

**Metropolitan Council Environmental Services
Voluntary Mercury Reduction Agreement
December 28, 2000**

1.0 Introduction and Background

The Metropolitan Council (“Council”) is a public corporation and political subdivision of the state of Minnesota organized under Minnesota Statutes, Chapter 473. The Council owns and operates the Metropolitan Disposal System (“MDS”) in the Twin Cities Metropolitan Area. The MDS is comprised of nine wastewater treatment plants (WWTP) which treat approximately 300 million gallons of wastewater per day, has over 550 miles of interceptor sewer pipes and 239 lift and meter stations (as of 2000).

The Council has other responsibilities related to environmental quality in the Metropolitan Area, and is committed to the improvement of environmental quality in the Metropolitan Area.

Metropolitan Council Environmental Services (MCES), a division of the Council, supports the Minnesota Mercury Contamination Reduction Initiative and the Advisory Council recommendations that resulted from that effort. MCES and its predecessor agencies have maintained an active mercury reduction program. MCES is committed to further reducing mercury emissions and discharges to the environment. To that end, MCES has developed this Voluntary Mercury Reduction Agreement (VMRA). This VMRA summarizes our past actions and states our commitments under this agreement, according to topic area. These previous actions, current activities and future plans for reductions go well beyond any current regulatory requirements.

2.0 Control of Discharges to the MDS

2.1 Control of Industrial Sources

2.1.1 Previous Action. MCES has administered the delegated industrial pretreatment program for the metropolitan area since the early 1970’s, including establishing limits, permitting, monitoring and inspection of dischargers to the Metropolitan Disposal System (MDS). We received delegation for the program from the MPCA in 1983. MCES has over 800 different companies on permit throughout the metropolitan area, with 300 of those being significant industrial users (categorical dischargers) (2000). In addition to permitting industrial dischargers, MCES has permitted all area hospitals since the early 1980’s and requires each hospital to have a mercury reduction plan in place. Furthermore, pollution prevention and mercury reduction opportunities are regularly highlighted as part of the annual inspections of significant industrial users.

From 1990 through 1994 MCES conducted a collection system evaluation of the interceptors tributary to the Metropolitan Wastewater Treatment Plant (Metro Plant). The evaluation consisted of sampling major lines to try to find “hotspots” of mercury, PCBs and pesticides. With one exception, the results of this comprehensive 4-year effort did not identify any additional sources of mercury to be permitted and controlled or any historic loading or hotspot. However, it did lead us to identify the University of Minnesota Hospitals as a source

that needed additional control. As a result, MCES placed additional conditions in that hospital's industrial discharge permit.

2.1.2 Current Activity. Every five years, as part of the pretreatment program, MCES reviews the discharge limitations, including mercury, that it places on the users of the MDS. Based on the results of the evaluation, the limits that dischargers to the MDS are required to meet may need to be changed. The last review occurred in 1996, and resulted in a lowering of the mercury limit for users from 100 micrograms per liter ($\mu\text{g/l}$) to 2 $\mu\text{g/l}$. MCES is currently conducting this evaluation as part of the pretreatment program requirements and is scheduled to complete the study by September 30, 2001.

2.1.3 VMRA Commitment: MCES will complete evaluation of its local limit for mercury by September 30, 2001.

2.2 Evaluation of Dental Discharges

2.2.1 Previous Action and Current Activity. MCES has conducted surveys of other sectors, including dental clinics, to assess their potential for discharge of mercury and other pollutants. Results from the dental clinic survey lead to the submission of a monograph published by the Water Environment Federation titled "Controlling Dental Facility Discharges in Wastewater – How to Develop and Administer a Source Control Program" (1999). That case study, presenting the survey information gathered in 1995-96, estimated mercury contributions to the collection system from dental clinics to represent 76-80 percent of the total mercury discharged. As a result, in January 1998, the MCES entered into a partnership with the Minnesota Dental Association (MDA) to further evaluate the contributions of mercury from the dental community and to test advanced amalgam removal equipment. MCES, in conjunction with MDA, has designed and implemented two extensive studies to achieve this objective.

2.2.2 Amalgam Removal Equipment Evaluation

The first study is designed to evaluate the removal efficiency and associated costs of a variety of amalgam removal equipment and to quantify clinic loadings. There is very little data available nationally regarding the efficiency of these units, nor is there a quantification of the amount of mercury that these types of units remove. The ultimate objective of the evaluation is to give the information to dentists so that they can make informed choices about the best removal equipment for their type of clinic setting.

MCES developed analytical methods for quantification of mercury in the removed amalgam. Two types of units were pilot tested in three clinics in 1999. The pilot testing allowed us to better understand the problems of installation of this type of equipment in dental offices and the procedures necessary for their proper operation. In-clinic testing of three additional types of amalgam filters and separators was completed in October 2000 at four other clinics. The data from the in-clinic testing, including removal efficiency and operating costs of the different units, will be evaluated, with project completion scheduled for approximately March 2001.

2.2.3. Community-wide Study

The second study is referred to as the “community-wide study.” The purpose of the community-wide study is four-fold: 1) collect virtually all dental amalgam waste in the area tributary to the Cottage Grove and Hastings WWTPs, 2) to quantify the mercury removed by the equipment at the clinics, 3) to evaluate whether the mercury removed results in a measured reduction of mercury at the two WWTPs, and 4) to determine relative contributions of mercury from dental activities to WWTPs. All dental offices and clinics in the service areas have been identified and arrangements are being made to install equipment in all of them. We anticipate completing the clinic portion of this study by April 2001, with data analysis concluding by approximately June 2001.

2.2.4 VMRA Commitment. Complete the two studies in 2.2.2 and 2.2.3 and develop future programs related to control of mercury from the discharge of dental amalgam based on the results of these evaluations.

2.3 Evaluation of Domestic Sources of Mercury

2.3.1 Previous Action. MCES is a member of the Association of Metropolitan Sewerage Agencies (AMSA.) This national trade organization conducts much of its work through the use of committees, task forces and workgroups. Due to our concerns about mercury contributions to our facilities, MCES helped establish the AMSA Mercury Workgroup in July 1998. The initial task of the workgroup was to develop data and information about mercury discharges to publicly owned treatment works (POTWs) in order to develop effective control programs. Part of that work has resulted in the preparation of a report titled “Evaluation of Domestic Sources of Mercury for the AMSA Mercury Workgroup” (August 2000). The evaluation found significant contributions of mercury from domestic-only wastewater. In addition to quantifying the mercury concentrations in household products and estimating contributions to POTWs, the evaluation identifies that a significant portion (approximately 82%) of the total domestic mercury load is attributable to excreted dental amalgam mercury (due to in-place amalgam). MCES participated in providing data for this report by conducting monitoring of part of its collection system known to receive only domestic wastewater.

2.3.2 VMRA Commitment: MCES will continue to participate in the AMSA Mercury Work Group in order to share data and information nationally.

3.0 Policy-Related Actions

3.1 Mercury Reduction Strategy

3.1.1 Previous Action and Current Activity. The Council adopted a Mercury Reduction Strategy in April 1998. This strategy guides staff implementation activities and actions and is a demonstration of the Council’s commitment to mercury reduction. In addition to the efforts that are conducted as part of controlling discharges to the MDS, the strategy is intended to be implemented through a variety of approaches such as education,

pollution prevention, research, monitoring and technology-based controls. This strategy is intended to go beyond the substantial reductions already achieved through the control of industrial and other dischargers to the MDS and to go beyond the current regulatory requirements for owners and operators of WWTPs.

3.2 Minnesota Mercury Contamination Reduction Initiative

3.2.2 Previous Action and Current Activity. MCES actively participated in the Minnesota Mercury Contamination Reduction Initiative and Advisory Council. The Advisory Council evaluated mercury reduction options across all sectors. In addition, the report of the Advisory Council identified and recommended activities that the Minnesota Pollution Control Agency (MPCA) and the Minnesota Office of Environmental Assistance (MOEA) should conduct, including educational outreach activities and product bans.

3.2.3 VMRA Commitment: If the MPCA or MOEA develop a legislative program to seek bans of mercury containing products or conduct other such efforts to achieve product bans, the Council will discuss with MPCA or MOEA how best to support such efforts.

3.3 Mercury Dental Insurance Policy

3.3.1 Current Action. Given the estimated contribution of excreted dental amalgam mercury that was found in the AMSA Evaluation noted in item 2.3.1 above, the Council has taken action to change its dental insurance policies for its own employees to encourage the use of mercury-free posterior restorations (dental cavity fillings). Previous dental policies were negotiated to allow employees and dependents to select mercury-free composites, but would only cover up to the cost of a mercury amalgam filling. Since the mercury-free composite is significantly more expensive, there is a financial disincentive for employees and their dependents to select the mercury-free alternative.

3.3.2 VMRA Commitment: Effective with the new contract beginning January 1, 2001, the Council policy will remove this cost disincentive. The increased cost incurred by the Council is currently estimated to be approximately \$8,000 per year for approximately 8000 employees and their dependents.

3.4 Grant Programs

3.4.1 Nonpoint Source Grant Program

3.4.1.1 Previous Action. By MPCA estimates, 1-2 percent of the mercury in surface waters statewide is from direct point source dischargers. The rest of the mercury comes from either direct atmospheric deposition to the surface water or from atmospheric deposition to land and subsequent runoff to the surface water. Results from a cooperative MPCA/MCES study indicates that as much as 90,000 grams per year makes its way into the Mississippi River from nonpoint source pollution (NPS) runoff and settles out in the sediment of Lake Pepin. That is one of the reasons MCES has committed \$7.5 million over the five-year period to a grant program to reduce NPS runoff.

3.4.1.2 VMRA Commitment: Continue the NPS Grant Program through 2003.

3.4.2 Infiltration and Inflow Reduction Grant Program

3.4.2.1 Previous Action. Infiltration and Inflow (I/I) has been identified as another potential source of mercury in sanitary sewer collection systems, because of the mercury found to be present in groundwater (infiltration) and stormwater inflow. The MCES has had an ongoing program to remove I/I from our own collection system for many years. In addition, MCES initiated a grant program for local communities to address I/I beginning in 1993. Under four separate offerings, the MCES has offered financial assistance to communities to identify, locate and remove sources of I/I within local sanitary sewer collection systems. Each of the four financial assistance programs required a matching dollar share to come from the recipient community.

However, beginning with the 1996 offering, the program was expanded to offer matching dollar loans to communities to carry out capital improvements to physically remove targeted I/I from the system. Each loan had a provision in which, if the community could certify that the targeted I/I had not returned to the system, the annual repayment of the loan would be forgiven. The certification period for each loan project was 5 years in duration.

Overall, the MCES has expended a total of \$1.375 million to-date to target I/I removal from local collection systems. The total amount of I/I removed from the system is approximately 800 million gallons per year. This figure does not include those projects that local communities initiated without aid of MCES financial assistance. It is unlikely that the Council would conduct another offering after the one in 2000, since most local needs have been met.

4.0 External Pollution Prevention

4.0.1 Previous Action and Current Activity. A key part of our pretreatment program includes periodically providing information to the regulated community regarding potential sources of mercury in their facilities and processes and encouraging mercury elimination to avoid discharge to the collection system. For example, we are aware that mercury can contaminate a variety of industrial chemicals such as acids and caustics and have communicated this and other information to industrial users.

In addition, staff write up case study information on “lessons learned”, as sources of mercury are identified and dealt with. This is done to help internal staff and outside industries that are looking to find and reduce sources of mercury being discharged to the MDS.

MCES staff take every opportunity to communicate with our customers about various environmental issues and the impacts they may have on our facilities, operations and wastewater rates. We do this through a variety of communication methods including printed information to communities and industrial users, information posted on our website (www.metrocouncil.org),

and when we make presentations or speeches to our customer communities, industry and other interest groups. These types of communications have the expressed purpose of educating people about potential mercury sources and reduction options.

MCES has participated in the preparation of mercury reduction materials by others. For example, MCES staff served on a 25-member advisory committee to assist the Western Lake Superior Sanitary District (WLSSD) in the development of the document titled “Blueprint for Mercury Elimination” (March 1997).

4.0.2 VMRA Commitment: Continue outreach programs.

5.0 Internal Pollution Prevention

5.1 Facility Inventory

5.1.1 Previous Action. MCES has inventoried the mercury containing devices at our facilities and has prioritized replacement with non-mercury containing items as appropriate. Removed mercury switches and other mercury-containing devices have been recycled. Some staff also conduct demolition activities at our facilities. These staff have been informed that all mercury-containing devices must be removed and recycled prior to demolition.

5.1.2 VMRA Commitment: MCES will record the type and number of devices removed from service.

5.2 Contract Specifications

5.2.1 Previous Action. MCES has experimented with contract language in capital projects that restricts the use of mercury-containing devices. For example, the South Washington County Wastewater Treatment Plant Request for Proposals (RFP) contained a prohibition on mercury containing devices except with MCES approval. Types of devices that would be allowed include fluorescent and ultraviolet lamps because they can be recycled.

5.2.2 VMRA Commitment: MCES will continue to consider ways to recover mercury in use as a part of demolition projects and/or reduce the use of mercury in new capital projects as appropriate on a case-by-case basis.

5.3 Product Substitution

5.3.1 Laboratory Thermometers

5.3.1.1 Previous Action. MCES has eliminated the use of mercury-containing thermometers in our laboratory and in the wastewater sample refrigerators at the WWTPs. In addition, where possible, we have eliminated or reduced the frequency of use of some analytical methods because they contain mercury. For example, we have requested the elimination of NPDES permit requirements to analyze effluent samples for total Kjeldahl nitrogen, since the reagent contains mercury.

5.3.2 Mercury Fever Thermometer Exchange

5.3.2.1 Previous Action. In September 2000, as part of Pollution Prevention Week, MCES conducted a pilot mercury fever thermometer exchange for approximately 120 employees in the Environmental Planning and Evaluation Department. For each mercury-containing thermometer that was brought in, employees were given a mercury-free digital thermometer at no cost to the employee. Each digital thermometer costs \$3.29. During this pilot period, 66 mercury fever thermometers were collected for recycling.

5.3.2.2 VMRA Commitment: In 2000 and 2001, MCES will extend the exchange program to all MCES employees, as well as those in Regional Administration. This would expand the program to approximately 1235 more staff.

5.4 Research and Development (R & D)

5.4.1 Ultra-trace Mercury Analytical Capability

5.4.1.1 Previous Action. MCES has had extensive involvement in the development of ultra-trace mercury analytical capabilities beginning in 1991, and started up a clean R&D laboratory to perform work and conduct research projects beginning in 1993. Samples have been analyzed for others who have been interested in obtaining ultra-trace mercury analytical information. MCES performed all mercury sampling and analysis functions for Western Lake Superior Sanitary District's Mercury Zero Discharge Project, in addition to their effluent monitoring conducted in 1997 and 1998.

5.4.2 Metro Plant Mass Balance

5.4.2.1 Previous Action. In 1994, we performed a comprehensive mercury mass balance at Metropolitan Wastewater Treatment Plant, characterizing mercury in all major plant process streams. Results of this work were peer reviewed and published in *Water, Air and Soil Pollution*. To our knowledge, this is the first mass balance study voluntarily conducted at a municipal or industrial facility in Minnesota.

5.4.3 Water Quality Monitoring

5.4.3.1 Previous Action and Current Activity. Beginning in 1994, we initiated river water quality characterization. This work includes characterization of the mercury concentrations in the St. Croix, Minnesota and Mississippi Rivers and selected tributaries. The results from four different studies have been published in professional, peer-reviewed journals.

A mercury nonpoint source study of six streams in the Minnesota River basin has been conducted. In addition, MCES studied historical inputs of mercury and methyl mercury to 55 lakes in Minnesota (with MPCA and the Science Museum of Minnesota) and conducted two studies, in association with other agencies, that characterized mercury in snowmelt runoff from agricultural fields and mercury in snowmelt runoff in 12 rivers and streams.

In 1998, we received an Interagency Monitoring Grant, in association with the MPCA, to further evaluate mercury from nonpoint sources on the Minnesota River. The grant award of

\$300,000 over 2 years has allowed us to establish six monitoring sites on rivers and streams in the Mankato area to characterize mercury and methyl mercury concentrations and loadings. This important work has helped us to establish a strong correlation between total suspended solids (TSS) from sediment, turbidity and mercury concentrations.

5.4.3.2 VMRA Commitment: We intend to continue this monitoring and research, contingent on continued grant funding, in order to better understand the implications for downstream water resources.

5.4.4 Aquatic Life Monitoring

5.4.4.1 Previous Action. The impact of mercury on aquatic life is important to us as well. In 1996 we completed a research study of mercury and methyl mercury uptake by zebra mussels in the Mississippi River, with the results published in a professional peer reviewed journal.

5.4.5 Drinking Water Testing

5.4.5.1 Previous Action. In 2000 we characterized mercury concentrations in drinking water of two metropolitan area cities and found mercury to be present in very low concentrations of 1 nanogram per liter or less in the 8 sites that were surveyed.

5.5 Production Laboratory with Low-level Mercury Analytical Capability

5.5.1 Previous Action. MCES investigation of a low-level analytical method for use in a production laboratory setting began in 1990. That investigation concluded in 1993, when it was determined that without a clean room in which to conduct the analyses, a production-oriented method was not possible at MCES' facilities. The R&D method noted in item 5.4.1 above can only process a very limited number of samples and is not practical to use on a permanent-ongoing basis for routine analytical work.

In May 2000, MCES completed construction of a new production-oriented laboratory facility that is designed with a clean room. The clean room was designed for low-level analytical methods to be conducted. It is anticipated that the laboratory will become certified by the Minnesota Department of Health (MDH) in the first quarter of 2001 to conduct low-level analysis for NPDES permits, making it one of a handful of laboratories nationwide that is certified by MDH to conduct such analysis.

5.5.2 VMRA Commitment: MCES intends to obtain MDH certification for low-level methods and offer this service to others beginning in summer 2001.

6.0 Technology-based Controls

6.1 Liquid Treatment

6.1.1 Previous Action. MCES has evaluated the cost and effectiveness of technology-based controls for mercury removal from municipal wastewater effluents at the Cottage Grove/South Washington County Wastewater Treatment Plant and as part of the

Rosemount Wastewater Treatment Plant Interim Improvements. The evaluation found that the analytical method for measuring low concentrations of mercury (in the single digit parts per trillion range) is so new that there is virtually no experience nationwide in assessing the effectiveness of these technologies in treating down to such levels. In addition, the evaluation found that it is not cost effective to provide technology –based controls for end of pipe removal of mercury from these types of effluents, particularly on a cost per pound removed basis. This result corresponds to findings by Western Lake Superior Sanitary District and MPCA.

6.2 Energy Efficiency

6.2.1 Previous Action. MCES is a MnGREAT! Award Recipient for 2000.

The award recognizes the Metro Plant for innovations in energy recovery and wastewater handling technology. The Metro Plant has a nominal capacity of 250 million gallons per day. MCES converted the secondary wastewater treatment tanks’ air-delivery system to fine-bubble diffusion, doubling the oxygen transfer rate and dramatically decreasing the power required for the air compressors. The plant recovers energy from the incineration of the solids removed from the wastewater and uses it to heat the plant, run pumps and fans, and treat the solids. Projected cost savings from these two innovations are nearly \$3 million annually, and the combined annual energy savings are 25 percent since 1996. This can be converted to 8,130 tons of coal not being burned to generate electricity. The energy savings prevent 173 tons of nitrous oxides, 512 tons of sulfur oxides, 58,500 tons of carbon dioxide and 1.04 pounds of mercury in air emissions per year.

6.3 Air Emissions Control

6.3.1 Previous Action and Current Activity. The Metro Plant processes the solids removed from the treated wastewater through combustion in six multiple hearth incinerators. Each incinerator has an associated air pollution control (“APC”) system which treats the exhaust gases from the combustion process. The existing APC systems are primarily composed of wet scrubber units. Because water from these scrubbers is recycled back into the plant, higher mercury concentrations are found in the solids than there would be without these recycle streams. When the solids are subsequently incinerated, this negates the incidental removal efficiency of the wet scrubber units.

The Council has initiated the Metro Solids Processing Improvements Project to replace the aging multiple hearth incinerators and APC systems with new combustion technology (fluidized bed incinerators) and accompanying APC systems. Procurement of these new systems began in early 2000. The Council awarded a contract for design and construction of the fluidized bed incinerators and accompanying APC systems at its December 13, 2000 meeting. Issuance of the notice to proceed is dependent on the issuance of the air emissions permit amendment. Operation of the new facilities is scheduled to begin in 2005.

Technology to achieve mercury removal from combustion exhaust gases at sewage sludge incineration (“SSI”) facilities is still being researched and developed. There is no known SSI facility in North America that has an APC system specifically designed to achieve mercury

removal. Technology used in other industries to remove mercury from exhaust gases has not yet been demonstrated as effective in SSI facilities.

6.3.2 VMRA Commitment: The Council will provide in the new APC systems the capability to treat exhaust gases with carbon which is expected to achieve a goal of reducing mercury in air emissions by approximately 70% from current emission estimates (1997). The cost for the carbon injection technology and the enhanced particulate removal technology, which are integral to enhanced mercury removal, is approximately \$5.7 million. Once installed, MCES will operate the system.

6.3.3 VMRA Commitment: MCES will conduct quarterly stack testing of the new APC systems to determine the amount of mercury in the stack exhaust gases. This testing will be conducted for three years following the installation and operation of the new APC systems.

7.0 Mercury Reductions Achieved

The previous actions noted above and other efforts to control sources of mercury discharged to the MDS have resulted in a reduction of mercury concentrations in Metro Plant sewage sludge from approximately 3.0 milligrams per kilogram (mg/kg) in 1990 to 1.25 mg/kg in 1999. Where other data is available, similar reductions in mercury concentrations in sludges have been noted at our other facilities.

8.0 VMRA Administration

8.1 Primary Contact

All significant communications regarding the content of this VMRA shall be directed to: Rebecca J. Flood, Manager, Environmental Compliance Section, MCES

8.2 Annual Reporting

The Council will provide an annual report on the progress under the VMRA by March 1 of each year for the preceding calendar year.