

**Metropolitan Council Environmental Services
Voluntary Mercury Reduction Agreement**

2002 ANNUAL REPORT
March 2003



1.0 Introduction and Background

The Metropolitan Council Environmental Services (MCES), a division of the Metropolitan Council, submitted a Voluntary Mercury Reduction Agreement (VMRA) to the Minnesota Pollution Control Agency (MPCA) on December 28, 2000. The VMRA summarizes the past actions and outlines the commitments under this agreement, according to topic area. This annual report describes the activities and accomplishments that occurred during the year 2002. These activities and accomplishments are arranged using the same major headings found in the VMRA.

2.0 Control of Discharges to the MDS

MCES formed a partnership with the Minnesota Dental Association (MDA) in 1998 as part of our Mercury Reduction Program, and undertook the two studies noted below. The studies evaluated dental amalgam separation equipment and loadings of mercury in amalgam to the sanitary system.

Evaluation of Amalgam Removal Equipment

This study and associated report titled "Evaluation of Amalgam Removal Equipment and Dental Clinic Loadings to the Sanitary Sewer" were completed and distributed in 2002. The study, done in cooperation with the MDA, found that amalgam removal equipment is available from many vendors, it operates efficiently, and that mercury loadings to wastewater treatment systems from dental clinics can be significant. The results showed an overall weighted average discharge rate of 234 milligrams of mercury per dentist per operating day with basic filters in place. Five models of amalgam removal equipment were installed within the vacuum systems of seven dental clinics for a cumulative total of 87 "clinic-weeks." The amalgam removal equipment was shown to remove 91-99 percent of the mercury discharged, primarily by capturing amalgam. It is important to point out that mercury discharged from dental clinics is primarily in the form of amalgam and the levels are quite variable, ranging from 28-540 mg mercury/dentist/day. MCES and MDA encourage caution when using the data because of the large variability.

Community-Wide Study

A community-wide study was conducted to quantify the amount of mercury discharged from dental clinics to MCES' wastewater treatment plants (WWTPs). This was accomplished by an intensive sludge sampling and analysis program at the Hastings and Cottage Grove (now known as Eagles Point) WWTPs before and during the testing period when amalgam removal equipment was in place at the dental clinics upstream of the WWTPs.

While the amalgam removal equipment was in place, a 44 percent reduction of mercury in sludge was found at the Hastings WWTP and a 29 percent reduction was found at the Cottage Grove WWTP. Based on the measured reductions of mercury in sludge at the WWTPs, and estimating the removal rates of mercury in WWTP grit, efficiency of the amalgam removal equipment in the dental offices and the number of days of operation of each clinic, a mercury loading from dental clinics was estimated. The mercury loading from the dental clinics to the WWTPs was estimated at 120 mg mercury/dentist/operating day.

To obtain the executive summaries of either the equipment evaluation or community-wide study, please contact Peter Berglund at 651-602-4708 or via e-mail at peter.berglund@metc.state.mn.us.

Dental Amalgam Separator Program

The results of the two studies noted above established a scientific basis for concluding that advanced amalgam separation equipment can be cost-effective in removing amalgam particles from the dental office wastewater stream resulting in reduced mercury loadings to the sanitary sewer, and should be installed. As a result, during the year, MCES and MDA developed a "Voluntary Dental Office Amalgam Separator Program." This is a jointly managed program that will ensure the installation of advanced amalgam separation equipment in all general practice dental offices throughout the state. The program will involve more than 1,300 general practice dentists or about 1,000 dental offices in the MCES service area. Rollout of the program began on January 1, 2003, and the final date for installation and operation of amalgam separators is set for February 1, 2005.

MDA will take the lead in promoting the program within the metropolitan wastewater service area and throughout the state. MCES and MDA will provide technical support to the dental community in order to facilitate decision-making and separator installation by dental offices. MDA will keep a database of all dental office activities. When an office has satisfactorily completed installation and reported waste management plans, MCES will provide a certificate of compliance. Each office will be expected to report to MCES on an annual basis in order to maintain compliance. If an office does not satisfactorily respond to the voluntary program, MCES will take steps toward regulatory action.

The voluntary approach of this program will be less burdensome and less expensive than a conventional regulatory approach for each dental office as well as for MCES. This program is a fair and low-cost means of reducing the dental contribution of mercury to the sanitary sewer system. It avoids costly infrastructure expenses at MCES facilities, enhances protection of the environment, continues the partnership with MDA and dentists, and promotes equity and fairness across sewer user groups.

The Environment Committee of the Metropolitan Council recommended adoption of the program on November 12, 2002, with final Metropolitan Council approval on December 11, 2002.

In addition, the April 2002 and December 2002 issues of MCES' regular newsletter targeting its industrial users, "Open Channel News" included articles describing the activities regarding amalgam control. Information on the dental amalgam studies was also shared with member organizations of the Association of Metropolitan Sewerage Agencies (AMSA).

3.0 Policy-Related Actions

The following policy related actions were taken in 2002:

- In 2002, MCES awarded \$1,436,330 of the \$7.5 million in grant monies available (over a five-year period - 1999-2004) to reduce non-point source (NPS) runoff. Since mercury strongly associates with soil particles, reductions in NPS runoff will lead to reductions in mercury in runoff to surface waters. To date, the Council has approved about \$6.5 million in competitive and targeted grants for nonpoint source pollution abatement and prevention projects.
- As part of its Dental Insurance Program benefits, the Council continued to encourage employees and their dependents to use mercury-free posterior restorations (dental cavity

fillings) by removing the cost disincentive to selecting the significantly more expensive mercury-free composites.

4.0 External Pollution Prevention

MCES has dedicated much staff time to help other organizations learn about and minimize the use of mercury and mercury compounds, as well as minimizing the potential release of mercury to the environment. Among the activities involving technical assistance and support that were undertaken in 2002 are the following:

- MCES has been an active participant in the Mercury Work Group of the Association of Metropolitan Sewerage Agencies (AMSA), a trade association representing publicly owned treatment works (POTW). This group has been active in persuading the U.S. Environmental Protection Agency (EPA) to resume validation testing of EPA's mercury Method 245.7 and conducting follow-up sampling of EPA's 1994 study of Great Lakes POTWs.
- In March 2002, AMSA released "Mercury Source Control and Pollution Prevention Program Evaluation – Final Report." MCES staff served as peer reviewers of the report, which evaluates the percent contributions from dental clinics and other key sources of mercury to wastewater treatment plants, and will help treatment plant operators focus their efforts to maximize the reduction of mercury releases to the sanitary sewer.
- MCES is a participant in another AMSA project that began in 2002. This will involve tracking mercury levels within wastewater treatment plants as certain cities implement their programs to control mercury contributions from dental offices.
- The Minnesota Office of Environmental Assistance sponsors meetings of healthcare providers, regulators, technical service providers, trade associations, and others through a group known as the "Healthcare Environmental Awareness and Resource Reduction Team (HEART)." MCES continues to be an active participant in the activities of HEART.
- MCES staff have spoken at a number of conferences, disseminating information and promoting the minimization of the use and the release of mercury.
- The Massachusetts Strategic Envirotechnology Partnership (STEP) is a joint program between the Executive Office of Environmental Affairs (EOEA) and the University of Massachusetts to assist business with the development and promotion of innovative, technology-based solutions to environmental problems in the Commonwealth. The STEP program is currently evaluating methods to test amalgam removal equipment, looking for a simpler, less expensive benchtop method that could replace the ISO method. Their testing compares a new benchtop method with clinic testing of equipment to determine if the benchtop method is "predictive" of amalgam removal equipment operating in clinics. MCES is providing peer review of the study. MCES also has provided assistance to wastewater operations personnel at the Massachusetts Water Resources Authority in Boston regarding dental mercury issues.

- MCES has assisted the States of New Hampshire and Vermont, serving as an advisor to address issues related to mercury from dental offices.

5.0 Internal Pollution Prevention

Among the activities involving internal pollution prevention that were undertaken in 2002 are the following:

- In 2002, MCES did not aggressively promote its thermometer exchange program; nonetheless, staff collected 69 mercury thermometers from employees and exchanged for digital thermometers. MCES has collected a total of 602 mercury thermometers during the three years of the program. In addition, the mercury thermometers in the MCES first responder kits were replaced with digital thermometers.
- In collaboration with the MPCA, MCES R&D staff collected and analyzed over 360 river and lake water samples for total mercury and methylmercury. River water samples were collected from the Mississippi, Minnesota, St. Croix, Elk, Rum, St. Louis, and Poplar Rivers. Lake water samples were collected from 15 lakes across Minnesota. These efforts were in support of the MPCA's development of mercury total maximum daily loads (TMDL) for Minnesota surface waters.
- Working with scientists from the MPCA and the St. Croix Watershed Research Station of the Science Museum of Minnesota, MCES R&D staff analyzed 96 sediment samples from six Minnesota lakes (Brule, Sawbill, Alton, Kabetogama, Winnibigoshish, and Side) for total mercury (THg) and methylmercury (MeHg). Historical rates of THg and MeHg accumulation in dated sediment cores were compared with levels of Hg in fish in these lakes over the past 70 years.
- MCES R&D staff provided analytical and consulting services to the Minneapolis Park and Recreation Board in support of their stormwater mercury monitoring program. The Board provides stormwater monitoring services under contract to the cities of Minneapolis and St. Paul. MCES staff trained Board scientists in "clean" mercury sampling procedures and provided analytical support services throughout 2002.
- During 2002, the MCES Laboratory Services discontinued the use of the atomic absorbance mercury analysis on liquid sample matrices. All liquid sample matrices are now analyzed for mercury by atomic fluorescence, using U.S. EPA Region 5 approved alternate test procedure (ATP) of a modified version of EPA 245.7 method, with an optional gold amalgam trap. The Minnesota Department of Health certified the laboratory for the use of Method 245.7 on January 8, 2002. Efforts were focused to develop a lower quantitation level, originally determined to be 3 ng/L, utilizing the gold amalgam trap. The new quantitation level is 0.5

ng/L and was placed into operation in July 2002. Low level mercury samples are collected using EPA method 1669 at the Eagles Point, Rosemount, St. Croix Valley, and Metropolitan Wastewater Treatment Plants and analyzed in the laboratory using the ATP approved EPA method 245.7 with the gold amalgam trap. In August, at the request of MCES, MPCA approved the use of EPA method 245.7 (without the gold amalgam trap) for analysis of mercury in the effluents for the Blue Lake and Seneca Wastewater Treatment Plants, since the permits specified the use of the preceding less-sensitive analytical method (Method 245.1).

- As a result of the "Voluntary Dental Office Amalgam Separator Program", the Laboratory was, and currently is, involved in developing an analytical procedure that will sufficiently oxidize all forms of mercury present in the treatment plant influent matrix. The contribution of amalgam associated with the grit is also being quantified using an established Laboratory modified method that has been shown to effectively recover mercury in a known weight of actual amalgam.

6.0 Technology-based Controls

The MCES is currently constructing new solids processing facilities at its Metropolitan Wastewater Treatment Plant. Site preparation, including site excavation and partial foundation construction for the new building, was completed in July 2002. The contract for construction of the Solids Management Building itself (that will house the incineration and air pollution control systems) began in May 2002 with final completion to occur in October 2005. This contract also includes facilities for sludge storage, sludge dewatering, and sludge chemical stabilization along with electrical, mechanical and odor control systems.

Installation of three fluidized bed incinerators and their corresponding air emission process trains within the solids building began in June 2002. The new air pollution control systems for the fluidized bed incinerators are being designed with the capability to treat exhaust gases with carbon which are expected to achieve a goal of reducing mercury in air emissions by approximately 70% from 1997 emission estimates. The cost for the carbon injection technology and the enhanced particulate removal technology, which is integral to enhanced mercury removal, is approximately \$5.7 million. Start-up of the entire incineration and emission control system is scheduled to begin in June 2004.

7.0 Mercury Reductions Achieved

Actions taken to control sources of mercury discharged to the collection system have resulted in a reduction of mercury concentrations in sewage sludge at the Metro Plant from approximately 3.0 milligrams per kilogram (mg/kg) in 1990 to 1.02 mg/kg in 2002.

8.0 VMRA Administration

MCES agreed to provide an annual report of the progress made under the VMRA by March 1 of each year for the preceding calendar year. This report fulfills that commitment.