

Mercury Reduction Program

*Progress Report
to the
Minnesota Legislature*

January 2002



**Minnesota Pollution
Control Agency**

Table of Contents

Section 1.	Summary, Introduction and Recommendations	1
Section 2.	Human Health Risk and Fish Contamination.....	5
Section 3.	Progress Toward Meeting State Mercury-reduction Goals.....	9
Section 4.	Mercury Reduction Program Evaluation	15
Section 5.	Voluntary Agreement Program	19

Figures

Figure 1.	Statewide mercury release inventory, as understood during the discussions leading up to the 1999 legislation that set the statewide 60% and 70% reduction goals from the 1990 baseline.. ..	10
Figure 2.	Statewide mercury release inventory, as updated in this report, with statewide 60% and 70% reduction goals	11
Figure 3.	Estimated statewide mercury releases by source, for year 2000.	11
Figure 4.	Estimated mercury emissions in Minnesota associated with electrical production from coal and municipal solid waste (MSW) combustion.....	13

Appendices

Appendix A. Human Health Risk Summaries

Summary of Human Health Risks from Methylmercury Consumption
Executive Summary from Toxicological Effects of Methylmercury
“Blood and Hair Mercury Levels in Young Children and Women of Childbearing Age”
Summary of Results from Fish Consumption Survey: Minnesota and North Dakota

Appendix B. State Mercury Release Inventory, October 2001

Appendix C. Mercury Reduction Program Summary

Summary of selected Minnesota Pollution Control Agency and Office of Environmental Assistance mercury-reduction programs
Mercury research at the Minnesota Pollution Control Agency

Appendix D. Voluntary Mercury Reduction Agreements

Evaluating Voluntary Agreements
Attachment 1 to Appendix D. NEAPOL Questionnaire
Attachment 2 to Appendix D. Voluntary Agreements
Attachment 3 to Appendix D. Progress Reports
Attachment 4 to Appendix D. Further Reading on Voluntary Agreements

Section 1. Summary, Introduction and Recommendations

Report is required by the Mercury Reduction Law.

In 1999, the legislature passed Minn. Stat. § 116.915 to help reduce mercury contamination in Minnesota fish. The statute (1) sets state mercury release goals, (2) lists Minnesota Pollution Control Agency (MPCA) contamination-reduction strategies, (3) requires the MPCA to solicit voluntary reduction agreements, and (4) requires reports in 2001 and 2005. This is the 2001 report.

Problem: Eating mercury-contaminated fish may harm developing nerve systems.

Recent information reaffirms that methylmercury-contaminated fish, when eaten by children and expectant mothers, may be causing subtle but widespread neurological damage in children in the United States. In Minnesota, mercury levels in fish are starting to drop, but contamination remains widespread. Continued efforts to reduce mercury releases and to better understand other factors leading to mercury contamination in fish are needed.

State mercury releases have dropped by two-thirds since 1990; recent progress has been slower.

The MPCA estimates that mercury releases in Minnesota dropped about 68 percent between 1990 and 2000, nearing the 70 percent state reduction goal for 2005. The statewide reductions are due almost entirely to efforts taken before the 1999 legislation — specifically, banning or restricting mercury use in products such as paint and batteries in the early 1990s, as well as controls on incinerators. In large part, the percentage reductions reflect increased estimates of the 1990 baseline mercury inventory. (A dynamic research system supports emission estimates. That is why emission inventories have and will continue to change.) Emissions from most industrial sources, such as coal-fired power plants, have remained relatively constant since 1990. This report summarizes the complex, indirect relationship between mercury releases and contamination in fish, and concludes that further state release reductions are needed.

Voluntary agreements provide valuable information, but direct reductions or specific commitments are limited.

This report summarizes and evaluates state mercury-reduction programs, including voluntary agreements. The 1999 legislation did not establish clear evaluation goals or criteria for the voluntary agreements, so their success is difficult to judge definitively. Fifteen agreements are in place. Most participants have developed important new information that may lead to future reductions. However, with some notable exceptions, the agreements have produced few measurable mercury reductions or long-term reduction commitments to date.

**Recommendations:
new legislation to establish
clearer voluntary goals,
develop clearer
expectations for voluntary
agreement participants
and better linkages
between regulatory and
voluntary efforts**

The MPCA recommends new legislation to revise the overall mercury-reduction goals to recapture the spirit and intent of the 1999 legislation and develop clearer expectations and clearer benefits for voluntary agreement participants.

Revise mercury-reduction goals; continue Voluntary Agreement Program. The following recommendations are made to improve reduction goals and the Voluntary Agreement Program:

1. Future legislation should be enacted to revise the overall mercury-reduction goals to recapture the intent of the 1999 legislation. The MPCA recommends establishing a clearer goal that is not subject to revisions of the baseline inventory. The 70 percent reduction goal in the 1999 legislation translated to total statewide releases of about 2,500 pounds per year by 2005 (using the figures for the inventory estimated in 1999). Under the latest MPCA estimates, coal and taconite emissions would need to drop by 10 to 20 percent below their 1990 levels to reach the 2,500-pounds-per-year figure by 2005. Therefore, we recommend that the reduction goals for both coal and taconite emissions be set at no less than 10 percent below their 1990 levels by 2005.
2. Continue the voluntary agreement program until at least October 15, 2005, when the program will be reevaluated in light of federal regulatory developments in both air and water. Annual progress reports and public presentations by participants will continue.

Develop clearer expectations. Based on program results to date and the results of other voluntary agreement programs in Europe and Canada, specific, measurable targets are a prerequisite to a successful nonregulatory effort. Therefore:

3. By October 31, 2002, the MPCA will develop standardized measurement, verification and reporting protocols, based on available information, for the voluntary agreements.
4. By December 31, 2002, the MPCA will develop voluntary targets for each relevant sector and for each facility that releases more than 50 pounds of mercury per year. Reduction efforts will consider several factors, including the environmental significance of the sector or facility, the availability of technology, and economics. The MPCA recommends that future legislation reference the sector- and facility-specific goals.

Develop a coordinated regulatory and voluntary mercury-reduction program. To develop clearer

benefits for participants, including better permitting predictability, the following efforts are recommended:

5. For coal-fired power plants and taconite-processing firms, the MPCA will work with the U.S. Environmental Protection Agency (EPA) and other states to advocate for federal recognition of early reductions. The MPCA's efforts will include exploring the establishment of systems that will satisfy federal authorities' concerns that local emission reductions are "surplus, quantifiable, enforceable and permanent." As part of this, the MPCA will investigate establishing a state registry for emission reductions (including funding options for maintaining such a registry).
6. For municipalities and industries that discharge wastewater to impaired waters, the MPCA will advocate for federal recognition of reductions. Depending on future federal total maximum daily load (TMDL) policy, this may become part of future Minnesota TMDL implementation.

The following recommendations are made to improve the general Mercury Reduction Program:

1. Improve public communication and coordination efforts, and improve access to mercury-reduction best practices information for sources. This can be achieved, in cooperation with the EPA and other partners, through the expanded, Internet-based Great Lakes Mercury pilot project.
 2. Participate with the Environmental Council of States to encourage the EPA to better coordinate the many federal programs and forums that are in place to address various aspects of the mercury problem.
 3. Participate actively in federal efforts to regulate mercury emissions from coal-fired power plants, with a preference for allowing flexibility and trading if structured to protect local impacts.
 4. Continue evaluation and potential use of a generic, statewide TMDL for mercury as a vehicle for developing a more coherent framework of specific expectations and reduction schedules for all state mercury sources.
 5. Collaborate with the Department of Commerce and the Public Utilities Commission to actively support and advocate for energy conservation and construction of energy sources that do not emit mercury.
-

Section 2. Human Health Risk and Fish Contamination

This section outlines health risks, appropriateness of state reduction goals.

This section summarizes the following four topics:

- health risks of eating mercury-contaminated fish;
 - mercury contamination and deposition trends;
 - the relationship between statewide releases and fish contamination; and
 - appropriateness of statewide reduction goals.
-

**The problem:
Mercury, a potent nerve toxin, accumulates in fish.**

Mercury is a naturally occurring metal that is also a potent nerve toxin. Human exposure occurs through two main routes:

- by breathing elemental mercury vapors, and
- by eating methylmercury-contaminated fish.

Breathing too much elemental mercury — the kind used in some thermometers and switches — can cause lung damage, nausea, skin damage, permanent nerve damage and even death under certain circumstances.

More commonly, low-level human exposure occurs through eating mercury-contaminated fish. Small amounts of mercury in lakes and rivers are transformed into methylmercury, primarily by bacteria. Methylmercury then accumulates up the aquatic food chain to reach high levels in fish and fish-eating wildlife. Predatory fish — bass, walleye and northern pike — tend to have the highest concentrations of mercury because they are at the top of the food chain.

Methylmercury may cause widespread, subtle developmental damage in children.

In 2000, the National Academy of Science's National Research Council (NRC) published a report that evaluated several epidemiological studies on the human health impacts of eating methylmercury-contaminated fish. The NRC report indicates that few adults eat enough contaminated fish to be at direct risk of mercury poisoning. Mercury, however, selectively harms developing nervous systems. The NRC report reinforced previous conclusions that low-level methylmercury exposure through fish consumption may be causing subtle, but widespread, neurological damage in fetuses and young children. Communities that rely on fishing for a large part of their diet have had to reduce their fish consumption because of mercury contamination.

Federal study shows elevated methylmercury levels in 10 percent of U.S. women.

Another study recently released by the Centers for Disease Control (CDC), titled the National Health and Nutrition Examination Survey (NHANES), indicates that 10 percent of their sample of women of childbearing age had been exposed to levels of methylmercury close to that suspected of causing adverse effects. Using this information and the number of births registered in the United States in 1998, the U.S. Environmental Protection Agency (EPA) has estimated that as many as 400,000 newborns are at risk of elevated methylmercury exposure. Methylmercury exposure levels estimated in a recent study of fish consumption in Minnesota and North Dakota (Energy and Environmental Research Center, 2001) support the results of the CDC's NHANES study.

Mercury contamination of fish in selected lakes has dropped about 12 percent since 1990, but contamination is still widespread.

Methylmercury concentrations in Minnesota fish appear to be declining, but gradually. In lakes for which the MPCA has three or more years of data, methylmercury concentrations in fish have, on average, declined about 12 percent over the last 10 years. However, this subset of lakes may not be representative of all lakes statewide.

Despite substantial reductions in mercury releases over the last 20 years (described below), the fish in many lakes and rivers remain contaminated with methylmercury. The Minnesota Department of Health continues to publish annual fish consumption advisories on how often various types of fish from Minnesota water bodies may be safely eaten. Parents and expecting parents should be particularly careful to monitor the frequency and type of fish that they and their children eat.

In addition, negative developmental effects due to methylmercury on loons and other fish-eating wildlife have been documented in some parts of North America.

Deposition rates show some decreases, some increases.

The amount of mercury entering our lakes can be estimated by (a) measuring the mercury that accumulates in sediment layers on lake bottoms or (b) direct measurements of the mercury falling in rain and dry particles. Sediment coring studies indicate that mercury deposition in Minnesota has declined since the 1970s in some areas, but has not declined in others. More recent (since 1990) measurements of the mercury in rainfall, show slight increases or slight decreases, depending on location and data analysis technique used.

Seventy to 90 percent of mercury comes from air pollution sources located outside the state.

For a variety of complex reasons, there is not a direct relationship between (1) state mercury releases, (2) the level of mercury entering our lakes, and (3) the concentration of methylmercury in fish.

In most areas of Minnesota, up to 90 percent of the mercury entering our waters comes from a wide variety of natural and man-made air pollution sources located throughout North America and the rest of the world. When it is washed out of the atmosphere, this airborne mercury falls on or near our lakes.

Conversely, most of the mercury from our air emission sources tends to be transported outside the state. Some in-state mercury releases, such as mercury in wastewater discharges and certain air emissions that tend to fall near their source, do affect Minnesota waters more directly. However, releases from most of these sources have been reduced substantially in Minnesota since 1990.

Contamination of fish depends on mercury inputs, other factors.

Surprisingly, some of our most pristine lakes contain our most contaminated fish. But fish from nearby lakes with similar mercury inputs can have lower methylmercury levels. This is because the pathways between mercury releases and fish contamination are complex and vary between water bodies. Fish mercury levels depend not only on mercury loading from the atmosphere and watershed but also on such factors as the fish population and the rate at which the mercury is converted into methylmercury (which in turn is related to sulfate concentrations and other factors).

Mercury is a national and global pollutant, but state-level reduction efforts are important.

Although the relationship between Minnesota mercury air emissions and contamination of Minnesota fish is often indirect, continued local and statewide reduction efforts are important:

- to help reduce contamination in our own lakes, and to do our part to reduce global mercury emissions. (Our emissions contribute to the contamination of ocean fish, which we eat.) and
 - to help develop innovative, cost-effective solutions.
-

Continued reductions in state mercury releases are necessary.

In conclusion, based on the most recent evidence of human and ecological health impacts of low-level methylmercury exposure, further efforts to reduce mercury contamination in fish are necessary. Minnesota, with its many lakes, is among those states at greatest risk. In addition, Minnesotans believe they have a right to expect fish to be safe to eat without consulting a fish consumption advisory.

Section 3. Progress Toward Meeting State Mercury-reduction Goals

Mercury is released from many sources, including consumer and industrial products.

In Minnesota, mercury is released by a wide variety of sources, including incinerators, fossil fuel combustion, iron-ore processing and products that contain mercury, such as paint, batteries, electrical switches and thermometers. (More than 350 tons of elemental mercury are still used in products manufactured in the United States every year.)

Much of the mercury used in products is recycled and reused, or remains relatively safe. Some, however, is released when it is spilled or when it is thrown down the drain or into the garbage. This mercury is commonly referred to as “product-related.”

Mercury releases have dropped two-thirds since 1990 due to product bans, incinerator controls, new information.

The amount of mercury used and released in Minnesota and the United States has been cut dramatically over the last 20 years. Annual mercury releases in Minnesota are about one-third what they were in 1990, according to the latest MPCA estimates.

The statewide mercury reduction goal set in Minn. Stat. § 116.915 is to reduce annual mercury releases 60 percent by 2000 and by 70 percent by 2005, compared to 1990 levels. Current MPCA estimates indicate that statewide releases in 2000 were about 3,800 pounds, 68 percent below estimated 1990 levels and 2 percent short of the 2005 goal.

Nearly all reductions since 1990 are due to banning or restricting the intentional use of mercury in products like paint (where it was used as a fungicide), batteries and electrical equipment — as well as emission controls on waste-combustion facilities.

New estimates increase 1990 baseline, complicate use of percent reduction goal.

The mercury inventory is dynamic and changes to reflect new scientific information and changes in technology and industry.

The single largest recent change in the state mercury inventory is due to better information about past releases, not new reductions. The MPCA now estimates that over 3,000 pounds more mercury were released from paint in 1990 than was previously estimated (500 pounds had been the previous estimate). As a result, the estimated total 1990 emissions rose from about 8,450 pounds to 11,700 pounds. The result is that, compared to earlier estimates, the percent decline in mercury emissions between 1990 and 2000 is much greater (compare figures 1 and 2). So, this essentially means that we had met our 2000 reduction goal (and came within 2 percent of the 2005 goal) stated in the 1999 legislation before the legislation even took effect.

Coal, taconite emissions are flat, represent an increasingly large percentage of total.

Mercury releases from products have declined since 1990. However, emissions from harder-to-control industrial sources have remained constant or increased slightly. As a result, direct emissions from coal combustion and taconite processing now constitute a higher percentage of total emissions. (Coal’s share increased from 13 percent to 43 percent of total emissions and taconite’s share increased from 6 percent to 20 percent.) Many of these industrial sources have, however, helped reduce product-related releases by replacing mercury-bearing equipment and related efforts. (See figures 3 and 4.)

Under the MPCA’s latest inventory, the state could reach its 70 percent goal set for 2005 without significant, direct reductions in emissions from coal-fired power plants and taconite facilities. To maintain statewide progress, direct emission reductions will be needed from electrical utility and taconite firms because product-related reductions will become increasingly difficult over the next decade.

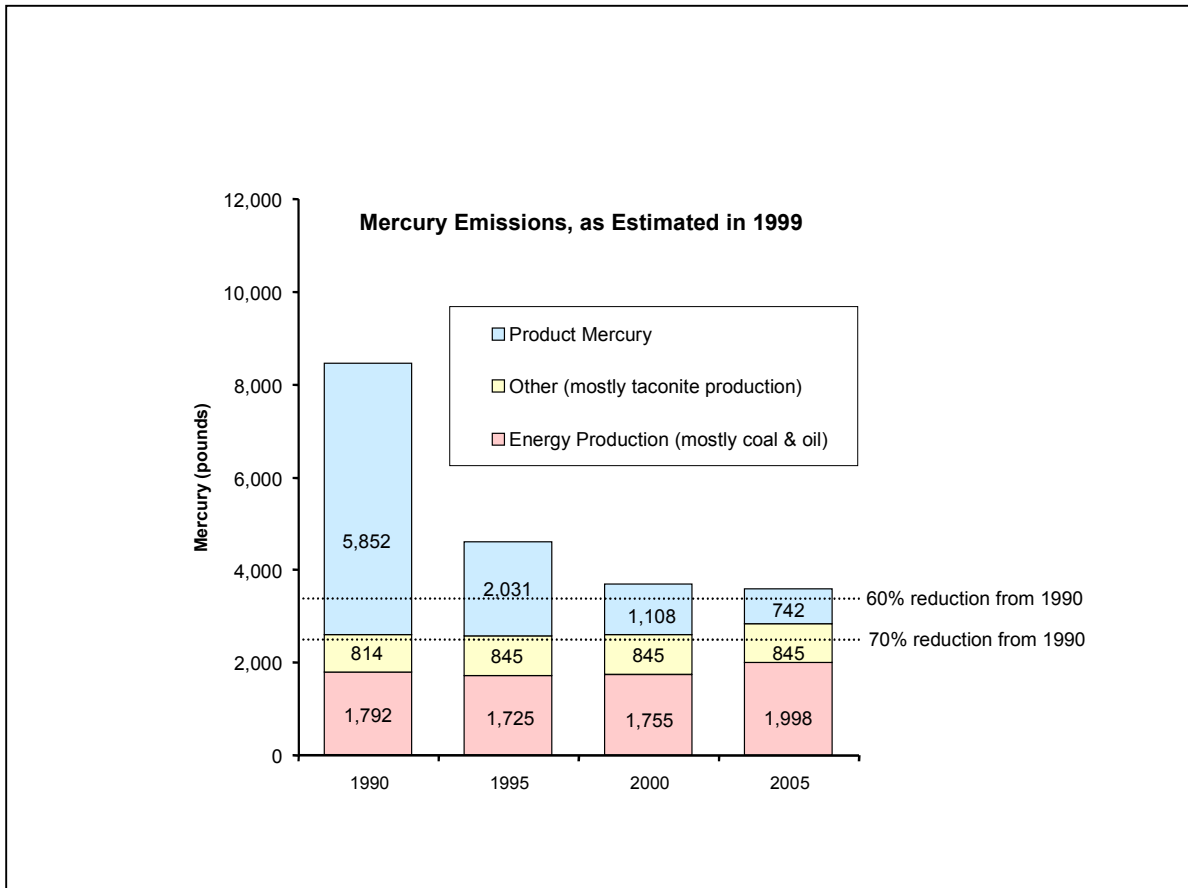


Figure 1. Statewide mercury release inventory, as understood during the discussions leading up to the 1999 legislation that set the statewide 60% and 70% reduction goals from the 1990 baseline.

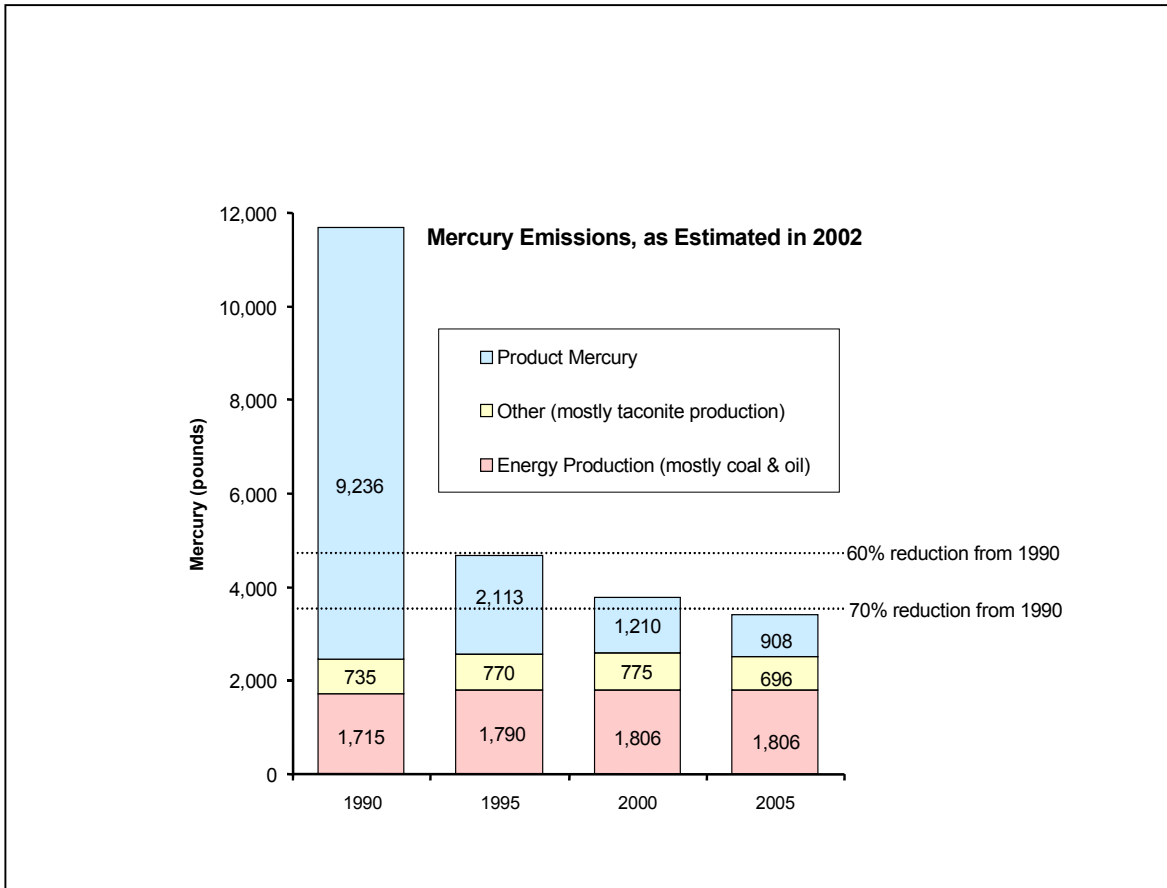


Figure 2. Statewide mercury release inventory, as updated in this report, with 60% and 70% statewide reduction goals.

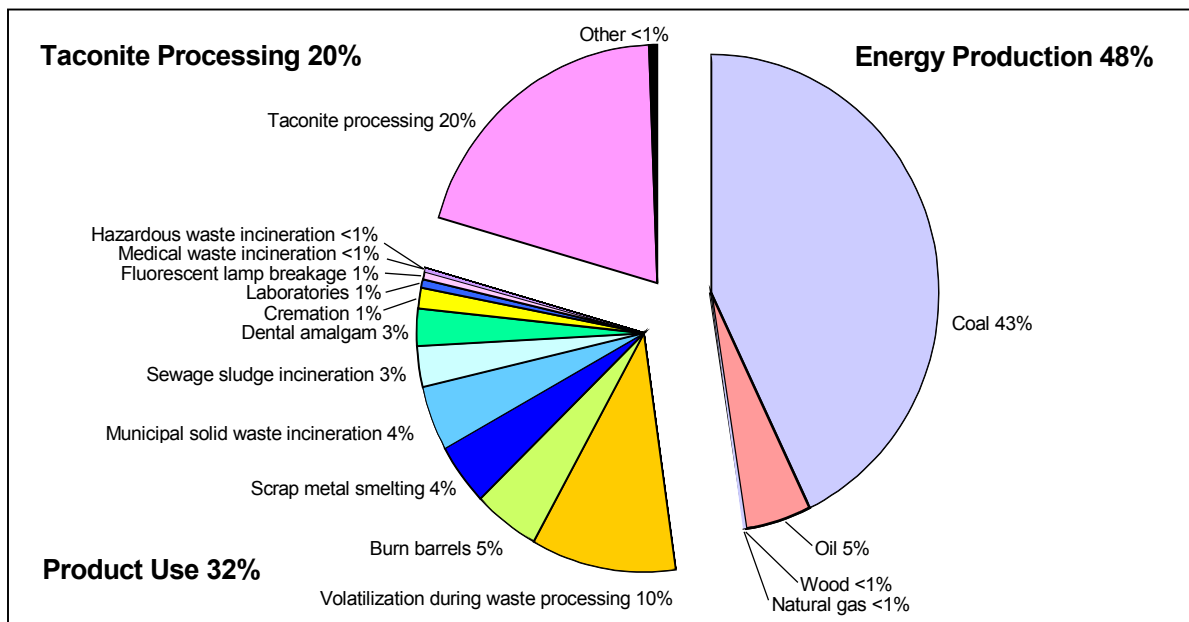


Figure 3. Estimated statewide mercury releases by source, for year 2000.

State options are constrained by global air pollutant problem, regulatory uncertainty.

Emission reductions from coal combustion and taconite processing, however, will be more difficult and expensive than has been the case with most product-related mercury reductions. In addition, the EPA is now developing nationwide draft regulations that will limit mercury air emissions from coal-fired power plants, due to be published in 2003. Taconite emissions may fall under federal regulation by the end of the decade.

Therefore, as with other regional or global air pollutant issues, affected states are presented with the problem of how or where to move forward at the state level in the face of federal and international regulatory uncertainty. While Minnesota has chosen to move forward with a nonregulatory program for mercury for major air sources at this time, other concerned states are either trying to develop regulations (Wisconsin) or are considering regulations or legislation (Massachusetts).

Further efforts under the voluntary agreements are needed.

The MPCA believes that major air sources should further develop and implement plans to reduce mercury releases over the next three to five years — even if their emissions have a limited direct effect on methylmercury concentrations in Minnesota fish. Even over the short term, targets are needed for these sources in order to provide continuing incentives for developing potential low-cost breakthroughs in mercury-reduction technologies.

The challenge has been — and still is — to determine how to best quantify and track these and other mercury-reduction efforts, and to define what a reasonable level of effort would be for all sources for the next years. The next sections of this report describe such efforts to date, and provide recommendations for next steps.

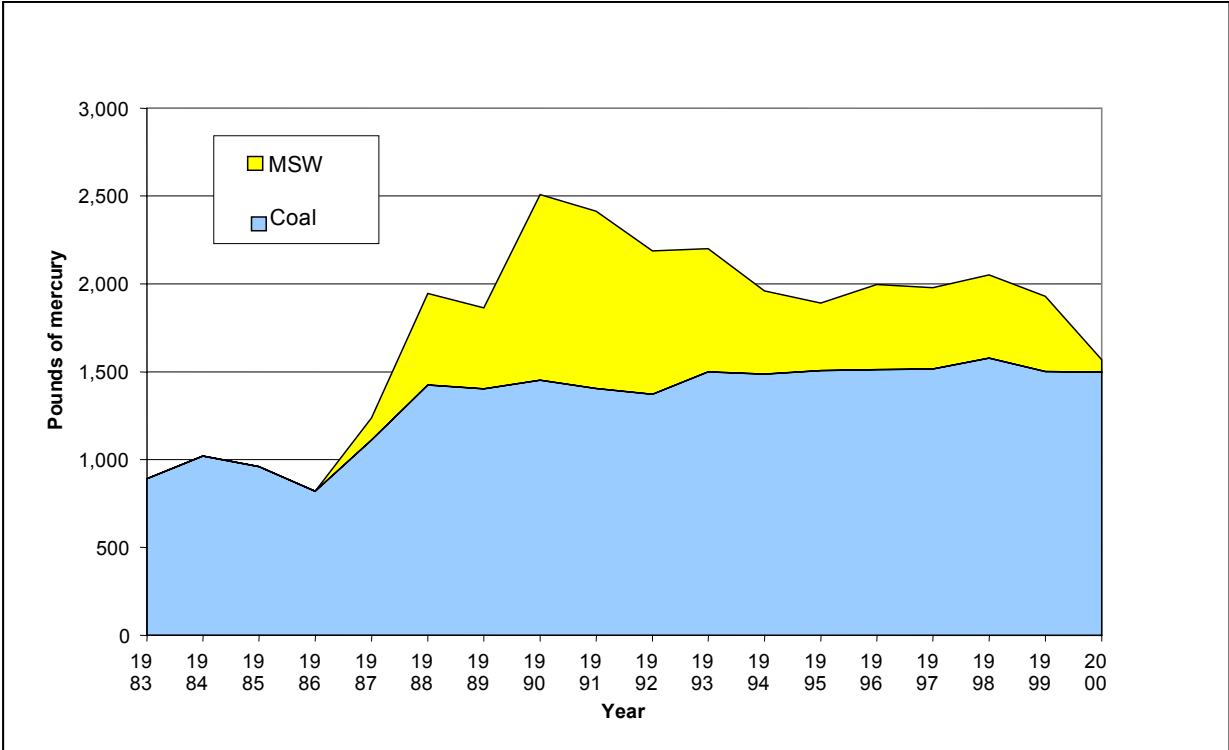


Figure 4. Estimated mercury emissions in Minnesota associated with electrical production from coal and municipal solid waste (MSW) combustion.

Section 4. Mercury Reduction Program Evaluation

This section outlines ongoing program difficulties.

This section first evaluates existing state regulatory tools used to reduce mercury contamination, including some long-standing difficulties with existing mercury regulations.

Problems with Minnesota's statewide reduction goals are then described.

Next, two important pending federal regulations are summarized.

Finally, other MPCA and Office of Environmental Assistance (OEA) mercury-reduction programs, most implemented since 1999, are described briefly.

Minnesota's voluntary mercury reduction agreement program is discussed separately in Section 5.

Existing regulations are complex and disconnected.

Since 1980, federal and state mercury regulations have limited wastewater discharges to state waters and reduced air emissions from some sources, such as waste incinerators. These regulatory controls have proven effective in many cases.

However, the current federal and state regulations are also complex and disconnected; they separately cover air, water and waste disposal without considering their interactions. Since mercury is an element, it does not break down. So, regulations covering waste disposal may, for example, end up encouraging releases of mercury back into the air.

The next section of this report describes two ongoing problems with the existing regulations: fairness and predictability.

Fairness problem is described.

Regulating some mercury sources but not others creates fairness issues. For example, new or expanding wastewater discharges are strictly regulated. And some existing wastewater discharges will need difficult-to-meet permit limits after about 2005 under current federal regulations. However, wastewater discharges represent a small percentage of total mercury input to most Minnesota waters compared to the amount delivered by air pollution. At the same time, air emissions of mercury from coal-fired power plants and some other sources are not specifically regulated.

Predictability problem is described.

The major air sources in Minnesota tend to emit elemental mercury, a form that tends not to fall nearby. So the facilities generally do not create a local health risk, but they do contribute to the general mercury problem in Minnesota and the rest of the world.

Nevertheless, any proposed new air source in Minnesota, even if its mercury releases are not specifically regulated, faces controversy when it reaches the MPCA during environmental review or permitting. At that point, without any clear criteria for “how much is too much,” MPCA decisions are made case-by-case, as new projects come up.

Value of state goals is hampered by shifting baseline, lack of facility-specific information.

Minn. Stat. § 116.915 did establish a statewide mercury-reduction goal, as well as a voluntary agreement program initially targeted at major air emission sources. Minnesota also participates in regional compacts, like the Lake Superior Binational Agreement, which has its own regional mercury release inventory and reduction goal.

Using these goals to help guide decisions on specific projects, however, has been limited by three general problems:

1. *The shifting baseline is problematic for goal-setting.* Statewide or regional release inventories mix relatively accurate estimates for some mercury sources (such as incinerators), with less accurate estimates (for example, releases from products). As a result, the overall inventory (including past releases) continues to be subject to change, as much due to improved information as from actual reductions.
 2. *More facility-specific information is needed.* Combining source categories creates an “apple-to-oranges” problem. The statewide inventory, while adequate for measuring general progress, is not a good benchmark for individual source categories or reduction programs. Therefore, more facility-specific information is needed to measure individual progress.
 3. *There is no specific state implementation plan.* The statewide or regional goals are not broken down by source or source sector. Therefore, without more specific expectations for individual sources or source categories, state decision makers, industry and the public are still left uncertain about “how much is too much” when projects come before the MPCA for permits. A statewide goal without an implementation plan also tends to create a “free rider” problem among mercury sources.
-

Pending federal coal, TMDL rules create additional uncertainty for states and industry.

Two particularly important federal decisions are pending that will affect state-level mercury-reduction efforts. First, the EPA plans to regulate air emissions from coal-fired power plants — either through existing authority or through new, “three-pollutant” legislation (limiting mercury, sulfur dioxide and nitrogen oxides). Under existing regulations, the EPA will issue draft regulations by December 2003, final regulations by the end of 2004, with controls for existing plants required to be in place by the end of 2007. In the meantime, until federal standards are promulgated, any new coal-fired power plants are subject to case-by-case, state-level performance standards for mercury emissions.

Second, the EPA is again beginning the process of revising its controversial Total Maximum Daily Load (TMDL) rule. This is likely to affect water discharges and possibly other mercury sources.

Uncertainty creates disincentives for state-level commitments.

The MPCA supports federal power plant air emission regulations and revising the federal TMDL rule. The agency is participating in federal development of both. But continuing uncertainty surrounding feasible technology, economics and final forms of regulation is creating short-term problems for state-level mercury initiatives. As described in Section 5 below, Minnesota electric utilities are reluctant to invest in mercury-control technologies in part due to these uncertainties.

MPCA’s reduction programs focus on finding, disposing of, reducing mercury used in products.

To supplement existing laws and regulations, Minn. Stat. § 116.915 directs the MPCA to implement a variety of new and existing strategies to reduce mercury contamination in fish. Since 1999, in addition to implementing the voluntary agreement program (described in Section 5, below), the MPCA and the OEA have continued or initiated a number of mercury-reduction programs. These include:

- the Mercury-Free Zone Program, in which a specially trained detector dog is used to search schools and other facilities for spills and other “hidden” mercury;
- a project to reduce and recover mercury in automotive switches;
- a statewide mercury thermometer ban and swaps;
- health care program;
- community mercury-reduction projects;
- improved estimates of releases from mercury in products;
- ongoing labeling law enforcement;

- ongoing efforts to recover mercury at demolition sites;
- waste incinerator and combustor regulations;
- integrated state/federal Internet pilot project;
- the Minnesota/North Dakota Fish Consumption Survey;
- low-level monitoring for wastewater discharges; and
- continued monitoring of, and research into, mercury releases and deposition.

These MPCA and MOEA programs rely significantly on support from other organizations, both public and private.

Some of these programs are described briefly in Appendix C. Full program descriptions, results and plans will be available through www.pca.state.mn.us/air/mercury.html or through Minnesota's new mercury Internet site at www.mnmercuryinfo.org, which is expected to be available by February 1, 2002.

Section 5. Voluntary Agreement Program

This section summarizes, evaluates the voluntary agreements.

This section covers the following three topics:

1. Voluntary Agreements: Description and Background;
 2. Program Results: Pro and Con; and
 3. Implementation Problems.
-

Voluntary mercury-reduction agreements are described.

Minn. Stat. § 116.915 requires the MPCA to solicit voluntary agreements from major air emission sources in the state. (“Voluntary agreement” is a general term for a variety of optional pollution-reduction efforts — from public challenges to complex negotiated agreements, such as the EPA’s Project XL.) The program is an experimental alternative to “command-and-control” regulation. Although focused initially on major unregulated air emission sources, smaller air sources and facilities with wastewater discharges are invited to participate as well.

With voluntary agreements, maximum flexibility is intended.

The MPCA has implemented the voluntary agreement program to allow maximum flexibility, with minimal negotiating. In most cases, sources are challenged to develop their own reduction efforts, to use trial and error, and to conduct innovative research. Sources can work with other industrial, governmental or nonprofit partners to reduce mercury releases.

One purpose of the program is to provide a simple, cost-effective mechanism for mercury sources to contribute to state reduction goals, particularly whether reducing their own stack emissions might not be feasible in the short-term.

The MPCA has not required specific reduction commitments or specific reporting formats. The MPCA’s role is largely to verify any quantified release reductions, publicize results and provide technical or other assistance.

State-level mandatory requirements remain in place.

To help “make room” for the experimental program, the MPCA assured participants that it would not propose new state-level regulations covering mercury air emissions while the voluntary agreement program was in place and deemed to be successful. However, all existing federal and state regulatory requirements are still in force. In addition, case-by-case mercury permit-limits or other conditions are possible for particular facilities, even if the permittee was participating in the voluntary agreement program.

Potential conflicts with federal wastewater regulations arise.

In early 2000, two federal regulations affecting wastewater discharges created unanticipated effects. First, the EPA determined that waters with fish-consumption advisories were “impaired” under the Clean Water Act, triggering new regulatory requirements for discharges to those waters. Second, the EPA approved a new, much more sensitive analytical technique for measuring mercury in wastewater.

As a result, at the same time that mercury in wastewater discharges could be accurately measured, many more wastewater discharges became subject to increasingly strict discharge limits. One effect of these changes was that some otherwise voluntary pollution-prevention efforts were now potentially mandatory. This caused additional confusion as to the role of the voluntary agreement program and potential benefits for participants with wastewater discharges.

Federal uncertainty, lack of early reduction credits for utilities constricts “voluntary” state program.

In addition, the EPA determined in December 2000 that federal regulation of air emissions from coal-fired power plants was appropriate, with regulations to be issued by 2003. The MPCA supports federal draft regulation of power plant emissions.

However, there are no legal guarantees that early reductions will be recognized or otherwise rewarded at the federal level. Therefore, state utilities are reluctant to make significant investments in control technologies in the short term or otherwise commit to trying to reduce their emissions over specific time frames. Therefore, utilities tend to see the voluntary agreement program as a limited, “bridge” effort covering the period between now and when federal regulatory requirements are finally in place.

Other conflicts or potential conflicts arose between regulatory and nonregulatory programs. These types of conflicts have proven to be common in U.S. regulatory innovation efforts.

Results: high participation, new information, research

Fifteen agreements are in place, including nearly all companies or public agencies with in-state emissions of more than 50 pounds of mercury per year. These facilities include electric utilities, taconite plants, an oil refinery, major municipal wastewater-treatment plants, and the state’s only steel mini-mill. Some smaller sources, and one major electricity cooperative with power plants located out-state have submitted agreements also.

Quantifiable mercury reductions have been limited so far to Minnesota Power, using lower-mercury coal (annual reduction about 60 pounds). The Western Lake Sanitary District has

reduced its mercury releases since 1999 as well, but its program was under way before the voluntary agreements program began. Notably, Metropolitan Council Environmental Services has made a long-term commitment to use new emission controls to reduce emissions from its sludge incinerator by 70 percent by 2005. In 2002, Xcel Energy's plan to repower its Black Dog plant has the potential to lower annual mercury emissions by as much as 35 pounds. (The amount of the actual reduction depends on how electricity output is distributed.)

**Benefits:
flexibility, useful
information**

The voluntary agreements do show some limited progress. Firms have reported that they have collected and managed hundreds of pounds of mercury in switches and other products. Minnesota Power has switched to lower-mercury coal; Xcel Energy plans to repower its Black Dog plant; and many participants are collecting elemental mercury from various products. Metropolitan Council Environmental Services (MCES) has committed to a long-range reduction target.

Virtually all the participants have developed and shared useful information on the amount, type and potential controls on emissions from their facilities, information that was not previously available. As part of their voluntary agreements, North Star Steel, Koch Industries and others have made nationally groundbreaking efforts to better understand their mercury inputs, flows and releases. Great River Energy, Minnesota Power and Xcel Energy have developed varied research programs that test emission-control systems.

In addition, most participants have made substantial efforts to find new ways to reduce their mercury releases through research on control technologies and pollution-prevention alternatives. Although difficult to document, the MPCA believes that the program has produced this new information faster than would have otherwise occurred. Participants cannot yet make quantitative estimates of the effects many programs have on mercury emissions. However, they believe their programs put Minnesota ahead of other states in mercury-control efforts.

**Drawbacks:
limited reductions, lack of
specific commitments**

The voluntary agreements have the following drawbacks:

1. *Lack of significant, measurable reductions or reduction commitments.* With the exception of MCES, participants have not committed to specific, long-range reduction targets.
2. *Perception that the agreements are largely public relations efforts.* The lack of specific, measurable performance targets in the agreements tends to erode program credibility.

3. *Fairness and predictability problems.* The voluntary agreement program, by itself, has not made state permit decisions more predictable. Without specific, measurable expectations for individual participants, the program has mostly only added a new element of uncertainty for both the public and the facilities during review and permitting by the MPCA.
 4. *Lack of standardized, transparent reporting, measurement and verification protocols.* Without standardized protocols, the agreements are difficult to evaluate or compare.
-

**Contributing problems:
lack of clear expectations,
benefits to participants**

Contributing problems of the Voluntary Agreement Program include:

1. *Lack of clear, measurable performance targets for individual participants or sectors.* There is only one, general criterion in place to evaluate the Voluntary Agreement Program: whether the statewide reduction goals are being met. At best, this is only an indirect measure of voluntary agreement success. As described in Section 4, above, the voluntary agreements have not been the source of most of the reductions that have allowed the state to approach the state 70 percent reduction goal.
 2. *Lack of clear benefits for participants.* Potential conflict with current or future federal regulations reduces incentives for participants to commit to specific reduction schedules, disclose certain information, or invest in control technologies in the short-term. This is particularly true for coal-fired power plants due to pending federal regulations or legislation. Even for other sources, however, information developed through voluntary research or studies could potentially be used to develop future federal or state permit requirements. This creates a potential “catch-22” disincentive for aggressive voluntary efforts by participants.
 3. *Lack of agency resources.* Nonregulatory efforts are not necessarily less staff intensive than “command and control” approaches. More technical staff time should ideally be devoted to the program, but this would require additional funding.
 4. *Measurement Problems.* There is not yet a generally accepted, quantified method to measure or “credit” research efforts, mercury-in-products collection efforts, or reductions by out-of-state sources owned by participants (some of which are owned by multi-state or multinational corporations).
-

**Metropolitan Council
Environmental Services,
wastewater dischargers
have measurable
performance targets.**

The voluntary agreement program has at least one example of a measurable, specific air emission reduction target. MCES has developed a 70 percent reduction commitment for its new sludge incinerator, negotiated as part of its air permit.

In addition, although the voluntary agreement program was set up primarily for air emission sources, it is wastewater discharges that currently have clearer, measurable targets and incentives. Under the MPCA's current approach, most existing wastewater dischargers are allowed to use their next five-year permit cycle to use voluntary efforts to meet state water quality standards in their discharges.

If wastewater dischargers are able to establish that mercury concentrations in their effluents are below the applicable standard, they can avoid mercury permit limits and conditions. This is an example of a measurable, specific goal, with benefits to participants if the target is met. In this case, the means to the end is voluntary, not the end itself.

However, wastewater-treatment plants are already under increasing financial and regulatory pressure on a number of fronts, and their wastewater discharges are usually (but not always) minor contributors to the mercury loading in the affected water body.
