

The Quicksilver Caucus (QSC) is a coalition of State associations formed to address and resolve health and environmental problems resulting from the release of mercury to the environment. The membership of the QSC includes the Environmental Council of the States, the Association of State and Territorial Solid Waste Management Officials, the Association of State and Interstate Water Pollution Control Administrators, the Association of State Drinking Water Administrators, the National Association of Clean Air Agencies, and the National Pollution Prevention Roundtable.

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Case Studies of Five Dental Mercury Amalgam Separator Programs

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Maine Department of Environmental Protection

Introduction

In Maine, legislative proposals to ban amalgam have been introduced at the beginning of each biannual session for nearly a decade. In early 2000, a proposed amalgam ban resulted in a statutory change to the Maine Dental Practice Act requiring dental offices using amalgam to display a poster and provide an education/information brochure to all patients. The poster and brochure provide a description of the benefits and shortcomings of various filling materials, including mercury amalgam. This includes the potential environmental impacts of the various filling materials. After the 2002 implementation of the booklet and poster mandate, a few practices stopped using amalgam completely because they chose not to deal with informing patients.¹

The state legislature directed Maine Department of Environmental Protection (Maine DEP) to work with dentists and other interested parties to develop a pollution prevention plan for mercury from dental procedures that provides for reasonable measures to reduce mercury pollution by July 2002. A stakeholder group of interested citizens, environmental groups, the Maine Dental Association (MDA), and a few dentists was formed. The resulting pollution prevention plan was submitted to the legislature with a cover letter from Maine DEP that included multiple recommendations including mandated amalgam separators for all dental facilities.

In 2003, the MDA approached a state representative and requested his sponsorship of their bill mandating the installation of amalgam separators in all dental offices handling amalgam.

Voluntary vs. Mandatory

In Maine, amalgam separators are mandated by statute.² The statute set a December 31, 2004, deadline for installation of amalgam separators for affected dental facilities handling amalgam.

Performance Criteria

As defined by statute, "amalgam separator system" means a device that removes dental amalgam from the waste stream prior to its discharge into either the local public wastewater system or a private septic system located at the dental facility. The device must meet a minimum removal efficiency of 95% if installed prior to March 20, 2003, or 98% if installed on or after March 20, 2003, as determined through testing in accordance with the standard: "ISO 11143, Dental Equipment - Amalgam Separators," published by the International Organization for Standardization, in effect on the date the system is installed.

¹Conclusion based on legislative testimony and relayed information from the Oral Health Program staff; actual number unknown.

²Maine Mercury Added Products and Services 38 MRSA §1661 (1-A), (1-13); §1667. <http://janus.state.me.us/legis/statutes/38/title38sec1661.html> and <http://janus.state.me.us/legis/statutes/38/title38sec1667.html>.

In addition to installing a separator, the dentist or other party is required to provide the following: (1) documentation that the separator unit meets 98% removal efficiency as tested according to ISO 11143; (2) documentation from the separator manufacturer that the 98% efficiency rate is maintained at the unit's maximum flow rate; and (3) documentation that Maine DEP staff in the Bureau of Remediation and Waste Management have determined that the separator unit is "totally enclosed".

Maine DEP Rules

In addition to the statute requiring installation of separators, dental facilities must maintain a copy of the Maine DEP Confirmation of Compliance, shipping records for filters sent to recyclers, and written documentation that the system has been properly inspected and maintained. Also, according to Maine DEP rules, to be exempt from required licensing for treatment of hazardous waste, the treatment unit – in this case the amalgam separator - must be “totally enclosed”.

Results

Maine DEP reports approximately 100% compliance related to separator installation at dental facilities and notification to the department.

Successes/Challenges

The passing of the legislation requiring amalgam separators went smoothly. The MDA supported legislation as they recognized the direct environmental impact of amalgam and wanted to do their part. The proposed legislation to mandate amalgam separators is not recalled as contentious. Debate occurred on technical standards including efficiency for the separators. Legislative records indicate that voting in the Maine House of Representatives was not recorded as a roll call vote; another indication of lack of controversy.

Even with legislation having been passed smoothly, there were some challenges in implementing the law. For instance, there were challenges with maximum flow rates for amalgam separators. An acceptable test result as published in the May 2002 Journal of American Dental Association article entitled "Laboratory evaluation of amalgam separators" was Maine's initial method of determining whether the separator unit met ISO 11143. Maine DEP later learned that the separators were not all tested at the same flow rate and that, in fact, the flow rates varied dramatically. Maine subsequently required letters from separator manufacturers stipulating the unit's maximum flow rate and assurance that mandated efficiency rates were achieved at the maximum flow rate for the separator.

Additionally, Maine DEP faced some challenges related to its hazardous waste rules which require that the separator design be totally enclosed as determined by the department and that the recovered amalgam waste be sent to a recycler in order for the facility to avoid the need for an environmental license. Separator design relative to operation of the unit and recovery of the amalgam waste varied widely.

Dentists requested that Maine DEP provide information on brands of separators they would consider compliant. Department requirements that the separator manufacturer stipulate that the unit met efficiency rates at maximum flow and the need for a Maine DEP determination that the unit to be totally enclosed led to the development of a list of Maine DEP compliant separator models.³ The use of separator models that are not on the DEP list of compliant separators is not prohibited but the burden of proof and the legwork to obtain the necessary documentation to demonstrate that the unit meets all statutory requirements as determined by the department falls upon the dentist or other party.

Finally, initial outreach to the dental community was complicated by a lack of computerized contact information from the State Board of Dental Examiners.

Lessons Learned

Because of problems with maximum flow rates, Maine's list of compliant separator models includes maximum flow information. Since the ISO process of testing the amalgam separators for removal efficiency has no provisions to determine the hydraulic maximum flow rate of the unit, Maine recommends that each unit be hydraulically tested to determine its maximum flow rate using a standardized test method and then the unit would be ISO tested at this flow rate for removal efficiency. This would eliminate any debate, doubt, or hearsay concerning the maximum flow rates of the units once installed as compared to the rates utilized in the ISO removal efficiency test method.

As the use of amalgam separators becomes a long-term practice the quality control benefits of certification would be valuable. Amalgam separator units can be "tested" and manufacturers may further seek a "certification" for compliance with ISO 11143. Testing indicates that the separator unit meets ISO 11143 for that unit at that point in time. "Certification" indicates that the separator unit is compliant with ISO 11143 at that point in time and that in the event that the separator is ever altered it may be sent back for retesting to reconfirm compliance with ISO 11143. Maine's law required determination of ISO compliance by "testing" not the additional step of "certification".

Make the time to develop working relationships with your state dental association. They are key stakeholders. The state dental association proposed and supported mandated amalgam separator installation. Considerable work occurred with the state dental association as a vehicle for outreach to the dental community and as a source of technical information on dental facilities and practices.

Research the opportunities for outreach through state boards that provide oversight of dental practitioners. Work with the State Board of Dental Examiners resulted in limited but valuable opportunities for outreach.

³Separators brands currently determined to be compliant by Maine DEP are listed on our website at <http://www.maine.gov/dep/blwq/topic/amalgamseparator/index.htm>.

Ensure best management practices (BMPs) address amalgam separator operation and maintenance issues. For instance, vacuum line cleaning compounds must be reviewed for appropriateness (pH, corrosivity, etc.).

BMPs should address appropriate estimated maximum filter cartridge lifecycles. Discuss maximum cycle time for filters, even if the vacuum lines are still pulling adequate suction. Maine DEP found that some practices had the same filter cartridges in place for 1 – 2 years.

Provide detailed direction for dental practices and vendors related to operation and maintenance recordkeeping. This will help the many dental practices that have their supplier representatives perform some or all of the separator operation and maintenance, and recordkeeping tasks as a "turnkey" service. Required Maine DEP Confirmation of Compliance, paperwork concerning proper handling of the separator filters, and inspection log still need to be on-site.

Newly practicing dental providers may not be aware of amalgam separator requirements. This is not information taught in dental schools or included in the procedures necessary for obtaining a license. To address this, a link to the amalgam separator statute has been posted on the homepage of the State Board of Dental Examiners. Maine DEP also anticipates referencing the amalgam separator requirements in the print version of the Maine Dental Practice Act.

Plumbers also need to be educated about amalgam separator requirements. Maine DEP provides an amalgam separator fact sheet with an emphasis on plumbing-related requirements for a statewide training of the Licensed Plumbing Inspectors. They also plan to propose an amendment to the State Indoor Plumbing Code to reference amalgam separator requirements.

Open Issues

The results of the program need to be studied and assessed. Maine DEP recently reviewed pre- and post-amalgam separator requirement trend information on mercury in sewage sludge and did not find reductions in mercury concentrations as significant as those observed in a greater Boston study. More research is needed. Maine's population is rural, small, and underserved for dental services, particularly in rural areas. The state does not yet understand if these are contributing factors. Further discussion on mercury reductions in sludge from amalgam separator installation is expected at the regional level.

The environmental impacts of amalgam from cremation have been raised in Maine's legislature. Maine's Bureau of Air Quality indicates that because of their small stack size, installing stack controls on Maine crematories is not economically feasible. Discussion of source removal prior to cremation namely pulling teeth remains very difficult due to various cultural associations. Cremation bills have yet to gain traction in the Maine legislature.

Data on mercury levels in indoor areas where amalgam is used and where amalgam separators are housed would be valuable information in determining other potential environmental and public health impacts of amalgam.

Massachusetts Department of Environmental Protection

Introduction

It is estimated that over 10,000 lakes, ponds, and reservoirs, 24 river segments, and more than 46,000 river miles contain fish that are unsafe to eat in the northeast due to mercury. In Massachusetts, over 50% of tested water bodies have fish with unacceptable levels of mercury. A regional 2007 assessment concluded that mercury pollution would need to be reduced by 86% - 98% to restore northeast water bodies and make their fish safe to eat.

The Massachusetts Water Resources Authority (MWRA), which services about 2.5 million people and operates the largest wastewater treatment plant (WWTP) in Massachusetts, estimated that mercury from the dental sector was responsible for a large fraction (18-78%) of mercury loadings to its system in the 1990's.⁴ WWTP mercury can pollute the environment when WWTP sludge is incinerated, reused or landfilled.

To address mercury pollution in the region, the New England Governors and Eastern Canadian Premiers unanimously adopted a far-reaching regional Mercury Action Plan in June of 1998.⁵ Goals for the dental sector were established in 2005, which stipulated that by 2007, 75% and by 2010, 95% of the region's dentists who generate mercury-containing wastewater from dental amalgam should install amalgam separators and use other BMPs to minimize mercury pollution.

Voluntary vs. Mandatory

In Massachusetts, the Massachusetts Department of Environmental Protection (MassDEP) and the Massachusetts Dental Society (MDS) have worked collaboratively to reduce mercury releases. In 2001, a joint memorandum of understanding (MOU) was adopted to encourage the voluntary adoption of BMPs and the use of amalgam separators. State agencies and the MDS agreed to cooperate on outreach efforts. As part of this initiative the Massachusetts Innovative Technology program also funded an independent assessment of amalgam separators by the University of Massachusetts, which concluded that these pollution controls were effective.

Although the MOU helped to raise awareness of the environmental impacts of dental mercury and the technology assessment addressed concerns voiced by dentists about amalgam separator effectiveness, amalgam separator use increased only modestly under the MOU. To level the playing field and speed up the use of amalgam separators, MassDEP initiated a follow-up two-phase program in 2004. Initially, MassDEP indicated that it was developing regulations, which would require the use of amalgam separators, among other provisions. To achieve faster mercury pollution reductions during the period of regulatory development, MassDEP, in collaboration with MDS, initiated a voluntary early compliance program. Dental practices that installed

⁴*Mercury in Dental Facilities: Boston* (1997) Massachusetts Water Resources Authority, <http://www.mwra.state.ma.us/03sewer/html/dentsum.htm>.

⁵*New England Governors/Eastern Canadian Premiers Mercury Action Plan* (1998) Conference of the New England Governors and Eastern Canadian Premiers, <http://mass.gov/dep/toxics/priorities/negecp.pdf>.

amalgam separators during the voluntary early compliance program were required to install amalgam separators with 95% efficiency. Those waiting to install amalgam separators after the law went into effect had to install ones with 98% efficiency.

Performance Criteria

Under this program, participating dentists electronically certified their installation of an amalgam separator achieving greater than 95% mercury control based on ISO 11143 and their use of BMPs for mercury. Those participating by February 28, 2005, were exempted from agency permit fees and grandfathered from potentially more stringent regulations until February 1, 2010. Dentists who certified participation between March 1, 2005, and February 1, 2006, were granted the same incentives but for a shorter period, until February 1, 2007.

Regulations

Regulations requiring the use of amalgam separators and BMPs were developed with the assistance of a stakeholder workgroup including individual dentists, MDS representatives, sewerage authorities, and environmental groups. Regulations were adopted in April 2006.⁶

Results

The incentivized early compliance program was very successful. About 75% of Massachusetts dentists participated in the first year. Additionally, the 2007 goal of 75% of dental clinics installing separators was substantially exceeded with about 80% of the region's dentists complying. Currently, Massachusetts estimates that greater than 95% of Massachusetts dental offices that generate amalgam containing wastewater are using compliant amalgam separators.

The effectiveness of this program is supported by data from the MWRA. MWRA carefully monitors mercury levels in its WWTP sludge, almost all of which is beneficially reused. From 2004 – 2006, when amalgam separator use was increasing to over 80% in Massachusetts, mercury levels in MWRA sludge decreased by about 48%.

Massachusetts' experience demonstrates that collaborative initiatives, which include effective outreach and education to the dental community, quantifiable goals and objectives, and meaningful deadlines, can be effective in reducing mercury pollution attributable to the dental sector.

⁶310 CMR 73.00: *Amalgam Wastewater and Recycling Regulations for Dental Facilities* (2006) <http://mass.gov/dep/service/regulations/310cmr73.pdf>.

Metropolitan Council Environmental Services

Introduction

Metropolitan Council Environmental Services (MCES) is the publicly-owned treatment works (POTW) responsible for wastewater collection and treatment in the Minneapolis and St. Paul metropolitan area of Minnesota. In 2003, MCES and the Minnesota Dental Association (MDA) launched the Voluntary Dental Office Amalgam Recovery Program (Program) to encourage general practice dental clinics that place or remove amalgam to install separators.

Mandatory vs. Non-mandatory

The Program initially was voluntary and promoted jointly by MCES and the MDA. However, there was the threat of regulation to get a clinic to install a separator, which most of them did in order to avoid more stringent action by MCES. But to get the last fraction to install, MCES told the clinics that those without separators would have to apply for a permit. To obtain and retain a permit, clinics have to pay fees, sample twice a year, analyze, report, and most significantly, meet a mercury discharge limit of 2 micrograms per liter (a total facility limit). Any clinic that installs a separator from the Program's list of approved models is issued a "certificate of compliance" and granted a variance from MCES' mercury limit. Instead of meeting the testing and reporting requirements of a permit, clinics with a separator simply submit a signed statement to MCES each year indicating that they are still properly operating their separator and managing all of their wastes.

Extent of the Program

This Program was developed by both MCES and the MDA for the seven county metropolitan area of Minneapolis and St. Paul. Although the MDA promoted the Program statewide, MCES' variance and the clinics' annual reporting requirements only applied to the clinics in MCES' service area.

The Program operated by MCES and the MDA, within MCES' service area, has matured. There is a new statewide effort underway by the Minnesota Pollution Control Agency (MPCA). MPCA and the MDA signed an MOU⁷ to promote separator installation, establish criteria for approving separators, resolve regulatory issues dealing with the management of solid and hazardous waste, and address questions related to dental clinic discharges to septic tanks with drainfields.

Performance Criteria

The MCES and MDA Program calls for separators that achieve at least a 99% removal efficiency when tested according to the ISO 11143 Standard. This standard calls for testing a

⁷ MOU is available at: <http://www.mn-ei.org/policy/SWG%20meeting%20info/MnDAMOUPdf>.

separator that is empty three times, and testing it under simulated full conditions three times. The lesser of the two averages, either empty or full, is considered the efficiency of the separator.

Since MCES and the MDA raised the bar to 99% (up from 95%), they determined that it would be sufficient if the overall average result of the empty and the full test results was at least 99%. MCES and the MDA maintain a list of approved separator models.

After the Program was initiated, MCES and the MDA added the requirement that any new separator model must be certified. (See “Lessons Learned”, below.)

Administrative Rules Defining Program Components

MCES worked with its Council to approve the details of the Program. The main regulatory element of the Program has been the formal granting of the mercury limit variance for wastewater discharged from those clinics that install and properly operate their separator. MCES believes that wastewater from clinics operating separators will meet the limit (2 micrograms/liter, total facility); however, the variance will serve an incentive to install and as insurance for the clinics in the event that an outside party claims that the dentist is not meeting the mercury limit.

Clinics participating in this Program are obligated to report annually via a signed statement that they are properly operating their separator and managing their wastes. These procedures are like a general permitting program, but without a permit or fees.

Results

To date, over 99 percent of the general practice clinics have installed an amalgam separator. The mercury level in the influent has been reduced by approximately one half since the Program began.

Problems/Challenges

The ISO 11143 Standard has a loophole in it, since it does not specify a threshold or minimum flowrate at which the test should be conducted. As a result, the separator manufacturer is able to pick any flowrate for conducting the test. MCES is aware of a separator manufacturer retesting at a lower flowrate to achieve a higher removal efficiency in an attempt to get their separator model listed for use in the service area. If this is not addressed, there may be a “race to the bottom”.

Partway through MCES’ development of its Program, MCES learned that a testing laboratory had not followed the ISO Standard properly. So then MCES had to determine who was capable of testing to the ISO 11143 Standard.

Compliance with the Program is based on installing a separator that passes ISO 11143, as opposed to meeting a numerical concentration limit in the clinic’s wastewater. Dental supply companies may stock and sell only a limited number of models; therefore, they may not have

much flexibility in working with various sized clinics, or clinics that have difficult installation requirements such as plumbing or space issues.

Lessons Learned

A set of tools exists that can help regulators, but was unknown to MCES when its Program was first established. One basic tool is “certification”, a quality control procedure set up between a “certification body” and the manufacturer for ongoing conformity assessment. More information on this is available in the 2006 National Association of Clean Water Agencies paper titled: *Controlling Mercury in Wastewater Discharges from Dental Clinics*.⁸

If regulators require that all models be certified, and identify acceptable certification bodies they will greatly reduce their workload and manufacturers bear the cost of testing and certification. A certification body will be able to address questions as to whether or not the testing was properly done and will be able to address what happens if a manufacturer decides to modify their separator model. MCES determined, along with the MDA, that it needed to identify a number of testing laboratories and certification bodies, from which the manufacturers would have to contract with for services. Two labs and certification bodies were chosen, SP Technical Research Institute of Sweden and TÜV NORD in Germany.

Amalgam separator models that were already listed as approved by MCES and the MDA were grandfathered into the Program. For these older models, MCES and the MDA have become the de facto certification body. A lengthy document was drawn up by MCES and the MDA to spell out the criteria for approving and listing models and for addressing modifications to those models. Such a procedure may be too involved for smaller regulators, and is unnecessary and duplicative regardless of size, given existing conformity assessment procedures in place.

Another tool that exists is the accreditation process which defines ISO guides and standards for all the parties involved to follow. Labs and certification bodies should be accredited.⁹

If regulators call for certified separators, and proper accreditation of the labs and certification bodies, this will enlist the help of professionals in conformity assessment and will advance the overall level of understanding. Certification bodies and labs should at a minimum, have a good history of certifying and testing separators, and ideally, their accreditation should specify that they are qualified for ISO 11143.

If a regulator sets up a list of approved models, it will need to do so carefully, given the competitive aspect of multiple manufacturers vying for market share. Further, if a regulator does set up a list of approved models, they will need a basic understanding of the ISO 11143 Standard for testing.

⁸Available at <http://www.nacwa.org/images/stories/public/2006-01dmercwp.pdf>.

⁹For more information on accrediting certification bodies, please refer to: http://www.ansi.org/conformity_assessment/accreditation_programs/accreditation_certification_programs.aspx?menuid=4.

New York State Department of Environmental Conservation

Program Overview

New York State mandates the statewide installation of dental amalgam separators under 6NYCRR Subpart 374-4 Standards for the Management of Elemental Mercury and Dental Amalgam Wastes at Dental Facilities. This regulation, effective May 12, 2006, requires approximately 15,000 dentists to install amalgam separators at their facilities by May 12, 2008; to recycle dental amalgam waste and elemental mercury; and to maintain recycling and separator records for a specific period of time. Separators must be *certified* to the ISO 11143 Standard and operate at 99% removal efficiency. A few specialties (orthodontics, periodontics, prosthodontics, and oral/maxillofacial surgery) are exempt from installing amalgam separators but are not exempt from recycling dental amalgam or from record keeping requirements.

The New York State Department of Environmental Conservation (NYSDEC) presently employs one full-time person to administer the amalgam separator program. This position has been involved with all facets of the program including: writing the regulation, reviewing separator certificates and test reports, communicating with the dental community and separator manufacturers, and developing educational materials and website information. Workload and involved staff are expected to increase due to compliance and enforcement work following the installation deadline.

The NYSDEC did not develop additional or special administrative rules defining detailed program components; however the regulation does include BMPs for the recycling and management of dental amalgam. NYSDEC's website is continuously updated to inform the dental community of issues specific to this regulation such as frequently asked questions by dentists for the recycling of mercury; a list of mercury and dental amalgam recyclers; laws governing the recycling of dental amalgam; and a listing of separator manufacturers who have submitted a certificate and test report.

Performance Criteria

ISO 11143 efficiency testing is carried out three times on the empty separator and three times on the full separator. Averages are calculated for both the empty and full conditions. The lower average of the two test series is the efficiency of the separator and must be at least 95% to pass the basic ISO 11143 Standard. Since 99% efficiency removal appears difficult for many separators to achieve, New York calculates one overall average from all six tests to determine the removal efficiency. This calculation allows more separators to achieve New York State's 99% removal efficiency requirement.

Problems/Challenges

NYSDEC has received feedback from separator manufacturers, dental equipment distributors, and the dental community since the promulgation of this regulation. Confusion abounds primarily over what constitutes a *certified* separator. While the Department has not and does not intend to approve separators and does not recommend or endorse any specific separator or separation method, it has listed separators on the website that have certificates and test reports from an accredited certification body and testing facility. Unfortunately, some vendors may be selling separators that are not appropriate in order to readily compete for the substantial separator market available in New York State.

Also, many dentists feel the State is “picking on them” by requiring separator installation while other industries continue to be major sources of mercury pollution.

Additionally, there is contention within the dental community due to New York’s exemption of certain specialties that potentially remove more mercury fillings than specialties that are not exempt.

Lessons Learned

NYSDEC has gained valuable experience from implementing this program over the past few years. For any state implementing a similar program, NYSDEC suggests the following criteria should be considered prior to legislation and/or regulatory development and implementation:

- *Research* - Regulators should thoroughly understand the certification process and the system of “conformity assessment” as it works under the International Accreditation Forum.¹⁰ This is a complex issue so understanding the process involved and what your state is requiring when you ask for a *certified* separator is essential. Communication with states that have implemented a separator program is very helpful in order to discuss problems that have occurred in their states.
- *Certification* - Regulators should specifically define “certified”, “certificate” and “certification body” in their regulations. In New York State, some manufacturers are marketing separators as ISO certified; however, certification and testing were not done by accredited certification bodies. Recognized certification bodies may be mentioned in the regulation with regulatory language that additional accredited certification bodies will be considered. It is beneficial, in both cost and time, if regulators do not undertake the tasks of certifying and testing separators themselves. Additionally, regulators may entice the creation of more accredited certification bodies and testing laboratories in the United States by mandating certified separators.
- *Test Report* - Most certificates issued by certification bodies do not state the removal efficiency rating. This rating is obtained from the test report. New York requires test report submittal from an accredited testing laboratory to verify the required 99% removal efficiency.
- *Removal Efficiency* - Regulations should define the current accepted means for measuring removal efficiency with provisions for future measurement revision.

¹⁰ International Accreditation Forum’s website it: www.iaf.nu.

- *Approved List* - The dental community looks to their dental associations and regulators for guidance when purchasing a separator. A formal approved list, created shortly after regulation promulgation, provides guidance for the regulated community that is inundated with confusing and sometimes false information from manufacturers concerning a separator's ability to meet state requirements. By creating precise regulatory criteria for the few separator manufacturers that exist, a sound foundation is established for supplying quality separators to the dental community. The dental community members, in turn, are assured that they are purchasing equipment recognized by their state. Also, implementation and enforcement issues will be easier to address because listing parameters have been firmly established.
- *ISO 1143 Updates* - Regulatory language should consider future updates to the ISO Standard. By including regulatory provisions for possible updates, enforcement may be facilitated by criteria that fall under the updated ISO Standard.

Open Issues

Outstanding issues, such as enforcement, still need to be addressed once the installation date for separators arrives on May 12, 2008. Random dental facility site visits will take place to verify the installation of separators and that mercury recycling is being accomplished.

Washington State Department of Ecology

Background

Washington State Department of Ecology (Ecology) implemented a Persistent, Bioaccumulative, and Toxic Strategy in 2000. Ecology then selected mercury for the first chemical reduction action plan, the Mercury Chemical Action Plan (MCAP). The MCAP, published in 2003, identified amalgam waste from dental offices as one of the largest sources of mercury releases to waters of the state. However, the Mercury Education and Reduction Act (RCW 70.95M), also approved by the legislature in 2003, did not address dental waste.¹¹

King County promulgated an ordinance requiring amalgam separators in 2003, prior to that, amalgam separator installation was voluntary. Many other counties including Spokane and Thurston have since passed similar ordinances.

Voluntary vs. Mandatory

Based on existing regulations and a pilot project created by King County, Ecology negotiated an MOU with the Washington State Dental Association (WSDA) in August 2003, which allowed dentists two years to implement up-to-date BMPs regarding mercury and lead related dental wastes, including the installation of amalgam separators. Data collected during this period showed that less than 40% of dentists had installed a separator by April 2005. As a result, Ecology notified the WSDA that the MOU would not be extended and notified all state dentists that separators were required as of September 2005.

Extent of Program

Statewide, Ecology requires dental offices discharging to a septic system to install an amalgam separator and obtain a commercial wastewater discharge permit. In 2006, Ecology notified all municipalities that beginning with the largest, delegated municipalities, they would require mercury monitoring using the most sensitive detection available – the microwave digestion with the EPA1631E method.

Performance Criteria

King County requires ISO 11143 certified amalgam separators, which have a documented 95% capture rate, and that are approved by the County.¹² King County and other municipalities are implementing a rigorous method of testing septage waste from dental offices prior to accepting it at their wastewater treatment facility. The requirement is based on dental office septage being listed as high risk.

Statewide, Ecology has the same requirements as King County; installation of ISO 11143 certified separators with a 95% capture rate.

¹¹<http://apps.leg.wa.gov/RCW/default.aspx?cite=70.95M>.

¹²http://dnr.metrokc.gov/wlr/indwaste/sep_table.pdf.

Regulations

In April 2003, Ecology determined that mercury amalgam waste from dental practices could not be treated as an effluent. Rather, due to its characteristics, the waste needed to be tested and determined compliant with both hazardous waste and water quality standards, or contained prior to entering the combined wastewater from the facility (not at the point of discharge to the sewer). Based on data that showed that even though a wastewater treatment plant could separate mercury to a certain extent, the results were not low enough, and that the biosolids from the treatment plant contained rather high levels of mercury, Ecology used existing hazardous waste management rules to require the installation of amalgam separators. Washington Administrative Code 173-303-071(3)(a)(ii)(D), commonly called the domestic sewage exclusion rule states that:

The waste prior to mixing with domestic sewage must not exhibit dangerous waste characteristics for ignitability, corrosivity, reactivity, or toxicity as defined in WAC 173-303-090, and must not meet the dangerous waste criteria for toxic dangerous waste or persistent dangerous waste under WAC 173-303-100, unless the waste is treatable in the publicly owned treatment works (POTW) where it will be received. This exclusion does not apply to the generation, treatment, storage, recycling, or other management of dangerous wastes prior to discharge into the sanitary sewage system.¹³

Results

In 2007, the City of Vancouver obtained a national pollution discharge elimination system (NPDES) permit that requires implementation oversight of dental amalgam separators. The requirement was based on data collected from several local governments, showing fairly consistently about a 40% drop in mercury levels in biosolids for those municipalities that had aggressive amalgam separator installation programs.¹⁴ King County realized a 50% reduction in mercury in biosolids after 95% of its dentists installed amalgam separators and followed the required BMPs for amalgam wastes and spent fixer.¹⁵

On a statewide level, field visits and phone surveys documented about a 95% installation rate by April 2006.¹⁶ Also, the most recent statewide fish tissue monitoring data shows a drop of mercury levels in monitored fish populations. However, at this point, the drop is too small and with too few data to call it a trend.¹⁷

Challenges/Successes

The difficulties of obtaining funds, political attention, data and voluntary compliance from dental offices delayed reduction of mercury releases to waters of the state by at least two years. Ecology found that MOUs with professional associations have the potential of not being

¹³<http://apps.leg.wa.gov/WAC/default.aspx?cite=173-303-071>.

¹⁴http://www.ecy.wa.gov/mercury/BIOSOLIDS_MERCURY.pdf.

¹⁵<http://dnr.metrokc.gov/wlr/indwaste/amalgdiff.pdf>.

¹⁶<http://www.ecy.wa.gov/pubs/0604011.pdf>.

¹⁷<http://www.ecy.wa.gov/biblio/0703043.html> and <http://www.ecy.wa.gov/biblio/0703030.html>.

effective if the association represents less than 90% of the targeted population. Also, funding to maintain technical assistance visits and pursue any regulatory violations is needed, but has not been allocated since 2005. And staff with institutional memory of the project are assigned to other projects and cannot monitor the needs of dental offices at this time.

On the positive side, the WSDA tried very hard to obtain voluntary implementation of the BMPs, met with Ecology regularly, and provided presentations side-by-side with Ecology. This helped develop a positive relationship. Environmental groups, such as the Washington Toxics Coalition, amalgam separator manufacturing and marketing services, dental schools, and grassroots local organizations provided data, anecdotes and pressure politically and scientifically to increase public interest and level of understanding of the subject.

Lessons Learned

Both the municipalities and Ecology spent more time and resources than expected implementing these policies regarding dental office BMPs and amalgam separator installation.

Voluntary agreements do not seem to give dental offices clear direction, even if the list of BMPs is clear. An office-to-office visit program may have been more effective, more quickly.

Open Issues

Consideration of requiring 100% recycling of the amalgam, as well as preventative procedures at permitted crematoria in the state, have been considered but not pursued further.

