NACWA
A Clear Commitment to America's Waters

National Association of Clean Water Agencies

Controlling Mercury in Wastewater Discharges from Dental Clinics

White Paper

January 2006

I. Introduction

Across the country, more and more publicly owned treatment works (POTWs or wastewater treatment agencies) and states are working to minimize the amount of mercury discharged to the collection system. This is due in part to the availability of more sensitive analytical techniques, which allow wastewater treatment agencies and the regulatory agencies that issue their discharge permits to measure POTW effluent for mercury. Dental clinics, and other facilities such as hospitals, have been identified as sources of mercury to the sanitary sewer, and many POTW pretreatment programs are beginning to ask and, in many cases, require these sources to reduce their discharge of mercury.

A report released in 2002 by the National Association of Clean Water Agencies (NACWA) indicated that dental clinics are the largest source of mercury in wastewater as compared to other groups of users discharging to wastewater treatment plants (Mercury Source Control & Pollution Prevention Program Evaluation). In fact, the American Dental Association (ADA) estimates that 50 percent of the mercury entering POTWs is from dental offices (Draft ADA Assessment of Mercury in the Form of Amalgam in Dental Wastewater in the United States, November 2003, by ENVIRON)

Dental clinics discharge mercury in the form of amalgam, along with some dissolved mercury. This White Paper is meant to help POTWs and other organizations understand some of the technical issues associated with the generation of dental clinic wastewater and specifically to provide some useful, introductory information for those communities considering formal programs requiring the installation of amalgam separators.

This White Paper was prepared by NACWA to assist those communities or states that decide to recommend or require the installation of amalgam separators. This White Paper should not be interpreted as an endorsement for one approach over another. NACWA understands that there are a number of complex issues underlying the decision to begin an amalgam separator installation program and hopes this White Paper will provide some useful information.

II. Background

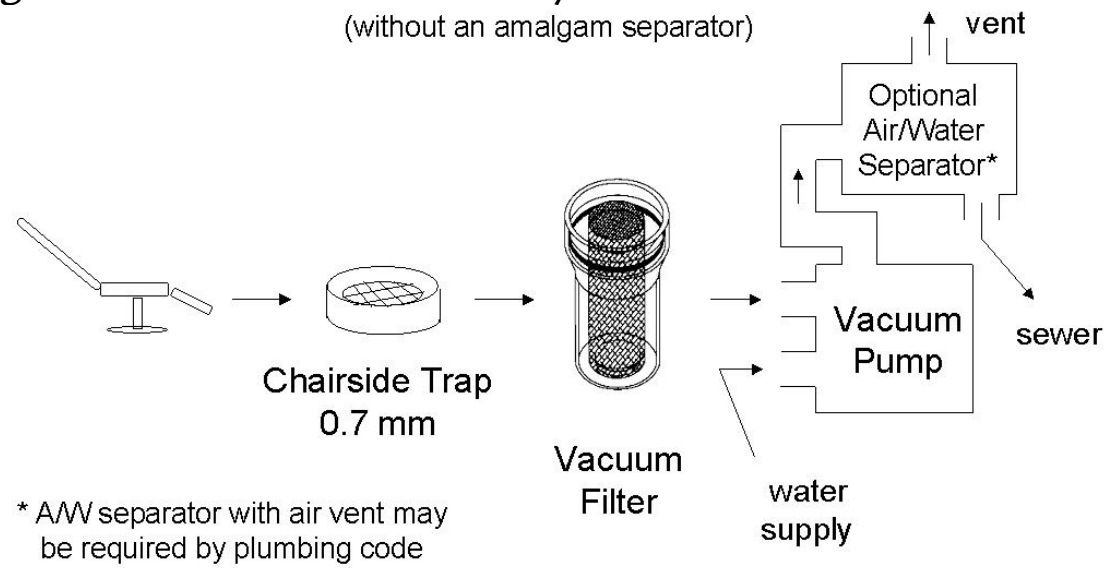
The placement and removal of amalgam restorations (fillings) results in the generation of waste particles of amalgam, along with some dissolved mercury. Even if a dentist does not place new amalgams, most general practice dentists remove old amalgam restorations. Since up to half of the weight of amalgam is mercury, efforts to keep amalgam out of the wastewater will result in less mercury being discharged to the sewer. (Silver, a significant component of amalgam, along with other metals such as tin and copper, would also be reduced.)

Most dental clinics currently use some type of basic filtration in their vacuum system to keep the system from plugging and, with some types of vacuum systems, to also protect the vacuum pump from the various solids that pass through the system. See Figure 1. (Additional technical information on dental clinic vacuum systems is given in Appendix 1.) This basic filtration does prevent some of the larger pieces of amalgam from entering the sewer system. Many dental clinics also follow some type of best management practice for maintaining their vacuum systems and managing the waste generated from the filters. Some dental clinics, either voluntarily or to comply with local requirements, have installed advanced equipment, called an "amalgam separator" designed specifically to remove amalgam from the wastewater to minimize the amount of mercury discharged to POTWs and the environment.

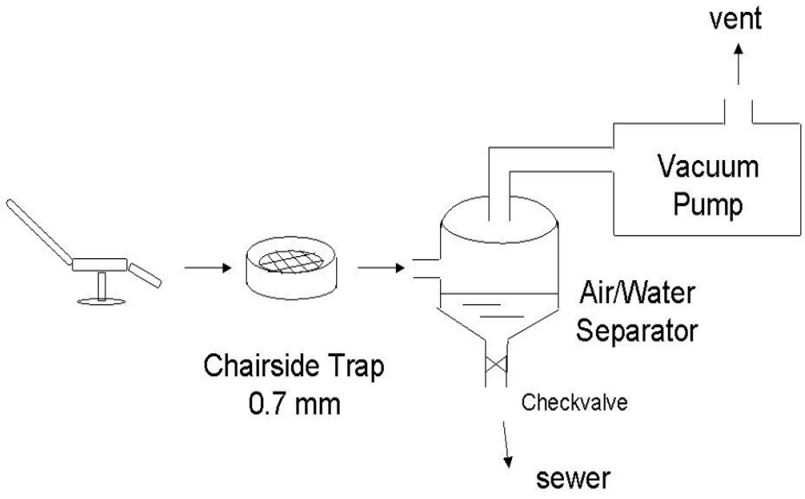
Many POTWs and states are already implementing or are considering a list of options to address the issue of amalgam and mercury being discharged to the sewer from dental clinics. Some of these options are to:

1. Recommend or require implementation of "Best Management Practices".
2. Implement numerical wastewater limits for dental clinics, as is done for other industrial users.
3. Recommend or require the installation of amalgam separators.

Figure 1. Dental Clinic Vacuum Systems



Liquid-Ring (Wet) Vacuum Pump System



Turbine (Dry) Vacuum Pump System

(Liquid-ring or turbine vacuum pumps may serve multiple chairs)

III. Program Implementation Options for Working with Dental Clinics to Minimize Mercury Discharges

1. Recommend or Require the Implementation of "Best Management Practices"

If dental clinics are not already implementing best management practices (BMPs), BMPs can be a good first step for a POTW or state to take to minimize mercury discharges from dental clinics. BMPs address the proper management of the solids collected in the chairside traps and vacuum filters. Some dentists may need to be updated on proper waste management of chairside traps and vacuum filters. Improper management can result in greater releases to the sewer. For instance, in some cases the traps and filters have been washed out in sinks, directly discharging the contents of the filters into the sewer system. BMPs can also help ensure that solids are not managed as infectious waste or mixed with other types of solid wastes that may be incinerated or autoclaved. Many state dental associations and the ADA are working to develop and distribute information and BMPs to clinics detailing the proper management of waste filter solids and other wastes such as lead foils, x-ray fixer, and vacuum line cleaners. More information about these efforts is available on the ADA's website (*www.ada.org/prof/resources/topics/amalgam_bmp.asp)*.

BMPs can also help encourage clinics to use vacuum line cleaners that are not too acidic, caustic, or oxidizing in nature such that they would increase the release of mercury into the sewer system (e.g., avoid bleach). Other chemicals that might be used in dental clinics that present similar concerns include acids for cleaning x-ray processing equipment. BMPs often require that dentists neutralize any such acids prior to discharge in accordance with national and local pH limits, or that they dispose waste acid off-site instead (in accordance with applicable regulations, such as the Resource Conservation and Recovery Act (RCRA) solid and hazardous waste rules and other applicable state or local requirements).

Given the promotion and support of BMPs by the ADA, the dental community may willingly adopt BMPs put forth by POTWs and states, especially if the alternative is a set of more onerous requirements. Even if one of the options outlined below is implemented by a POTW or a state, BMPs may still be prudent, since BMPs address the management of a wide variety of wastes and the selection of line cleaners.[1]

2. Implement Numerical Wastewater Limits for Dental Clinics

POTWs may consider controlling discharges from dental clinics as they do industrial dischargers. This could entail applying a local limit for mercury, either at the end of the process or on the facility's "total discharge", where the facility's sewer line connects to the sewer line in the street, and then enforcing this limit through some sort of permit or discharge agreement (i.e., through the pretreatment program).

This approach allows the POTW to regulate dental clinics in a familiar manner and could avoid the establishment of a new program, see option 3 below, that may require additional start-up time. Dental

[1] As noted in Appendix 1, clinics in some parts of the country are switching to turbine vacuum systems that use less water, and consequently, do not employ a "vacuum filter". Therefore, if a POTW is expecting the removal of amalgam beyond what a chairside trap removes as part of the basic BMPs with a vacuum filter, and a clinic makes this switch, there may actually be more amalgam discharged to the sanitary sewer.

clinics may install amalgam separators if this option is implemented. However, this approach focuses on meeting a limit, rather than the method a dental clinic chooses to use to meet the limit.

Implementation of a numerical limit approach is complicated and expensive. For example, it can be difficult or infeasible to collect a representative compliance sample in the field and for a laboratory to obtain a representative subsample for analysis for the following reasons:

- Dental clinic wastewater is heterogeneous given the presence of amalgam and other solids (meaning that all of the vacuum system wastewater may need to be collected and processed);
- Compliance sampling may need to be done under vacuum, or if not, then at a location which may include numerous other types of wastes from the same clinic or at a location that may include wastewater from neighboring businesses (the added volume of such other wastewaters may preclude the ability to collect all of the mercury-bearing wastes, such as the dense amalgam particles, which may lead to unrepresentative sampling);
- Residual from past practices may continue to be present in sewer lines for years to come, contaminating samples to levels not reflective of the current practices; and,
- If sampling the process waste to avoid other wastes, precautions may be necessary to minimize the exposure to risks associated with blood or pathogens. (Hepatitis B vaccine shots were administered to sampling and laboratory staff at one POTW that collected and analyzed dental clinic wastewater.)

If a sampling program entails issuing permits and reviewing periodic monitoring reports, there will be significant resource demands put on the POTW to administer such a program, especially given the potentially large number of clinics in a given community. Furthermore, compliance with numerical local limits can be technologically and economically infeasible for dental clinics, especially for those clinics discharging to POTWs that are trying to meet extremely stringent water quality criteria. Finally, the details and aspects of a permitting program put the responsibilities of wastewater compliance and monitoring on dentists, who may not have operated under such a program before.

> CASE STUDY – Numerical Limits
>
> At least one community has chosen, in part, a more traditional numerical limit approach. This POTW has given the dental clinics in its service area two choices to deal with addressing mercury in clinic wastewater. Each clinic must choose to either meet the local mercury limit or choose and install an amalgam separator from a list of approved models. If a clinic decides to meet the limit rather than install a separator, rigorous, detailed methods in line with more traditional numerical limit approaches are spelled out by the POTW for clinics on sampling their wastewater. In this instance, where the dental clinics were provided a choice, no dentists to date have decided to sample their own wastewater. Instead, they have opted to install an amalgam separator.

3. Recommend or Require the Installation of Amalgam Separators

A third option for controlling mercury discharges from dental clinics is the installation of amalgam separators. Separators are generally expected to remove more amalgam than basic chairside traps and vacuum filters, and therefore, separators can be an option for some POTWs with mercury reduction goals. The focus of this approach is basically to achieve the installation of separators, rather than clinics meeting a numerical limit.

NACWA is currently conducting a study that will, in part, provide additional insight into whether the installation of amalgam separators at the dental clinics in a particular POTW's service area may enable POTWs to meet National Pollutant Discharger Elimination System (NPDES) limits. Still, amalgam separators may be the best option some communities have to control mercury discharges. NACWA believes that this decision should be up to each POTW to determine whether or not to recommend or require separators.

Regardless of the details of a particular POTW's program, a method for qualifying amalgam separators for use by dentists may be necessary.[2] In areas that have a separator installation program underway, dental clinics are often asked to choose a separator from a list of approved models. With some programs, wastewater monitoring requirements may be waived once the clinic has installed an "approved separator." Therefore, it is important that good criteria be used to compile the list of separators. Depending on how the program is established (statewide or individual POTW), each POTW may then become responsible for maintaining such a list (see legal issues discussion below).

Using a list of approved separators is, in essence, a "best available technology" approach, and "compliance" is based primarily on whether or not an approved separator has been installed. Questions associated with this approach include:

- What is an approved amalgam separator?
- Does the POTW or regulator determine this?
- Does the dentist have to study and become an expert on amalgam separators?

Even if a POTW does not expect to maintain a list of approved separators, questions will inevitably arise as to what separators may be installed. The more informal the program, the more leeway may exist as to what may be installed. Programs with rigid requirements to install separators will be better off with a robust set of criteria for implementing the program and if certain legal protections are considered (see below).

Legal Issues Associated with Approved Separator Lists

Maintaining a list of commercial products, like amalgam separators, and requiring regulated entities to install equipment from that list may pose certain legal challenges. Some communities have chosen to use a disclaimer that each clinic or other entity must sign to release the POTW from any liability for faulty equipment or improper installation. Other communities have simply included a disclaimer in their program literature. Regardless of the approach selected, it should be made clear that the list of approved equipment is only meant to identify those systems that, when installed, would be considered to meet the POTW's program requirements. A list is not an endorsement of particular systems and does not imply that they will work without fault. It is recommended that any POTW setting up an amalgam separator program conduct a thorough legal review to ensure the POTW is protected against such claims. As a part of their disclaimer, a POTW may want to consider indicating that it will retain its enforcement authority should there be a problem with a listed separator. Such authority may dictate application of a mercury limit where necessary.

[2] Some POTWs may choose not to require separators, but they could still establish a program and provide some form of recognition to clinics that do install separators.

It is not ideal for a POTW to simply copy a list of approved separator models compiled by another POTW or some other organization. There may be existing concerns with the list, and a community's unique needs may not be served by another municipality's list.

Some of the issues and questions that will need to be resolved by each POTW prior to implementing a program include:

- What laboratories are qualified to test amalgam separators?
- What is the method or policy for establishing and maintaining a list of approved separators?
- What if a separator manufacturer proposes to modify their model that is already on a list?
- What if there are questions as to taking a model off of a list?
- Who polices the vendors and protects dentists and POTWs from false representations?
- How can new market entries be allowed and encouraged?

It may be helpful to work with separator manufacturers and distributors, and local dental supply companies, as installation programs and/or regulations are being developed.

CASE STUDY – Testing Lab Identification and Amalgam Separator Approval Procedure

Within one of the larger metropolitan areas in the United States, the POTW has specifically identified the only laboratories from which test reports of separator performance are acceptable. Certificates are also required, and the acceptable issuers of the certificates are also identified. (See the next section for more information on certification.) These laboratories and certification bodies are: RWTÜV (Germany) and SP Swedish National Testing and Research Institute (Sweden).

A policy has also been developed by the POTW to outline the criteria for: (1) listing approved amalgam separators, (2) modifying separators already listed, and (3) accreditation of testing labs and certification bodies. This updated and expanded policy was developed after the program was initiated. Calling for certificates on newly listed separators should minimize the administrative work of the POTW. (However, the work of maintaining the original list of approved separators continues to be administered by the POTW).

As part of implementing a separator installation program, POTWs will need to consider what, if any, ongoing requirements may be placed on the dental clinics, especially if there is no routine wastewater sampling and reporting — as is customary with other types of industry or permittees of a POTW.

CASE STUDY – Requirement for Separators and Inspection and Maintenance Programs

One of the POTWs implementing a program has had very good success in terms of the percentage of clinics having installed separators. This has been achieved by adopting a regulatory approach which requires dental clinics to install International Organization for Standardization (ISO)11143 certified amalgam separators, properly maintain separators and keep maintenance and disposal records. To date, this POTW has carried out inspections at over 50% of its dental clinics and has found that 93% of the clinics inspected have had the required separators installed. The main compliance concern has been the failure to replace the separator's "solids collecting containers" and failure to keep operations manuals and records on site as required.

Some options that POTWs employ to ensure proper maintenance of separators include: submittal of waste solids shipping records to the POTW and/or periodic general statements from the clinics to the POTW certifying that the separator is being properly operated and the solids collected are being properly managed. As POTWs administer programs based on lists of approved models, gathering information on the long-term maintenance of these models will be valuable. It may also be helpful if there could be some type of check on the performance (removal efficiency) of models that have been in service over an extended time period in actual clinic settings.

Many communities that establish lists of approved separators address the need for a set of standard criteria as well as many of the issues listed above by basing their list on the ISO Standard 11143 for evaluating amalgam separators. It is important for POTWs or states that rely on this standard to become familiar with the details of the standard and how to read a test report generated in evaluating a particular separator against the standard. (See the next section on ISO related information.) When reviewing test reports or other published information on the performance of amalgam separators, a POTW may need to be able to determine if the test was performed according to proper procedures, were all aspects and requirements of the ISO 11143 Standard met, and determine if the test report is complete.

IV. Amalgam Separator Testing, Certification, and Accreditation

The ISO 11143 Standard is a "bench-top" lab test that has become a commonly accepted method for testing amalgam separators. A separator that meets all of the requirements of ISO 11143 should be capable of effectively treating dental clinic wastewater. Upon completion of testing, which is initiated at the request of a separator manufacturer, a laboratory issues a test report detailing the model's performance during the test. More information on ISO and standards is available at: *http://www.iso.org/iso/en/aboutiso/introduction/index.html* (See Appendix 2 for information on a current effort to revise the ISO 11143 Standard).

Some POTW and state programs call for the use of a "certified" separator. A "certification body" issues certificates to manufacturers for their products.[3] While a test report pursuant to ISO 11143 is written after the completion of the testing, the issuance of a certificate is an additional step that is not always taken. Testing and certification are initiated at the manufacturer's request and the costs for these functions are born by the manufacturers. While testing is always the basic step taken when employing the ISO standard, some POTWs also specifically require certification. POTWs should be aware of the distinction between testing and certification and understand what the certification process may provide them in terms of additional assurance that the separators are satisfactory. Examples of some certification program elements include:

- Review of the test report,
- Review of information from the manufacturer in the event of design changes (after initial testing),
- Periodic site visits to the manufacturer by the certification body to ensure ongoing production of models that conform to the standard as originally produced and tested,

[3] An example of this is a "UL", or "Underwriters Laboratories, Inc." certification, which allows the manufacturer to put a "Mark" on their product. Certification bodies operate independently of the testing laboratories. Some organizations perform both testing and certification, however, these functions are carried out by different departments. More information on certification is available in ISO/IEC 67 – Fundamentals of Product Certification, available on the ISO website (*http://www.iso.org/iso/en/prods-services/ISOstore/store.html*).

- Operating with rules or a contract in place between the manufacturer and the certification body on the use of the certification "mark" on the product,
- Possible periodic retesting of the product in accordance with ISO standard, and
- Market surveillance (inspection/testing of models taken from the market).

There have been ongoing discussions within the dental community and the separator manufacturers about the benefits of certification in general and of even having a uniform set of certification program elements. While there has been some limited testing of separators in the United States, many have suggested that there should be a test laboratory and certification body in the U.S. for separators. Up to this point, most of the testing and certification has occurred in Europe and Scandinavia. The test procedure is standardized, but the certification procedures employed by the foreign certification bodies are not uniform. (See Appendix 3 for a brief discussion of some of the potential benefits associated with a uniform certification program.)

Given the lack of information on certification, and the lack of a uniform certification program, POTWs across the nation have handled the issue of ISO testing and certification differently.

CASE STUDIES – Amalgam Separator Testing and Certification

One POTW calls for both a "test report" and a "certificate", i.e., two separate documents. Both are required to gain extra assurance that the separators listed as approved are good separators. Given that testing and certification are the responsibility of the manufacturers, the POTW does not have to bear the costs of evaluating and scrutinizing the separators.

Another POTW requires dental operations to install ISO 11143 certified amalgam separators and post a copy of the applicable "test report" at the site of installation of the separator. Inspectors simply check that these, and other requirements, have been met in order to register compliance. This POTW has also chosen not to become involved in evaluating or approving separators, but supports further efforts to revise and clarify the use of ISO certification and accreditation criteria. Other POTWs have expressed a desire to employ methods, or to develop a uniform certification program, that can help them minimize the work of establishing and maintaining a list of approved separators.

POTWs may consider specifying which testing labs and certification bodies are acceptable for ISO 11143 testing and certification. This would be similar to POTWs that now specify which laboratories may be used by existing permittees for wastewater sample compliance testing. If a POTW determines which test labs and certification bodies are acceptable prior to implementing a separator installation program, there may be fewer questions and potential problems later. It may therefore also be helpful to make use of accreditation[4] to determine which labs and certification bodies are qualified to test amalgam separators and to issue certificates.

[4] With the goal of "certified once - accepted everywhere," there are accreditation systems in place that oversee the testing labs and certification bodies. These systems may vary slightly in structure from one country to another, but there are international organizations and procedures that help tie these functions together. For those agreeing to adhere to them, there are ISO/IEC Guides and Standards that spell out how each of the various parties (labs, certification bodies, and accreditation bodies) conduct their work. These are ISO/IEC 17025, ISO/IEC Guide 65 and ISO/IEC 17011.

To learn more about international accreditation, visit both the website for the International Accreditation Forum (*www.iaf.nu* — for accrediting certification bodies) and the website for the International Laboratory Accreditation

If the labs and certification bodies are identified, the separator manufacturers would know to use them for these services. This would avoid the potential problem of a manufacturer wasting time and money on testing, if later it was learned that the test report and the certificate were not accepted by a POTW or a state.

V. Conclusion

POTWs may need to determine what, if any, steps will be taken in terms of addressing mercury-bearing wastewater from dental clinics. Apart from taking no action, steps range from promoting "best management practices" to requiring the installation and proper operation of amalgam separators. If a program encouraging or requiring the installation of separators is chosen, it will be the POTW's responsibility to anticipate and plan for the major aspects of administering such a program. These program considerations include:

- Should the POTW recommend or require wastewater pretreatment?
- Will a numerical limit or a "best available technology" approach be used (such as amalgam separators tested according to the ISO 11143 Standard)?
- If using a numerical limit approach, who will test, where will samples be taken, where does the limit apply? Will permits be issued?
- If using the best available technology approach, will both a test report and a certificate be required?
- Who is capable of conducting the tests that are described in the ISO standards?
- If requiring a certificate, who is capable of functioning as the certification body?
- If accreditation is necessary, then by whom?
- Will the POTW take on the responsibility of maintaining a list of approved separators? If so, has the POTW ensured that its enforcement authority will not be limited?
- Will there be a policy written by the POTW to address adding models to their approved list and to address modifications to models that are already on their list?

Cooperation (*www.ilac.org* – for accrediting testing laboratories). Full members and signatories of these organizations adhere to the guides and standards listed above. (These members and signatories are known as the "accreditation bodies".) There is a belief by some that ISO "certifies" test labs. This is not the case, but rather there are systems in place for the accreditation of both labs and certification bodies. In the United States the American National Standards Institute operates an accreditation program for product certification bodies in accordance with ISO/IEC standards and guides. For more information about this accreditation program, visit ANSI's web site (*www.ansi.org*).

Certification bodies can perform some of the functions listed above. Certification of amalgam separators helps ensure that separators will, on an ongoing production basis, conform to the original ISO Standard against which they were tested. The certification process minimizes the amount of work that each POTW or state would otherwise undertake. The certification process also eliminates, or at least minimizes, the need for tracking individual separator models as part of maintaining a list of approved models.

Currently, however, the certification bodies that certify amalgam separators do not carry out their programs using identical functions. If the certification bodies' programs were to be standardized, each POTW, state, or region could make use of the certification process with greater "reciprocity".

Decisions regarding the control of mercury discharges from dental clinics, in terms of implementing best management practices, applying numerical limits, and/or establishing an amalgam separator selection/operation program using a "best available technology" approach, should be made at the local level. NACWA hopes that the information provided here will help increase the understanding of some options and tools available to wastewater utilities.

Appendix 1 Basic Dental Clinic Vacuum Systems

There are two common types of vacuum systems in use within most dental clinics. See Figure 1 above. These are the "liquid-ring" or known as a "wet" system or the "turbine" or known as a "dry" system. The liquid-ring pump allows for the wastewater to pass through the pump and it also has a freshwater ("city") water line plumbed to the pump to help seal the impeller within the pump. This extra water runs continuously as long as the pump is turned on. Therefore some call it a "wet" pump. The turbine pump remains dry, similar to a common household "shop-vac" that collects water in a tank, while the pump above just moves air and thus remains dry.

Most dental clinics operate with basic filtration in place, regardless of the type of vacuum system or pump. There is usually what is called a "chairside trap" with approximately 0.7 mm pore size openings. The chairside trap catches the larger waste solids and helps prevent plugging within the vacuum system.

A liquid-ring vacuum pump usually has another filter in place. This vacuum filter is still relatively coarse, with pore sizes approximately either 0.42 mm or 0.84 mm. It is located just upstream of the pump to protect the pump from the solids generated at the chair, which pass through the chairside trap. A liquid-ring vacuum pump may use up to 1 gallon of water per minute. (Some liquid-ring pumps have a "recycler" feature to reuse some of the water passing through the pump.)

To eliminate the use of any extra water, there are parts of the United States where clinics are switching from using liquid-ring pumps to turbine vacuum pumps. This switch usually results in the loss of the vacuum filter that was part of the liquid-ring system. (Some of the turbine pumps may also use less electricity.) Therefore, if a clinic does not install an amalgam separator, yet switches from a liquid-ring vacuum system to a turbine system, there will likely be more amalgam, mercury, silver, and other metals discharged to the sewer, rather than simply maintaining the "status quo".

To put the pore size of the chairside trap and the vacuum filter in perspective, the range of 0.42 mm to 0.84 mm equates to 420 to 840 microns. The standardized amalgam used to run through a separator during the ISO 11143 test ranges from 3150 microns to approximately single digit micron particles. Therefore, the expected size of the waste amalgam particles generated at a clinic includes particles significantly smaller than what basic filters would now remove.

Appendix 2 Revision of the ISO 11143 Standard

The ISO 11143 Standard is currently in the process of being revised. Many countries worldwide are participating in this effort. The United States' member body to ISO is the American National Standards Institute (ANSI). ANSI has delegated the authority to the American Dental Association to coordinate the work associated with developing and revising dental related standards. Formal, international procedures exist for reviewing, commenting, and voting on drafts and final standards. NACWA is participating in the process now underway to revise the 11143 Standard, along with others such as the separator manufacturers.

Some of the topics being considered include using a different test material other than amalgam particles to put through the separator during the bench-top testing to measure its removal efficiency. Another topic deals with establishing thresholds for the maximum flow rates for testing the multiple types of separators based on their different installation locations within a clinic vacuum system. Currently, there is no set threshold for the maximum flow rate used for testing amalgam separators in the ISO Standard. The US, with input from NACWA, has provided comments to ISO as part of the revision process addressing these, and other topics. The ISO working group's original schedule gave a completion date of August of 2007, however, they are attempting to finish their work earlier if possible.

Given that: (1) The ISO test as originally written did not establish a threshold for the maximum flowrate, (2) it will take quite a bit of time to complete the revision, and (3) the US is recommending to ISO a set of thresholds for testing at a maximum flowrate based on the possible separator installation locations, a POTW may consider calling for hydraulic testing for those separator models currently being marketed that were tested below the proposed threshold flowrates. This would allow the POTW to begin implementing a separator installation program prior to waiting for the completion of the ISO test revision process. The hydraulic testing should be done by an independent, accredited laboratory to demonstrate that the separator model will restrict the flow through it to the rate at which it was tested according to ISO 11143.

These maximum flowrate thresholds range from 1-4 liters/minute. The thresholds are: 1 liter/minute for chairside installations, 2 liters/minute for centralized installations upstream of either the vacuum pump or an air/water separator tank (in a turbine, dry, vacuum system), and
4 liters/minute for installations below either a liquid-ring pump or below the air/water separator tank in a turbine vacuum system.

Since the ISO 11143 Standard is now being revised, those POTWs currently establishing programs for the installation of amalgam separators may want to consider their options when specifying ISO 11143 in their own rules or program materials (e.g., specify ISO 11143:1999 to "lock-in" the current, known version or simply call for "ISO 11143" and be silent on which version).

Appendix 3 Potential Benefits Associated with Uniform Certification Program

While NACWA is not advocating for certification or the establishment of a uniform certification program, it has identified a number of benefits to stakeholders if one were to be established:

Benefits to POTWs:

- Minimize and streamline work by each POTW or state in establishing a separator program.
- By using a "Mark" on a separator from the certification body, a POTW (and solid/hazardous waste regulators) would be able to easily determine if a separator was certified when visiting a clinic.
- Uniform certification would streamline "reciprocity" nationwide.
- Minimize or eliminate the reviewing of separator test reports and certificates.
- Minimize or eliminate the compiling of an "approved list of separators", by calling for certified separators.
- POTWs will not have to address issues of modifications made to separators, as the certification bodies would perform this task.
- Starting with an established set of criteria before a POTW begins implementing its program will avoid the difficulties of modifying the program during implementation.
- Reduce risk of fraud and lesser-quality separator models, by establishing a rigorous, transparent, and uniform certification process.

Benefits to the separator manufacturers:

- Know how the program works.
- Level the playing field by making competition fair and limiting false representation by manufacturers and distributors.
- Manufacturers and distributors will not have to work with each of the POTWs, states, or regions on getting models listed and addressing modifications of models.

Benefits to dentists and dental supply companies:

(Dentists purchase much of their equipment through dental supply companies, and these supply companies may serve large geographic areas.)

- Uniform system for those purchasing and marketing across multiple POTW service areas, states, and regions.