

**MINNESOTA POWER MERCURY VOLUNTARY AGREEMENT
SUBMITTED TO THE MPCA
JULY 6, 2000**

1.0 Introduction

Minnesota Power (MP) supports the Minnesota Mercury Contamination Reduction Initiative and the Advisory Council recommendations that culminated from that effort. For years, MP has had an active mercury reduction program. MP submits this Voluntary Agreement to the Minnesota Pollution Control Agency (MPCA) that outlines our commitment to explore additional opportunities to further reduce mercury. The programs and schedule outlined in this Voluntary Agreement will be modified as warranted, as new information becomes available. Based on successful completion of all Voluntary Agreement programs described herein, MP estimates a mercury emissions reduction of approximately 10 percent in year 2000 as compared to 1990 emission estimates. This reduction estimate may be high or low depending on unforeseen changes in operating scenarios and/or reduction accounting mechanisms for some of these programs.

2.0 MP Previous and Ongoing Activities Relevant to the Mercury Issue

MP has been and continues to be actively involved in trying to develop solutions to the mercury issue. Summarized below are some previous and ongoing mercury-related activities.

- MP volunteered - and was selected to participate in - the Electric Utility Study mandated by the Federal Clean Air Act of 1990. Boswell Unit 2 was chosen along with seven other units nationwide to participate in this comprehensive assessment of power plant emissions of air toxics, including mercury. Testing was completed in 1993, and the results provided to the MPCA.
- MP has voluntarily tested emissions and fuel from Boswell Units 3 and 4 in 1994 for air toxics, including mercury. The data have been provided to the MPCA.
- MP co-sponsored a major study by the University of North Dakota Energy and Environmental Research Center (EERC) in 1995 assessing the effectiveness of various mitigation techniques on the reduction of air toxics emissions due to coal combustion. The study indicated limited success in reducing mercury emissions from sub-bituminous coal, using various sorbents. Testing was conducted at the pilot scale level.
- MP has conducted water quality studies in our hydroelectric reservoirs as part of a process to relicense our St. Louis River Project. These studies included mercury analysis of game fish for the Minnesota Department of Health fish consumption advisory and mercury analysis in yearling perch, water and sediments. MP continues

to conduct voluntary fish mercury analysis in conjunction with the Minnesota Department of Natural Resources. MP is actively involved in programs established to address St. Louis River water quality issues, including the Lake Superior Binational Program and the Total Maximum Daily Load (TMDL) development process.

- MP has in place a fluorescent bulb recycling program for our customers. Coupons are provided towards the cost of recycling to encourage customers to recycle their bulbs. Also, a network of hardware stores in our service territory has been established where coupons may be redeemed when used bulbs are brought in. MP routinely advertises the availability of the coupons and location of participating stores in our customer newsletter.
- MP has in place a mercury waste recycling program. All used MP batteries, fluorescent bulbs and other mercury-containing items are being recycled at licensed recycling facilities. MP has also implemented a purchase policy where items containing mercury can not be purchased if suitable substitutes exist.

3.0 Mercury Reductions That Have Occurred Since 1990 Due to MP Activities

Minnesota Power has implemented programs that have resulted in mercury release reductions, directly or indirectly. These programs are described below.

3.1 Mercury Emission Reductions Associated with Energy Use and Production

MP has undertaken several programs associated with energy use and production over the years that have the added benefit of reducing or offsetting mercury releases. Some of these programs are described below.

3.1.1 Demand Side Management, Conservation and Efficiency Improvements

MP initiated a Demand Side Management (DSM), Conservation Improvement Program in the early 1980's. Customer conservation improvement efforts include activities such as space heating, high efficiency lighting, process control, and energy auditing. The process efficiency improvement program is targeted to serve the needs of our industrial customers. MP has also implemented internal conservation measures to reduce our own electric usage.

The benefits of conservation improvements are included in the Minnesota Power load forecast, since it is anticipated that reducing customer electricity use will result in decreased electricity generation. Decreased generation due to implementation of the MP conservation improvement program, in turn, results in a reduction in mercury emissions.

The benefits of industrial process efficiency improvements are both direct and indirect. Direct reductions in emissions are achieved as a result of less customer energy use per unit of production. However, it is anticipated that reducing the unit cost of production for our industrial customers may also result in increased production. In this case, the

customer would acquire additional market share, displacing less efficient suppliers. The indirect impact from efficiency improvement might be the reduced emissions from less efficient suppliers that lose market share.

3.1.2 Expanded Use of Renewable Biomass

MP operates the M. L. Hibbard/Duluth Steam District No. 2 steam plant for the City of Duluth. The facility provides process steam to a paper mill and a recycled fiber plant. Acceptable fuels at the facility include coal, natural gas and wood waste. The plant has sought to maximize use of renewable waste wood as a fuel since 1991, expending additional capital to increase the wood handling capability. Also, MP has actively sought out waste wood suppliers from throughout the region to provide fuel for the facility, including chipped railroad ties. Because of these efforts, coal usage has decreased annually since 1990, while total energy output has increased. These efforts have resulted in a reduction in mercury emissions by over four pounds per year since 1995 compared to 1990 levels.

3.1.3 Generation of Electricity at Hibbard

In addition to the mercury reductions identified previously, since 1996 Hibbard also generates electricity at those times that it makes economical sense. The high proportion of wood waste burned at the facility results in significantly lower mercury emissions from Hibbard generation compared to coal-fired only generation alternatives.

3.1.4 Expanded Generation from Existing Hydro Electric Resources

In 1991, Unit 1 at our Thomson Hydroelectric station was converted from 25 cycle to 60 cycle operation, which allowed an additional 5 MW of generation. At least a portion of the energy displaced by the additional generation would likely have come from mercury-emitting sources.

3.1.5 Heat Rate Improvements, Boswell Energy Center

A heat rate improvement team was formed in late 1993 at the Boswell Energy Center to identify and implement means by which the four Boswell units can generate more efficiently, serving to reduce emissions along with plant fuel usage and operating costs. Viable options identified were implemented in 1993, which improved the heat rate for the units. Improved heat rate results in more electricity generated per unit of coal, resulting in reduced emissions of mercury per unit of electricity generated.

3.1.6 Use of Lower Mercury Coal

MP has for many years used western, sub-bituminous Powder River Basin coal that, based on substantial coal mercury analysis data, is below the national average in mercury content. In addition, in 1996 MP began using a coal as a portion of its total coal supply that recent test data shows is significantly lower in mercury content than other coals that burned.

As a result, MP burns coal with an uncontrolled emission rate that is approximately half of the national average, based on the recently completed EPA Information Collection Request. In addition, MP achieves additional reduction in mercury emissions by existing pollution control equipment.

3.1.7 Mud Lake Substation – Reduced Transmission Losses

MP installed the Mud Lake 230/115 substation in September of 1996. This installation improved load flow in the regional transmission system, resulting in reduced energy losses. The reduced energy loss potentially offsets energy production from mercury emitting sources.

3.1.8 Summary of Mercury Emission Reductions Associated with Energy Use and Production

To summarize, based on the activities described above, MP has reduced or offset mercury emissions due to energy production annually since 1990. It is difficult to accurately calculate the amount of mercury reduced or offset. The amount depends, for example, on whether the generation that is offset would have come from mercury emitting sources, and what their emission rates are for mercury. Based on the simplifying assumption that the offset generation would have been from our own energy mix, mercury emission reductions due to the activities described previously would be as high as 50 pounds annually.

In addition to the activities described above, MP has recently announced two efforts that will likely offset coal-based generation in the future. One is our green power offering for our customers. Those that elect the green power option will be buying wind power generated electricity. The other effort is the planned construction of additional natural gas-fired generation capacity in Superior, Wisconsin.

4.0 Mercury Emission Reductions Associated with Product Use Changes and Waste Management Activities

MP has since before 1990 recycled mercury and mercury-containing devices and chemicals. During the period from 1990 to 1999, MP has sent to recyclers approximately 600 pounds of bulk mercury. MP has also recycled approximately 3000 pounds of materials, such as thermometers, switches, batteries, and chemicals, which contained mercury. In addition, MP recycles approximately 10,000 fluorescent bulbs each year.

5.0 Proposed Voluntary Agreement Activities

MP will focus on the following activities over the next year or so as part of the Voluntary Agreement to reduce or work towards reducing mercury releases. In addition, MP will continue to evaluate other options.

5.1 Efforts to Address Stack Mercury Emissions

Efforts that MP will undertake over the next year to address stack emissions of mercury are summarized below.

5.1.1 Increase Utilization of Lower Mercury Coal

MP has determined through routine coal mercury analyses that one of the coals we currently burn in our boilers is consistently lower in mercury than the other coals. We have increased the amount of coal that we purchase from that coal supplier by approximately two-and-a-half times beginning in the year 2000. Use of this coal has already affected mercury emission rates. Testing which has just been completed verifies that mercury emission rates from all units at our Boswell Energy Center are lower than measured in 1993 and 1994.

Progress Measurement: Emission factors developed during the recent testing at the Boswell Energy Center (see 5.1.4 below) are representative of the new coal mix. Progress towards reducing mercury is measured by the relationship between the lower emission rates associated with the current coal blend, compared to the emission rates measured in 1993 and 1994 under the old operating regime. However, actual annual emissions are also related to the amount of coal consumed during the year, so it is difficult to predict the actual reductions that will occur in 2000 compared to 1990 emissions. Year 2000 actual emissions will be calculated in early 2001 and compared to 1990 levels.

5.1.2 Routine Coal Mercury Monitoring

MP will continue to monitor coal mercury content on a routine basis to determine if there are any changes in coal mercury content over time from the various suppliers. This information will prove useful in developing accurate mercury inventory information, and aid in future decisions on coal procurement. The current schedule for mercury in coal analyses is to analyze 2 samples from each coal supplier on a quarterly basis. This sampling frequency may change based on the variability of the results.

Progress Measurement: Success of this program will be measured by successful completion of the analyses as described above. The results of the analyses may in the future be useful as one component of coal procurement decisions.

5.1.3 Control Technology Research

MP has in the past conducted control technology research as a funding member of the Air Toxics Control Target of the Electric Power Research Institute (EPRI). As described previously, MP also co-funded a study by the EERC on mercury mitigation technology. In the year 2000, MP has significantly increased our commitment to this type of research. MP continues to fund the Air Toxics Control and Air Toxics Health Risk targets of EPRI.

In addition, MP will conduct control technology studies specifically on some of our own units. Minnesota Power will work with EPRI to assess mercury emissions from our Boswell facility and conduct control technology experiments. The study will look at various control options using a slipstream of flue gas. The effort will focus on Boswell Units 3 and 4, the two largest units. This study is to be conducted in 2000, with results expected in early 2001. A study design document will be submitted to the MPCA upon completion, which will provide more detail on the study, including QA/QC.

Progress Measurement: Success of this program will be measured by successful completion of the study as described above. The results of the study may in the future be used to drive future control technology research activities.

5.1.4 Characterize Mercury Emissions from Coal Combustion

MP volunteered to be a host site for a study assessing the fate of mercury in Lake Superior. The study did not receive full funding, however, portions of the study were conducted in 2000 and included characterizing the flue gas mercury speciation and the capture efficiency of existing control devices. The study was conducted on Boswell units 2, 3 and 4 in May. The results from the testing indicate that mercury emission rates are lower for all units tested than they were in 1993/1994. The final report has been submitted to the MPCA, and includes a detailed discussion on QA/QC.

Progress Measurement: Success of this program is measured by successful completion of the study as described above. The results of the study will be useful in refining the emission inventory. The results are also relevant to assessing control technology options, due to the inclusion of speciated mercury analyses.

5.2 Program Elements Related to Mercury in Products

Efforts that MP will undertake over the next year to address mercury in products are summarized below.

5.2.1 Product Use Inventory Update

In 1994, MP conducted an inventory of products that we use which contain mercury. Beginning in the latter half of 2000, MP will update that inventory starting with our two largest facilities, Boswell Energy Center and Laskin Energy Center. The inventory will be updated by a walk-through of the facility to identify items that contain mercury.

Information gathered through the inventory will be useful in developing an effective program for further phase-out of mercury-containing products. Mercury-containing products will be categorized based on the relative potential that mercury releases will occur from those products. A decision on whether to phase out a specific item and the timing of phase-out will be based on several criteria, such as the potential for actual release, the availability of reasonable mercury-free alternatives, and the cost.

Progress Measurement: Success of this program will be measured by successful completion of the product inventory as described above. The results of the inventory will be useful in developing a phase-out program of products that have a higher potential of mercury release. The inventory may also be useful for revising the MPCA mercury emission inventory for products.

5.2.2 Label Mercury-Containing Devices

One of the strategies included in the Advisory Council recommendations is to label mercury-containing devices currently in use. MP will label devices that contain mercury where feasible, to promote proper handling and disposal. The labeling will occur at the same time that the inventory is being developed. In addition to the labeling, employee awareness training will include training on the purpose of the labels, and how items that are removed are to be recycled.

Progress Measurement: Success of this program will be measured by successful completion of the product labeling as described above, as well as employee training (also see 5.2.3).

5.2.3 Update MP Purchase Policy for Mercury Products

As previously described, MP has a purchase policy where items containing mercury can not be purchased if suitable substitutes exist. Since the policy was put in place, purchasing practices at MP have been modified. In order to ensure that the policy is still effective, it will be reviewed and modified. Training will be conducted for employees on the revised purchase policy.

Progress Measurement: Successful review and modification of the purchase policy and development of a training module will measure success of this program for employees. Training will be conducted as part of the routine employee environmental training.

5.2.4 Evaluate the Purchase of Low Mercury Fluorescent Bulbs

MP will evaluate implementing a purchase policy that states that only low mercury fluorescent bulbs may be purchased. MP already purchases low mercury fluorescent bulbs at some locations within the company. Preliminary results indicate that the low mercury bulbs may have a shorter life span. An assessment will be conducted to determine if this is true. Based on the results of this analysis, a decision will be made on whether to initiate a company-wide policy to purchase only low mercury fluorescent bulbs, or to discontinue purchase of the low mercury bulbs.

Progress Measurement: Success of this program will be measured by completion of a review of the life span of low mercury fluorescent bulbs, and implementation of a company-wide fluorescent bulb purchase policy.

5.2.5 Support Customer Mercury Waste Management

MP will hold meeting(s) with relevant entities in portions of our service territory to determine whether there are gaps in the infrastructure for mercury-containing product waste management. MP will then evaluate the cost effectiveness of filling those gaps. At a minimum, MP will use the communication devices available to us (e.g., billing stuffers) to inform the public on the proper use and management of mercury-containing products. MP is currently working with the taconite companies on a joint effort in this area.

Progress Measurement: Success of this program will be measured by successful completion of a review of the needs within portions of our service territory. Based on this initial review, a plan may be developed to fill some of those needs. Also, based on the success of this program it may be expanded to other areas within our service territory.

5.2.6 Employee Mercury Thermometer Exchange

MP is evaluating a thermometer exchange program for our employees, where mercury-free thermometers are provided free of charge to those employees that bring in their mercury thermometers.

Progress Measurement: If the program moves forward, success will be measured by counting the number of thermometers exchanged and multiplying by the amount of mercury in the thermometers that is successfully recycled.

5.3 Supporting Relevant Research and Inventory Activities

Summarized below are activities that MP has committed to that will not directly result in mercury reductions. However, these activities will enhance the understanding of human health risks associated with mercury in Minnesota.

5.3.1 Co-Sponsor Fish Consumption Study

MP will support research activities relevant to the state mercury issue by co-sponsoring a fish consumption survey to be conducted by the EERC.

5.3.2 Fish Tissue Monitoring

As previously noted, MP has voluntarily conducted fish tissue monitoring over the past several years on the headwater reservoirs of the St. Louis River watershed. MP will continue to conduct the monitoring and provide the data to the Minnesota Department of Natural Resources.

6.0 Timeline for Implementation of Voluntary Agreement Components

The timeline for implementation of the Voluntary Agreement components described above is summarized in Table I. This timeline only goes out to the first quarter of 2001. During 2000, the overall program may undergo revisions based on what we learn. A formal review of the various program components will be conducted in early 2001. Based on that review, the Voluntary Agreement may be revised. Those programs that have not proven to be effective will be modified or discontinued. New program ideas will be evaluated and, if they make sense, they will be considered for addition to the program. Once this program review and modification is complete, a revised Voluntary Agreement will be submitted to the MPCA, with an implementation schedule for 2001 and beyond. At the same time, MP will submit a progress report to the MPCA that summarizes the findings to date, including estimates of mercury reductions achieved, if applicable to the specific program component. It is anticipated that the progress report would be submitted by April 1, 2001.

Table I. Timeline for Mercury Voluntary Agreement Implementation, Year 2000

Program ID	1 st Qtr 2000	2 nd Qtr 2000	3 rd Qtr 2000	4 th Qtr 2000	1 st Qtr 2001
Increase utilization of lower mercury coal	*	*	*	*	*
Routine coal mercury monitoring	*	*	*	*	*
Control technology research ¹			*		
Characterize mercury emissions from coal		*			
Product use inventory update ²				*	
Label mercury-containing devices ²				*	
Update MP purchase policy for mercury products				*	
Evaluate purchase low mercury fluorescent bulbs				*	
Support customer mercury waste management ³				*	
Employee mercury thermometer exchange				*	
Co-sponsor fish consumption study					*
Fish tissue monitoring			*		
Evaluate, revise Voluntary Agreement					*

¹ testing to be completed, final report expected early 2001

² Boswell and Laskin Energy Centers only, other MP facility inventories and labeling in 2001

³ program development finalized, implement in 2001