greater than 5 ppm silver are classified as hazardous wastes under RCRA. This raises the following question: do we have to monitor the silver content of the solution exiting our silver recovery cartridges to be sure that it does not exceed 5 ppm when it enters the drain leading to the sewer? The answer to this question is a conditional "no" (also see the question regarding silver test strips below.) RCRA contains a provision (40 CFR 261.4[a][1][i&ii]) which excludes wastes that travel through a sewer system to a publicly owned treatment works (POTW) for treatment. If your base is connected to a sewer system which feeds a POTW or FOTW (federally owned treatment works) and you are not collecting and storing the spent fixer on site, you are exempt from RCRA requirements with regard to the used fixer solution. In this case, rather than falling under RCRA standards, your situation will be covered by the Clean Water Act (CWA). The CWA establishes discharge limits from POTWs for various pollutants (including silver). For the POTW to meet its discharge limits, it establishes limits on the wastewater coming into the treatment works. These limits are called pretreatment standards or sewer use codes. The POTW will establish a limit for incoming silver concentration and specify a test point where this limit cannot be exceeded. Typically, the test point is the point where a facility or base's drainage pipes enter

the sewer system. Obviously, the silver concentration exiting the silver recovery cartridge will be considerably diluted with other fluids from the facility before it reaches this test point. It would be very unusual for the silver from a dental processor's silver recovery unit to cause a reading that exceeds the sewer use code. Bioenvironmental engineering or civil engineering will work with the POTW to ensure that the limit for silver or any other regulated material does not exceed the sewer use codes. Bioenvironmental engineering may take a baseline reading of the concentration of silver discharged from your dental silver recovery cartridge as well as other silver generating processes in the medical facility so that it knows possible upstream sources in case the POTW's limit is exceeded. In addition to POTW requirements, bioenvironmental engineering should inform you if there are any other locally generated requirements.

Question: Do I need to use test strips to monitor the silver content of the solution exiting our silver recovery cartridge?

Answer: AFMAN 23-110, Vol 6, Chap4, Para 4.2.8, requires "...periodic testing of hypo solution draining from electrolytic/cartridge units to ensure they are operating properly..." Note that the purpose of this testing is to ensure that the silver recovery cartridge is operating properly, not to provide an exact measurement of silver in the effluent. Silver test strips are one means to accomplish this periodic testing. As a silver recovery cartridge becomes exhausted, silver levels in the effluent increase, and silver test strips detect this increase. AFMAN 23-110 does not recommend a testing frequency, but there should be some logic regarding timing and frequency of the test in relation to expected cartridge life. Existing customers in the DRMS Precious Metals Recovery Program may request test strips by completing the PMPR Silver Recovery Supply Request Sheets on the DRMS Web site https://www.drms.dla.mil/turn-in/scrap/pm/pm_supprequest.shtml.

Bottom line: Silver should be recovered from used fixer solutions for economic, resource conservation, and environmental reasons. Most clinics process their used fixer solution through silver recovery cartridges rather than collecting the solution and turning it in. Occasionally DECS is asked by federal dental clinics if the Resource Conservation and Recovery Act (RCRA) limits the concentration of silver entering a facility's drain to 5 ppm. While silver should be reduced to as low of levels as is practical, there is no federal standard (including RCRA) that limits the silver in the effluent exiting a silver recovery cartridge and going down the drain to 5 ppm. The publicly owned treatment works (POTW) to which the water in the sewer system flows to be processed will establish concentration limits for silver and other hazardous materials entering the sewer system. The POTW will establish a sample point for this concentration limit and this sample point is typically at the location where the facility or base plumbing enters the public sewer. It would be very unusual for the effluent exiting a dental silver recovery cartridge to violate this limit. Bioenvironmental engineering can inform clinics if there are any other state or local requirements in this area.

The precious metals recovery branch of DRMS (<https://www.drms.dla.mil/turn-in/scrap/precmethome.shtml>) can recommend specific silver recovery cartridges based on the quantity of used fixer that a facility generates. Silver estimating strips can be used to monitor silver recovery cartridges for proper function.

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Dental Vacuum Systems Please visit the DECS 777779 Continuing Education page for a comprehensive text briefing.

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