



2006 Pollution Prevention Evaluation Report

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Total cost, including data analysis, to prepare this report: \$6,100

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Pollution prevention benefits our environment and our economy

Pollution prevention efforts not only help us preserve our environment and health but also make significant contributions to Minnesota's economy. By keeping abreast of emerging pollution prevention technologies, as well as economic and environmental drivers, the Minnesota Pollution Control Agency's pollution prevention program (formerly part of the Office of Environmental Assistance) can help businesses and their communities gain the economic and environmental benefits available through pollution prevention.

Environmental benefits

In contrast to managing pollution after it is created, pollution prevention eliminates waste at its source, by reducing the quantity and toxicity of the waste, air emissions, and water discharges that are produced from manufacturing processes and energy generation. Since pollution is eliminated rather than controlled, there is no risk of transfer of pollutants from one medium to another—for example, from air to water or land—and we can reduce the potential for harm in the event of an accidental or intentional release.

Economic benefits

Implementing pollution prevention practices can often result in significant financial benefits to companies. Once these practices are in place, economic savings from pollution prevention continue year after year.

- ▶ lowers operational and environmental compliance costs
- ▶ reduces or eliminates long-term liabilities and clean-up costs
- ▶ saves money through increased efficiencies and waste reduction

Report on progress

Every two years, the pollution prevention program reports to the Legislature on progress being made toward achieving the objectives of the Minnesota Toxic Pollution Prevention Act (Minn. Stat. § 115D.10). This report outlines the broad scope of partnerships and collaborative efforts that meld industry efforts with technical and financial assistance.

Although, the amount of toxic chemicals generated as waste has not declined, pollution prevention efforts have steadily reduced the amount of toxic chemicals released to Minnesota's air, water, and land. Documented results in this report show that millions of dollars have been saved, and millions of pounds of pollution have been eliminated through these partnerships.



Assessing pollution prevention

When evaluating progress in pollution prevention, it is important to keep in mind that out of the more than 87,000 chemicals in commerce in the United States, only about 600 are included under the federal Toxic Release Inventory (TRI) Community Right-to-Know legislation. Because of the environmental and health risks associated with these chemicals, TRI legislation requires facilities that manufacture, process, or otherwise use above-threshold amounts of these chemicals to report the amounts they manage and release to the air, water, and land. In Minnesota, the Emergency Response and Community Right-to-Know Act (EPCRA) program at the Department of Public Safety maintains TRI data. The most current available data from the 2003 reporting year provides information on the management of 117 different chemicals reported by 418 facilities in Minnesota.



Minnesota Technical Assistance Program: Twenty years of helping businesses prevent pollution and save money.

Since 1985, MnTAP, Minnesota's primary provider of pollution prevention technical assistance, has helped businesses prevent pollution and save money. During that time, MnTAP has responded to more than 26,000 requests for technical assistance, which includes telephone assistance, site visits, student intern projects, pollution prevention teams, presentations, workshops, and a materials exchange program.

With MnTAP's help, companies have:

- ▶ saved nearly \$18 million in first-year savings
- ▶ avoided more than 13 million pounds of air emissions
- ▶ eliminated 9 million pounds of wastewater loading
- ▶ reduced 324 million pounds of solid waste
- ▶ conserved nearly 308 million gallons of water

Statewide trends for reporting industries

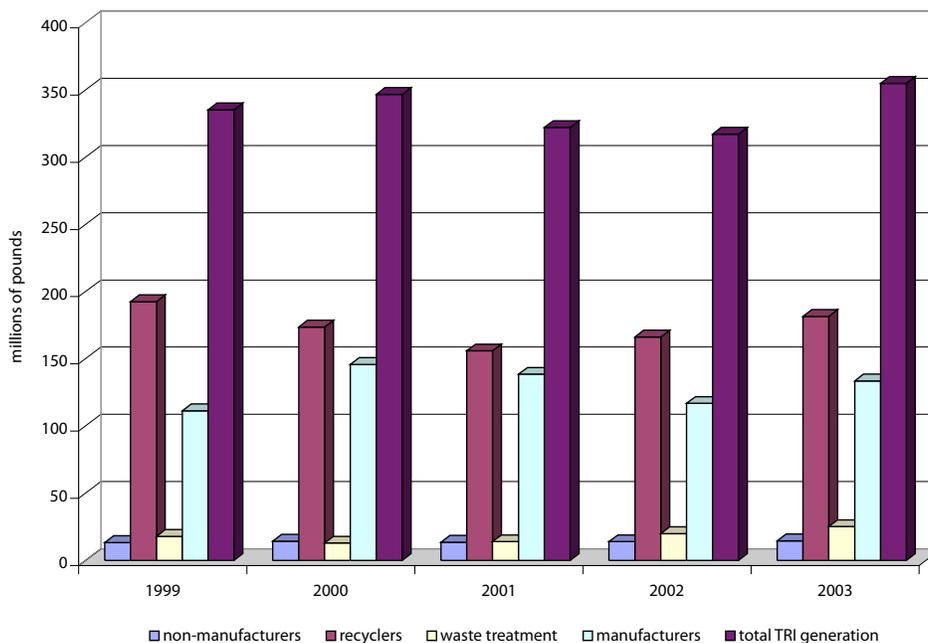
The state evaluates data supplied by reporting facilities to the Minnesota EPCRA program and the U.S. EPA to determine trends in quantities of chemicals generated and released. Although exceptions exist, the 2003 data from Minnesota's 418 reporting facilities suggest that some progress in pollution prevention among manufacturers has occurred. However, since the data supplied does not specify whether the reported reductions in amounts of chemicals released and/or generated by some manufacturers are due to discontinued production, moving the manufacturing processes outside Minnesota, or implementation of pollution prevention at the facility, it is not possible to know the cause of these reductions with certainty.

Facilities that report TRI releases are also required to file state Pollution Prevention Progress Reports with the EPCRA program. According to the 2003 data, 62 percent of the facilities filing progress reports met their own pollution prevention objectives, while the remaining 38 percent indicated that objectives were not met or it was not possible to determine if they were met. The two most common barriers to pollution prevention were technical limitations and concerns that product quality might decline.

Generation of TRI chemicals in Minnesota

For the purposes of the Toxic Release Inventory program, toxic chemical generation is defined as the sum, or aggregate, of the quantities for each waste management method employed, which includes direct release to air, water, or land; recycling; treatment; and burning for energy recovery.

Chart 1. Statewide trends for toxic chemical generation



Amount of TRI chemicals generated
(in millions of pounds)

| Year | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|-------|-------|-------|-------|-------|
| Non-manufacturers (electric utilities, chemical distributors) | 13.3 | 14.3 | 13.6 | 14.0 | 14.6 |
| Recyclers (metals and solvents) | 192.6 | 173.7 | 156.0 | 166.3 | 181.6 |
| Waste treatment (incineration) | 17.9 | 12.9 | 14.0 | 20.0 | 25.2 |
| Manufacturers | 111.4 | 145.9 | 138.6 | 116.9 | 133.6 |
| Total TRI chemical generation | 335.3 | 346.8 | 322.2 | 317.2 | 355.0 |

As Chart 1 shows, toxic chemical generation rose in 2003, with total generation increasing statewide from 317 million to 355 million pounds. The increase in total generation can be traced to four primary sources:

- ▶ 14-million-pound increase in on-site recycling at Gopher Resources
- ▶ 14-million-pound increase in on-site treatment at Flint Hills Resources (formerly Koch Refinery)
- ▶ 5-million-pound increase in off-site recycling and on-site treatment at 3M Cottage Grove
- ▶ 3-million-pound increase in on-site treatment among the ethanol producers.

Approximately 50 percent of the TRI chemicals generated in Minnesota each year come from recycling facilities, primarily Gopher Resources. Other recycling facilities include Gerdau Ameristeel Recycling (formerly North Star Recycling), U.S. Filter, Safety-Kleen, and Mercury Waste Solutions.

Over the past five years, an average of only about 38 percent of the TRI chemicals generated in Minnesota have come from manufacturing facilities. In 2003, just over half of those chemicals from manufacturers come from three specific industry sectors: petroleum refining, pulp and paper mills, and manufacturing coated and laminated papers.

As will be discussed further in the next section, manufacturers continue to make steady progress in reducing releases. However, the same progress is not being seen in reducing overall TRI chemical generation. Instead, manufacturers are reporting more on-site treatment. Some of this can be linked to other compliance requirements, such as a 2002 U.S. EPA decision that required ethanol plants in Minnesota to install thermal oxidizers to control volatile organic compound (VOC) emissions.

Additionally, the percentage of waste recycled is declining from a high of 51 percent in 2000 to 29 percent in 2003. It is not known specifically why this has occurred, though it does coincide with a trend

of increasing waste management through treatment, which has risen from 32 percent in 2000 to 58 percent in 2003.

How Minnesota businesses manage TRI chemicals

In 2003, Minnesota's 418 TRI reporting facilities generated a total of 355 million pounds of toxic chemical wastes, which were managed as follows:

Recycled: Approximately 62 percent of the TRI chemicals reported in Minnesota are recycled, most of which is due to chemicals reported by recycling facilities.

Treated: Approximately 28 percent of the TRI chemicals reported in Minnesota are treated, which includes chemicals that are incinerated, stabilized, or neutralized.

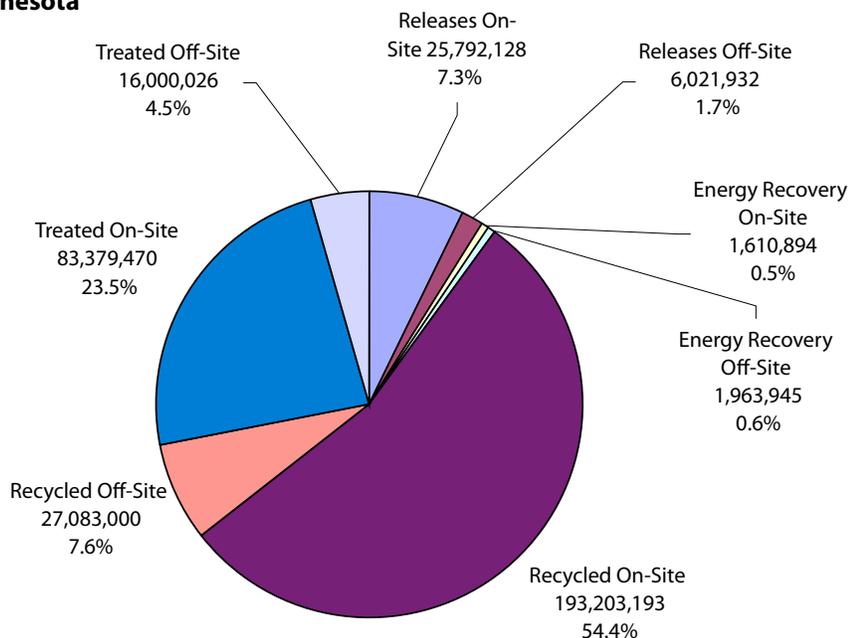
Released: About 9 percent of TRI chemicals are released into the environment, either on- or off-site. On-site releases refer to releases to air, water, and land within the boundaries of the facility. Off-site releases refer to wastes transferred to landfills or other land disposal that occurs outside the boundaries of the facility.

Energy recovery: Just over 1 percent of TRI chemicals reported in Minnesota are managed through energy recovery, which refers to chemicals such as hydrocarbon solvents that have significant heating value and are combusted in an industrial boiler, furnace, or kiln.

How a manufacturer manages its wastes will depend highly on the nature of the chemicals involved. Manufacturers that report primarily metal wastes, for example, will likely have a much higher recycling rate than those reporting primarily acid and caustic wastes or persistent, bioaccumulative toxic (PBT) wastes such as dioxins that have no commercial value.

Because of this, it may not be terribly effective to compare, for example, how a petroleum refinery and a metal finisher manage their wastes. However, it can be useful to study different sectors simultaneously to identify and prioritize common pollution prevention opportunities. Additionally examining methods for waste management within a given industry sector also allows for comparisons of similar manufacturing processes and types of waste streams. Both approaches can be useful for researching and providing assistance to individual facilities as well as entire sectors.

Chart 2: How toxic chemicals are managed in Minnesota



As Chart 2 shows, approximately 304 million pounds, or 85 percent, of these wastes are managed on-site, or within the boundaries of the facility, with the remaining 15 percent was transferred to other facilities to be managed or disposed of.

The large percentage of waste managed on-site is due in part to how some facilities are required to report to the TRI. For example, Gopher Resources, a recycler of automotive batteries and other lead-containing wastes, reported a total of approximately 177 million pounds of TRI chemicals generated in 2003, most of which is lead. What this represents primarily is the total amount of lead contained in the products they receive over the course of a year that is then processed so that it can be used to make new products that require lead.

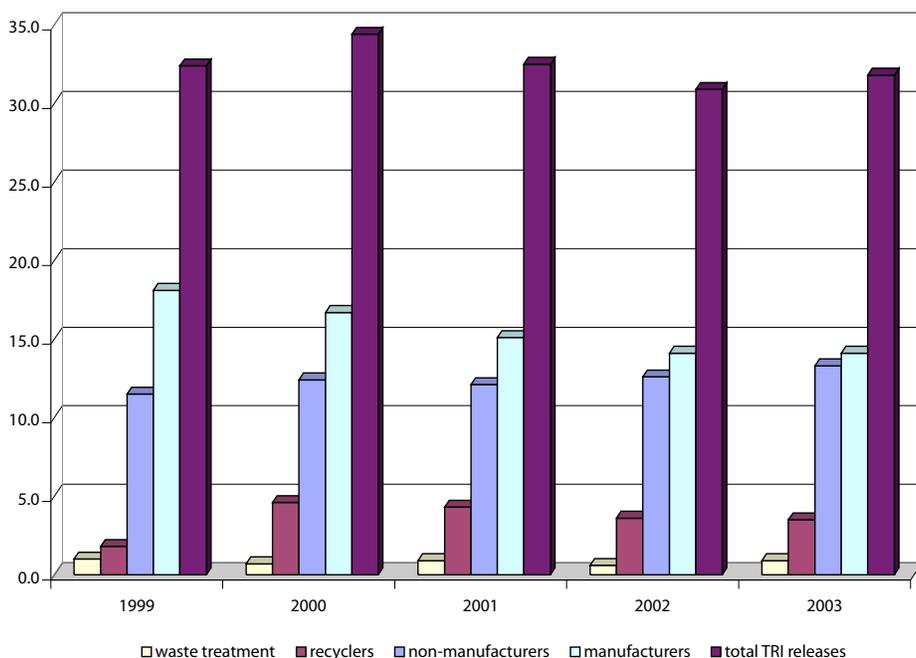
Trends in TRI releases

In spite of an increase in generation, TRI chemical releases have held fairly steady over the past five years, with changes only really occurring in what industry sectors those releases come from. The vast majority of TRI chemical releases come from manufacturers and electric utilities. Increased releases from the coal-fired electric utilities coincides with increasing demand for electric power from their various industrial, commercial, and residential customers.

Recyclers continue to make steady progress in reducing releases, which have dropped over 20 percent since 2000 (see Chart 3). Additionally, over the past five years, the percentage of TRI chemicals released in Minnesota that have come from manufacturing facilities has declined from 56 percent to 44 percent. In 2003, the top manufacturing sectors for reporting TRI chemical releases were the petroleum refining, pulp and paper mill, and reconstituted wood products sectors. These sectors make up about 13 percent of total releases from manufacturers.

The chemicals for which the largest quantities were reported released include barium compounds at 8.7 million pounds, copper compounds at 2.1 million pounds, ammonia and manganese compounds at just fewer than 2 million pounds each, and n-hexane at 1.7 million pounds. These chemicals represent 52 percent of the total releases reported in Minnesota. The primary industrial sources of these chemicals are the coal-fired electric utilities, steel works/mills, and the pulp and paper mills.

Chart 3. Statewide trends for toxic chemical releases

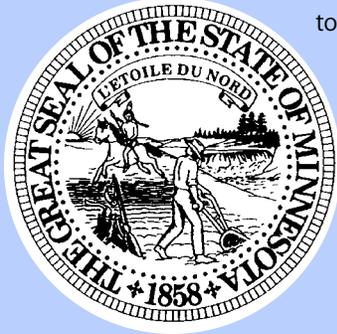


Amount of TRI chemicals released
(in millions of pounds)

| Year | 1999 | 2000 | 2001 | 2002 | 2003 |
|--|------|------|------|------|------|
| Non-manufacturers (electric utilities) | 11.5 | 12.4 | 12.1 | 12.6 | 13.3 |
| Recyclers (metals and solvents) | 1.8 | 4.6 | 4.3 | 3.6 | 3.5 |
| Waste treatment (incineration) | 1.0 | 0.7 | 0.9 | 0.6 | 0.9 |
| Manufacturers | 18.1 | 16.7 | 15.1 | 14.1 | 14.1 |
| Total TRI chemical releases | 32.4 | 34.4 | 32.5 | 30.9 | 31.8 |

Governor's Awards: Honoring excellence in waste and pollution prevention

Superior environmental achievement by Minnesota businesses, nonprofits, and private institutions is honored through the Governor's Awards for Excellence in Waste and Pollution Prevention and the Governor's MnGREAT Awards. This award program provides an opportunity to recognize innovative practices and programs that prevent pollution and waste, improve resource efficiency, and lead to sustainability at the highest level. For 2005, the following organizations received the Governor's Awards:



Governor's Awards for Excellence in Waste and Pollution Prevention

- ▶ Shafer Electronics Company
- ▶ Marvin Windows and Doors
- ▶ Hoffman Enclosures, Inc.
- ▶ Schwan Food Company
- ▶ Prestige Cleaning Center
- ▶ Karges Faulconbridge, Inc.

Environmental and economic benefits

The environmental benefits and economic savings due to these winners' pollution prevention activities are significant—and continue to accrue as the projects and programs progress. Success stories from throughout the state recognized through the Governor's Awards program serve as inspiration for others to implement and benefit from pollution prevention. For more details and information on past winners, visit <http://www.moea.state.mn.us/p2/awards.cfm>

Some of the waste reduction and cost savings resulting from the winners include:

- ▶ Cumulative reductions at two manufacturing facilities of 112,947 pounds of hazardous waste, 753,891 pounds of air emissions, and 336 billion Btus in energy along with reductions of 1.2 million pounds of hazardous raw materials use and 565,765 pounds of solid waste is resulting in annual savings of \$1.9 million.
- ▶ The first LEED (Leadership in Energy and Environmental Design) gold level building certified in the state is achieving reductions in the use of 48,530 gallons of water, 401 million Btus of energy, air emissions of 113,034 pounds for annual savings of \$23,660.
- ▶ Use of non-lead solder in an electronics assembly processes is resulting in elimination of 104 pounds of lead waste annually and demonstrating viable use of this alternative material.
- ▶ Expanded use of solar power to prevent 365,720 pounds of CO₂, 1,110 pounds of SO₂, 876 pounds of NO_x emissions and generation of one ounce of mercury.
- ▶ Elimination of 11,000 pounds of phosphorus emissions annually to waste water from a food processing facility through use of alternative cleaning materials.
- ▶ 70 tons of soil erosion will be kept out of Lake Superior trout spawning habitat through shore bank stabilization.

Governor's MnGREAT Awards

- ▶ University of Minnesota–Duluth
- ▶ Winona County
- ▶ Rosemount FMS-1
- ▶ Western Lake Superior Sanitary District
- ▶ Minnesota Army National Guard
- ▶ University of Minnesota Parking and Transportation Services
- ▶ City of Wayzata
- ▶ Minnesota Department of Commerce
- ▶ City of Fridley
- ▶ Minnesota Pollution Control Agency's ARROW Team

Pollution prevention efforts support Minnesota's economy

Pollution prevention incorporates voluntary, market-based approaches to reduce the amount of toxic chemicals used, thereby lessening the amount entering our environment and affecting public health. Part of the mission of pollution prevention assistance is to act as a catalyst to help new innovative strategies become mainstream. Much can be accomplished when environmental and economic factors work together.

The first table shows the potential economic impact for the medical device, food, and housing industries if their facilities achieved just 10 percent of the cost savings documented by pollution prevention and Design for Environment (DfE) case studies at General Mills and Medtronic.

The General Mills project involved evaluating multiple production areas to identify opportunities for process and product improvements that would enhance performance, reduce costs, reduce environmental impacts, and are replicable across all production lines at the bakery. Project results are available at <http://www.moea.state.mn.us/p2/govaward04.cfm#generalmills>.

The Medtronic DfE project involved incorporating two new tools into the design process that evaluate environmental concerns. The first tool evaluates hazards associated with the materials chosen to manufacture a product while the second is used to identify opportunities to improve the efficiency of materials use and the production operation. Project results are available at <http://www.moea.state.mn.us/p2/dfefeguide/medtronic.pdf>.

The Energy Star building practices column looks at the economic impact of adopting EPA's Energy Star building guidelines for new housing starts in Minnesota for one year.

Direct technical assistance provided by the Minnesota Technical Assistance Program (MnTAP) to health care facilities and to the metal plating and paper manufacturing industry sectors by MnTAP has resulted in significant environmental and economic benefit. The following table summarizes the economic impact on Minnesota's economy if these practices were adopted industry wide.

| Economic impact | Food industry pollution prevention | Medical device industry DFE | Energy Star building practices in new housing starts |
|--|---|------------------------------------|---|
| Direct jobs at the companies | 538 | 590 | 1,434 |
| Estimated indirect jobs Impacts on local suppliers statewide, unadjusted for displacement effects | 87 | 155 | 394 |
| Estimated induced jobs Long-term effects on personal income and consumer spending, localized and statewide. | 209 | 365 | 463 |
| Total estimated jobs | 834 | 1,110 | 2,291 |
| Total estimated wages and salary disbursements The monetary remuneration of employees, including compensation of officers, commissions, tips, and bonus and receipts-in-kind that represent income to the recipient. | \$10 million | \$20 million | \$48 million |
| Total estimated tax revenue on direct jobs Business/personal state income taxes, sales tax, excise tax and miscellaneous taxes, real estate taxes and business taxes. | \$1.6 million | \$4 million | \$10 million |
| Total estimated value-added activity Contribution to Gross State Product analogous to GDP (gross domestic product), output excluding the intermediate inputs (primarily compensation and profit). | \$4.3 million | \$38 million | \$78 million |
| Total estimated gross economic activity Amount of production in total sales, includes intermediate goods purchased as well as value-added (compensation plus profit). | \$19 million | \$73 million | \$163 million |

Source: Scenarios calculated using the Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, December 2004, Minnesota Office of Environmental Assistance, Wayne Gjerde

| Economic impact | Health Care Facilities | Metal Plating | Paper Manufacturing |
|--|-------------------------------|----------------------|----------------------------|
| Direct jobs at the companies | 59 | 34 | 33 |
| Estimated indirect jobs Impacts on local suppliers statewide, unadjusted for displacement effects | 12 | 10 | 10 |
| Estimated induced jobs Long-term effects on personal income and consumer spending, localized and statewide. | 42 | 16 | 17 |
| Total estimated jobs | 113 | 60 | 60 |
| Total estimated wages and salary disbursements The monetary remuneration of employees, including compensation of officers, commissions, tips, and bonus and receipts-in-kind that represent income to the recipient. | \$2 million | \$1.2 million | \$1.1 million |
| Total estimated value-added activity Contribution to Gross State Product analogous to GDP (gross domestic product), output excluding the intermediate inputs (primarily compensation and profit). | \$3.4million | \$2.5 million | \$2.2 million |
| Total estimated gross economic activity Amount of production in total sales, includes intermediate goods purchased as well as value-added (compensation plus profit). | \$5.8 million | \$4.8 million | \$4.5 million |

Source: Scenarios calculated using the Regional Economic Models, Inc. (REMI) Minnesota Forecasting and Simulation Model, December 2005, MPCA Environmental Assistance Division, Wayne Gjerde

Pollution prevention tools

The pollution prevention program provides assistance to Minnesota businesses, nonprofits, and other government organizations in several different ways. Financial assistance through grants and loans allow organizations to overcome the challenge of making the initial capital investments that come with implementing some pollution prevention techniques. Technical assistance serves as a means to introduce organizations to new technologies, process efficiencies or product design improvements, and also help resolve the concerns that accompany such changes.

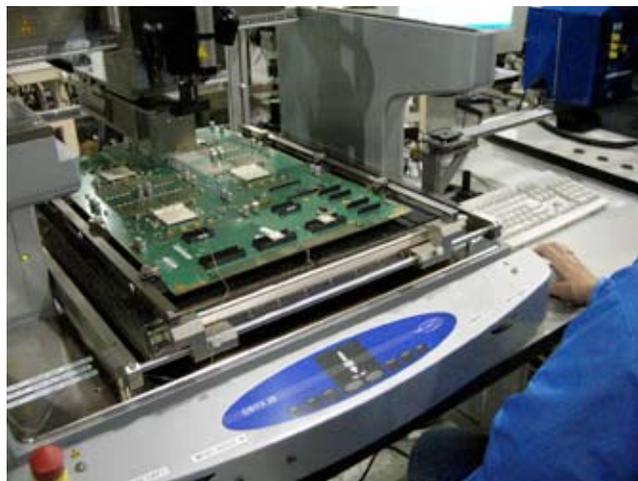
Financial assistance

Financial assistance in the form of grants and loans continues to be key for facilitating continued progress in pollution prevention in the state. Recipients contribute at least a dollar-to-dollar match, which typically generates significant financial payback on their investment through waste reduction. The following projects were awarded grants and loans totaling \$176,200 and leveraged \$939,577 in matching funds.

Lead-free electronics assembly

Through a \$45,000 pollution prevention grant, Benchmark Electronics in Winona eliminates an estimated 50 pounds of lead waste annually by converting to lead-free solder for electronic assembly of a product. If all products are assembled in the plant with lead-free solder in the future, over 7,000 pounds of lead waste from the facility will be eliminated.

The project which documents a detailed sequence of conversion steps will also be shared with other Minnesota electronic assemblers. Conversion to non-lead solder is imperative for Minnesota companies that want to remain competitive in the European market, which is restricting use of lead through the RoHS Act (Restrictions on Hazardous Substances) effective July 2006.



Rework equipment used as part of the non-lead solder assembly process at Benchmark Electronics (Winona).

Sustainable building at Augsburg College

Though a \$25,000 waste reduction grant, Augsburg College's design team (Holabird & Root) conducted LEED (Lead in Energy and Environmental Design) and Minnesota Society of Green Building analysis of a proposed science building design and determined the building would meet at least the LEED certified level. Energy design modeling shows that the design will provide simple payback in 2.8 years from energy efficiency investments, to achieve overall efficiency 60 percent better than the same building designed to standard Minnesota energy code.

This project is just the beginning for the college, which is interested in continuing to incorporate sustainable design into future campus projects. Augsburg College is promoting proposed building design features to the campus community, alumni, and potential donors as part of their commitment to sustainable design.

Southeast Minneapolis Pollution Prevention Project

The Southeast Como Improvement Association (SECIA) in Minneapolis recently completed a \$21,200 grant project where the primary goal was to engage in cooperative efforts with neighboring manufacturers to employ pollution prevention techniques in order to reduce air emissions, including ozone precursors, through the use of stakeholder dialogues and written good neighbor agreements. The association wanted to build on its previous success with reaching a good neighbor agreement with Ritrama, Inc. a manufacturer of decals and other pressure-sensitive materials, to reduce toluene emissions.

In 2004, SECIA was able to secure a good neighbor agreement with Rock-Tenn, a manufacturer of recycled paperboard and packaging, which had reduced VOC emissions by 670 tons in 2003 and committed to an additional 95 ton reduction in 2004. In return, SECIA helped Rock-Tenn secure a summer intern through the Minnesota Technical Assistance Program that identified several significant energy conservation opportunities and has pledged to work with Rock-Tenn as they pursue plans for a Biomass Combined Heat and Power Plant to provide steam and energy after the Xcel Energy High Bridge power plant is converted to natural gas in 2008.

Profile Powder Coating

In the summer of 2005, the Profile Powder Coating company installed new powder coating equipment for medium density fiberboard (often used for wood cabinet shelving). This technology improvement, which is allowing the company to reclaim and reuse 88,000 pounds of powder and save \$270,000 annually, was financed through an \$85,000 environmental assistance loan and matching funds. The loans are generating additional cost savings from the replacement of a convection oven with an infrared curing oven and the upgrade to a more efficient air compressor. The result is a 33 percent reduction in energy usage per part, for an additional \$240,000 annual cost savings.

Technical assistance

Pollution prevention technical assistance is a proven means to achieve implementation. A 1999 survey of manufacturers showed that on-site technical assistance ranked as one of the highest needs by Minnesota facilities. The state has sponsored several technical assistance providers in Minnesota, including partnerships with the University of Minnesota and the Minnesota Chamber of Commerce.

Minnesota Technical Assistance Program

The Minnesota Technical Assistance Program (MnTAP) provides pollution prevention technical assistance to manufacturers and service industries throughout Minnesota. On-site and telephone assistance is provided by engineering staff with numerous years of technical expertise across a wide array of industries. These specialists help to determine efficiency gains for manufacturing processes, and material or chemical substitutions, which result in lower costs and risks.

MnTAP is funded through an \$800,000 annual state grant to the University of Minnesota. Over the last two years (2004–2005), facilities receiving MnTAP assistance have saved over \$4.8 million dollars, prevented 70.5 million pounds of waste, and conserved 40.3 million gallons of water. Every dollar of state funding MnTAP receives results in three dollars in annual savings for Minnesota industry.

2004-2005 Environmental and Economic Impact Results

| Service provided | Waste reduced (pounds) | Water conserved (gallons) | Cost savings (\$) | Waste reused (pounds) |
|----------------------|------------------------|---------------------------|-------------------|-----------------------|
| Site visits | 7,151,571 | 27,177,000 | \$1,084,816 | |
| Student interns* | 63,383,750 | 13,195,000 | \$808,000 | |
| Materials exchange** | | | \$2,934,957 | 11,274,215 |

* Includes Hibbing Taconite concentrate iron ore recovery.

** MnTAP-covered areas of the state accounted for 77% of the materials exchanges that took place and 44% of the cost savings documented.

Technology diffusion

Technology diffusion accelerates adoption of pollution prevention technologies in the marketplace. MnTAP is using the technology diffusion model developed by the University of Illinois, Waste Management Resource Center (WMRC) to achieve a greater rate of pollution prevention implementation in Minnesota. Partners include the University of Illinois–WMRC and the University of Louisville, Kentucky Pollution Prevention Center.

The technology diffusion model is designed to identify pollution prevention technology needs in targeted business sectors and facilitate the adoption of these technologies through demonstrations and pilot trials. MnTAP's technology diffusion efforts are focused on four industry sectors: fiberglass reinforced plastics, wood finishing, metal casting, and metal finishing.

Pollution prevention and energy efficiency

MnTAP has focused its partnering, training, and fundraising in 2005 to include integrating energy efficiency with MnTAP's pollution prevention assistance. This has led to partnerships with various organizations that will help provide resources to offer energy efficiency assistance.

Three Minnesota companies evaluated energy conservation opportunities using MnTAP interns in 2004, resulting in identifying opportunities with the potential to save a total of 33,250 MMBtus annually through insulation upgrades and equipment and procedure changes. In 2005, one company used a MnTAP intern to identify equipment changes that would save up to 8,650 MMBtus per year.

Site visits

Site visits are a preferred way of working with companies due to the one-on-one interaction that MnTAP has with the company, and are a practical way to help businesses get pollution prevention done. Site visits are also an important way to promote team formation, identify potential student intern projects, and identify potential grant or loan opportunities.

A total of 220 site visits were conducted in the past two years, primarily with food processing, fabricated metal products, wastewater treatment plants, and healthcare facilities. These site visits were conducted at 126 different industrial facilities. Facility pollution prevention teams are a significant part of MnTAP's on-site work. MnTAP currently has nine teams at work, primarily in food companies. For site visits conducted in 2004 and 2005, companies were able to reduce 7 million pounds of waste, conserve 27 million gallons of water, and save more than \$1 million dollars.

Student interns

Companies not able to research pollution prevention projects due to lack of time or money have received a MnTAP student intern for help. By developing effective, specific solutions to reduce waste, interns help companies save operating costs and reduce regulatory compliance burden, as well as decrease their environmental impacts. Over the last two years, the intern program identified opportunities to annually eliminate up to 63 million pounds of waste, conserve 13.2 million gallons of water, and save more than \$800,000 for partner facilities.

Materials exchange

The Minnesota Materials Exchange Alliance, coordinated through MnTAP, is a service that connects businesses that can use one company's waste as another company's raw material. The materials exchange online listings and personal assistance helps facilities find low- or no-cost materials, save money on disposal costs, and find new markets for surplus materials. In 2004 and 2005, more than 11.3 million pounds of waste was converted to other facilities' raw materials, saving more than \$2.9 million.

Retired Engineers Technical Assistance Program

Minnesota's Retired Engineers Technical Assistance Program (RETAP) focuses on waste and energy use reduction assistance to non-manufacturing commercial and service facilities not covered by MnTAP. The assistance is provided by retired engineers and scientists, each with many years of experience. At the beginning of 2004, the RETAP program co-located with MnTAP to reduce operational costs, as well as leverage staff expertise and resources.

For 2004 and 2005, the program performed 30 on-site assessments, provided technical assistance to



Phosphorus Reduction in the Upper Mississippi River Basin

This two-year project, funded jointly by the McKnight Foundation, the U.S. EPA Region 5, and the Minnesota Pollution Control Agency (MPCA), focused on the use of pollution prevention strategies in phosphorus management plans and technical assistance to reduce loading of phosphorus and other pollutants from industrial sources in the Upper Mississippi River Basin.

Technical assistance included 120 phone calls with Publicly Owned Treatment Works (POTWs) and 61 with industries, 36 site visits to POTWs and 51 site visits to industry, facilitating five pollution prevention teams, and sponsoring three student interns in companies. This level of technical assistance resulted in 35,000 pounds of phosphorus reduced, 4.5 million pounds of biological oxygen demand and total suspended solids reduced, 37 million gallons of water conserved, and \$348,000 in cost savings to companies.

Companies benefit from pollution prevention because greater efficiencies minimize the loss of raw materials and result in reduced wastewater surcharges. Cities benefit from pollution prevention because less wastewater loading means less need for chemical treatment and reduced operating costs.

Through the phosphorus management plan process, relationships developed between MnTAP and POTWs through which MnTAP could promote pollution prevention and reach business clients. POTWs recognized the value of pollution prevention practices for their wastewater treatment plants and their industrial users, encouraging industry to use pollution prevention in order to meet current and future phosphorus reduction goals and ensure regulatory compliance.

A full report on this project is available at <http://mntap.umn.edu/potw/McKnight05.pdf>.

the Minnesota Department of Corrections, helped the Phillips Community Energy Cooperative with energy use reduction projects, and assisted the MPCA's Sustainable Schools project. As an example of the impact of RETAP's on-site assessments, a school district RETAP worked with was able to save second quarter 2005 utility costs in the amount of \$5,384 for two facilities compared to the same time frame in 2004. More information on Minnesota RETAP is available at <http://www.moea.state.mn.us/p2/retap.cfm>.

Pollution prevention activities

In addition to the state's primary technical and financial assistance activities, the pollution prevention program has also worked to promote design advances in manufacturing and construction to improve environmental performance as well as work with schools, other government agencies, and additional partners to identify and facilitate the implementation of practices that lead to pollution prevention.

Design for the environment

The design stage of product development provides an unparalleled window of opportunity for championing the environment. This is the time when the materials and energy used to manufacture a product are determined. Once these decisions are made, the environmental impacts of the product for its entire lifecycle are largely set.

A number of Minnesota companies, including IBM (Rochester), Medtronic, Tennant Company, BAE Systems, and 3M, recognize the significance of this stage of manufacture and have integrated design for the environment (DfE) into their product design processes.

Continued support of this emerging trend is occurring through the recent development of additional DfE resources, including a "Better by Design" video and an updated implementation guide book. Implementation grants at General Mills (Chanhasen Plant) and Medtronic, Inc. have been successfully completed and are documented in previous editions of the Pollution Prevention Evaluation Report and in case studies available as resources for other Minnesota manufacturers. More information on Minnesota's Design for Environment program is available at <http://www.moea.state.mn.us/p2/dfe.cfm>.

Let's Get the Lead Out! Program

Through an education campaign, the former OEA partnered with the Minnesota Department of Natural Resources to reduce the amount of lead deposited into Minnesota waterways by informing the public about alternatives to lead fishing sinkers and jigs. Over the past three summers, a public education and fishing tackle exchange effort organized over 80 collection events that yielded approximately 3,000 pounds of lead fishing tackle that was replaced with lead-free alternatives.

Thanks in part to this outreach effort, lead-free fishing sinkers and jigs have gone from a novelty item to the mainstream and are now made by a variety of manufacturers, including several based in Minnesota. Lead-free fishing tackle can now be found at major fishing tackle retailers such as Bass Pro Shops, Cabela's, and Gander Mountain. More information on Let's Get the Lead Out! is available at <http://www.moea.state.mn.us/reduce/sinkers.cfm>.



Pollution prevention in the healthcare sector

Hospitals for a Healthy Environment (H2E) initiative helps hospitals eliminate mercury from the waste stream, reduce waste generated by the facility to meet a total waste volume reduction of 50 percent by 2010, and to minimize persistent, bioaccumulative toxic (PBT) chemicals. MnTAP worked under a U.S. EPA Region 5 grant to use H2E tools to demonstrate the effectiveness of pollution prevention at healthcare facilities from April 2002 to June 2005.

As a result of MnTAP's work on this project, approximately 40 Minnesota healthcare facilities (including 25 percent of Minnesota hospitals) are engaged in documented pollution prevention efforts at some level. Nineteen facilities have signed on as H2E partners. Approximately 29 facilities have either eliminated 75 percent of their mercury or are working toward that goal. These facilities have eliminated 480 pounds of mercury, 43,600 pounds of hazardous chemicals, and 274,000 pounds of solid waste, resulting in savings of \$207,000. This number does not fully reflect savings due to decreased spill clean-up costs, hazardous waste disposal, and decreased liability or compliance costs. Additional reductions and savings are expected. More information about MnTAP's work with hospitals is available at <http://mntap.umn.edu/health/hospitals.htm>.



Public Health/Agriculture Laboratory building at 601 North Robert Street

Sustainable building

Buildings are costly to construct and expensive to operate—they have a major impact on our environment, consuming 70 percent of all electricity, emitting 30 percent of the greenhouse gases in the United States, and using 40 percent of all raw materials globally. Sustainable buildings are good public policy and save taxpayer dollars because they are designed to use resources more efficiently and create more productive workplaces. Integrated design allows sustainable buildings to be built within budget, but cost less to operate and maintain. Sustainable buildings exceed the state energy code by at least 30 percent, use materials efficiently to achieve lowest lifetime costs, are more durable and flexible, and keep reusable, recyclable, and toxic building materials out of landfills.

Promotion of sustainable building is occurring through education and training of Minnesota building professionals. LEED (Leadership in Energy and Environmental Design) accredited state staff are providing direct technical assistance, developing information resources, administering grant projects, and facilitating recognition through awards. Staff took a lead role in development of the Minnesota Sustainable Building (B3) Guidelines, which have the potential to place Minnesota government at the forefront of efficient and sustainable building design, construction, operation, and maintenance. The guidelines are also being applied to buildings leased by the state.

Three new state buildings designed with sustainable building requirements opened in the fall of 2005. These buildings will generate a savings of more than \$1 million per year in combined operational costs and avoid 5,900 tons of air pollution annually. Case studies of sustainable buildings as well as a wealth of online resources, are available at <http://www.moea.state.mn.us/greenbuilding/index.cfm>.

Lead-free wheel weights

In response to concerns related to installing, handling, and recycling lead wheel weights, the Department of Administration Transportation Management Division (TMD) participated in a grant project to demonstrate the feasibility and performance of non-lead wheel weights. Each year in Minnesota, an estimated 30 tons of lead weights fall off vehicles during normal use. The weights are quickly destroyed in traffic, dispersing lead into the environment.

Initial testing involved several types of non-lead wheel weights for evaluation on steel and alloy rims on passenger vehicles in TMD's state motor pool fleet. TMD soon found that the best of the products was an iron clip-on weight. One problem with any clip-on weight system, however, is the need to stock a large inventory of weights to fit different vehicle manufacturers' steel and alloy rim profiles.

In the summer of 2004, the former OEA learned of a Minnesota manufacturer's development of an extrudable high density tungsten-polymer used in manufacturing non-lead fishing weights and tackle. This manufacturer was interested in determining whether the material could be used for an adhesive wheel weight. Adhesive weights provide a significant advantage in terms of wheel weight inventory for a tire balancing shop. They can fit any wheel profile, and the material comes in a coil that is pre-scored for standard weights, such as five grams or one-quarter ounce.

The former OEA worked with the manufacturer and staff at TMD to jointly identify a material, profile, and adhesive combination that worked well on all rims in the state motor pool fleet. This product has been used exclusively by TMD since the beginning of 2005.

As a result of this success, the Minnesota-based manufacturer of the weight is now developing a plan to increase production and market the universal adhesive non-lead weight more widely, initially to other government and corporate fleets, and then to aftermarket tire installers.

With the help of Clancy, the nation's only mercury-detecting dog, program staff removed more than 1,000 pounds of mercury from the state's schools.



Minnesota Healthy Schools Program

This pilot project, currently involving three Minnesota schools—Hutchinson High School, Houston K-12, and Pine Point Elementary (Ponsford)—is exploring ways to make changes to school buildings or operations that will give students and staff a healthier environment that reduces sickness and actually helps improve their work and study performance.

Early examples of activities that have been implemented include establishing a “no-idling” program for school buses at Houston K-12 and changes made to the building heating system controls at Pine Point Elementary, which has helped to lower the school's energy bills. More results will be available in mid-2006 and more information on the Healthy Schools program is available at <http://www.moea.state.mn.us/ee/mnhealthyschools.cfm>.

Mercury-Free Zone Program

For the past four years, the Minnesota Pollution Control Agency's Mercury-Free Zone Program has partnered with Minnesota school districts and individual schools, with the University of Minnesota, and with state and county environmental health staff to remove mercury and mercury-containing equipment from middle and high schools throughout the state. With the help of Clancy, the nation's only mercury-detecting dog, program staff removed more than 1,000 pounds of mercury from the state's schools.

Pledging schools agree to inventory their facilities for all mercury and mercury-containing equipment and, at no cost to the school, are given mercury-free equipment in exchange (funding for this program

comes out of the State Environmental Fund). Each school also agrees to allow Mercury-Free Zone staff to assess their buildings for mercury spills, especially in the chemistry laboratories and storerooms, with the agreement that any discovered mercury will be cleaned up and removed from the premises. Schools are also offered a mercury curriculum and educational presentations provided by Mercury-Free Zone staff and Clancy.

To date, approximately 500 of the state's approximate 1,840 middle and high schools have pledged to be mercury-free, with approximately 170 of these being assessed for mercury contamination. Close to 17,000 Minnesota students, teachers, and adults have been educated as to the dangers of mercury and the capabilities of Clancy. More information on the Mercury-Free Zone Program is available at <http://www.pca.state.mn.us/programs/mercury-free/index.html>.

Interagency Pollution Prevention Advisory Team

The Interagency Pollution Prevention Advisory Team (IPPAT) is a group of participating state agencies that works to implement the executive order for pollution prevention, including pollution prevention, waste reduction, and energy and resource conservation. These agencies meet quarterly to share results of implementing pollution prevention activities within their respective organizations. These activities have decreased generation of toxic chemicals and waste through activities such as using less toxic cleaning supplies and alternative transportation options.

Simple examples of steps taken by agencies include:

- ▶ The Department of Employee Relations began implementing a computer monitor power management policy. By the end of FY 2005, 25 percent of the department's computer monitors were configured to turn off the monitor after 20 minutes of inactivity, saving of 200 kWh, or \$16, per monitor annually. DOER will expand this program to at least 75 percent of its monitors by the end of FY 2006.
- ▶ The Department of Natural Resources purchased and set up teleconferencing equipment. In 12 meetings, involving from 14 to 25 regional staff each, travel was reduced by over 15,000 miles, saving an estimated 800 gallons of fuel and associated emissions.
- ▶ IPPAT was also designated as the entity to coordinate implementation of the August 2004 executive order on reducing air pollution, which requires agencies to select two activities from a group of eight that are designed to conserve energy and fuel use. More information about IPPAT, including the executive order and summary reports of state agency progress in preventing pollution, is available at <http://www.moea.state.mn.us/lc/ippat.cfm>.

Minnesota Mercury Recovery

Minnesota Mercury Recovery is a voluntary partnership of Minnesota Waste Wise, the Minnesota Chamber of Commerce, the Minnesota Pollution Control Agency, and the Alliance of Auto Manufacturers. While not pollution prevention, this program does serve to prevent mercury releases as old automobiles are salvaged. The program is funded by the Alliance of Auto Manufacturers and aims to provide an efficient means to recycle mercury convenience lighting switches from automobiles and to avoid potentially burdensome legislative mandates.

Minnesota Mercury Recovery provides free technical assistance and recycling to salvage yards throughout the state. Recycling containers, recycling costs, and shipping charges are covered by the program. Approximately 180 salvage yards throughout Minnesota are participating in the program and roughly 50 pounds of mercury (or 22,500 switches) have been recovered since the program began in 2004.

Clean Air Minnesota

The MPCA is a founding member of Clean Air Minnesota (CAM), a voluntary partnership of government, industry, and nonprofits working to keep Minnesota in compliance with federal air

The Minnesota Mercury Recovery partnership works to prevent mercury releases as old automobiles are salvaged.





Clean Air Minnesota worked with Ramsey County to install retrofit equipment on trucks that reduces problematic diesel emissions.

quality standards through outreach, education, and pollution prevention. In 2004, the former Office of Environmental Assistance awarded a \$30,000 grant to Clean Air Minnesota to implement two emissions reduction pilot projects, one involving the installation of diesel retrofit equipment and another to develop fleet management practices designed to reduce vehicle emissions.

Diesel retrofits. In the diesel retrofit project, CAM and its partners are coordinating the installation of retrofits on local fleet operators' equipment to reduce emissions of ozone precursors, fine particulate matter, and air toxics. While diesel retrofits are a form of pollution control rather than pollution prevention, they do serve as an effective tool in reducing exposure to diesel emissions. Initially, CAM worked with Ramsey County and Donaldson Corporation to install diesel oxidation catalysts on three Ramsey County trucks. Building upon that experience, CAM is funding retrofits on 23 additional vehicles. CAM is also working to retrofit a number of the buses the University of Minnesota uses for transit routes at the Twin Cities campus.

Fleet management. Clean Air Minnesota is also partnering with local businesses, government agencies, trade associations, and the University of Minnesota to evaluate fleet management practices and to quantify associated fuel use reductions, cost savings, emission reductions, and program costs. For example, Hennepin County is crafting a new anti-idling policy, which may serve as a model for other metropolitan counties. Xcel Energy's new fleet policies have led to a three percent fuel consumption reduction, even though the number of miles driven was up six percent.

Based on these findings and analysis, CAM is developing a Fleet Emission-Reduction Toolkit, which will outline strategies companies can implement to help improve air quality. Fleet operators will learn useful techniques to make a business case for modifying fleet operations for business and environmental benefits.

Policy issues affecting pollution prevention efforts

As this report demonstrates, there have been a number of successes in advancing pollution prevention during the past two years. However, proposed changes at the federal level threaten the continued success of Minnesota's pollution prevention program.

Changes in funding structure

One of the cornerstones of the Toxic Pollution Prevention Act (TPPA) is the mechanism established to fund pollution prevention programs. Technical and financial assistance provided through these programs is not only key for continued progress in pollution prevention throughout the state, but it also generates economic benefits. **For every dollar spent by the state's primary technical assistance provider, the Minnesota Technical Assistance Program, industry saves three dollars in reduced raw material, energy, and waste management costs.**

The fees placed on toxic chemical releases are relative, the higher the releases, the higher the fee paid by the reporter. Conversely, if a company cuts its releases, the fee would be cut proportionately. In addition to this equitable fee structure, another characteristic of the fee is the direct tie to state technical assistance and grant programs to help businesses reduce the amount of toxic chemicals used and released, along with costs.

Since the TPPA was passed in 1990, revenues from fees have ranged from \$800,000 to \$1.2 million per year. For the upcoming years, if the programs remain the same, revenues will maintain the current level of approximately \$1.2 million each year.

The fees collected in Minnesota are tied directly to toxic chemical release inventory (Form R) reports

submitted to the Environmental Protection Agency. If a company, for whatever reason, no longer has to report their toxic chemical releases, they no longer pay a fee. Starting with the 1995 reporting year, EPA added an alternate reporting form called the Form A. When this occurred, companies, who reported less than 500 pounds per year, were no longer required to report. This had direct impact on reducing the total amount of revenue collected from the fees.

In October 2005, the EPA proposed to raise the exemption level by a factor of ten, to 5,000 pounds. This will have a significant effect on our fees, since about 70 facilities will no longer need to report releases, resulting in a revenue reduction of \$80,000 and a loss of approximately 300 of the 1,250 Form R reports currently submitted by Minnesota TRI reporters. Since these facilities would no longer report, the state would no longer have specific data about their toxic chemical releases or generation. As a result, the state would also no longer be able to track their progress in preventing pollution and would be hindered in its ability to offer technical or financial assistance.

The EPA also proposed to allow a certain class of chemicals, known as persistent, bioaccumulative toxic (PBT) chemicals, to be reported using the Form A provided they have no disposal or other releases to the environment, and do not manage more than 500 pounds (in sum) of the chemical by treatment, energy recovery, or recycling. Under current rules, facilities may not use Form A for PBT chemicals at all. Should this change occur, Minnesota would lose approximately 50 of the 250 Form Rs submitted annually for PBT chemicals. It would also eliminate available TRI data for 14 Minnesota industrial facilities and would significantly impact the quality of our data for tracking pollution prevention efforts for PBT chemicals such as lead, benzo (g,h,i) perylene, and polycyclic aromatic compounds.

EPA is also considering changing reporting to every other year, instead of every year. If this change goes forward, our state pollution prevention programs would lose one-half their funding or \$600,000 each year. Among other cuts, this would result in a 50 percent cut in MnTAP staff, as well as cuts to other collaborative assistance programs and partnerships such as Minnesota Waste Wise and the Minnesota Retired Engineers Program.

Supporting continued progress

Since enactment nearly 15 years ago, the Minnesota Toxic Pollution Prevention Act (TPPA) has continued to provide a solid base for sustained growth of pollution prevention throughout the state. Preserving its incentive-based funding mechanism is essential for providing necessary resources and support for continued progress. Should changes to TRI reporting occur at the federal level, statutory changes to the TPPA may be needed in the future to ensure that our effective pollution prevention programs continue to be funded and are able to provide services at the current level.

Minnesota Pollution Control Agency

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