2008 **Pollution Prevention** Evaluation Report

Minnesota Pollution Control Agency

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Introduction

Under the Minnesota Toxic Pollution Prevention Act (TPPA), the policy of the state is to eliminate or reduce at the source the use, generation, or release of toxic pollutants and hazardous wastes.

Pollution prevention is a front-end rather than end-of-pipe solution to waste. When pollution prevention rather than pollution control is used as a means to reduce the use and release of toxic chemicals, significant economic and environmental advantages often result. Preventing pollution can include finding less or non-toxic substitutes for raw materials, redesigning products or production processes, eliminating leaks and spills, and recycling and reusing materials within a system.

Environmental benefits

Reducing the quantity and toxicity of the waste, air emissions, and water discharges that are created through manufacturing products decreases the potential for harm in the event of an accidental or intentional release.

Economic benefits

There are also important economic benefits. Minnesota's businesses have saved millions of dollars by implementing pollution prevention measures that use less toxic materials or more efficient processes to produce goods and provide services. Businesses benefit through eliminating costly end-of-process pollution control equipment and hazardous waste management; conserving resources; improving worker safety and community relations; improving recyclability of manufacturing materials and products, and decreasing liability and the costs of managing the product in the general waste stream at the end of its useful life.

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 kept waste generation and releases from significantly increasing. In the case of toxic chemical releases, these efforts have helped to steadily reduce the amount 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 Planning and Community Right-to-Know Act (EPCRA) program at the Department of Public Safety maintains TRI data. The most current available data is from the 2005 reporting year and provides information on the management of 117 different chemicals reported by 421 facilities in Minnesota.

Statewide trends for TRI 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 2005 data from Minnesota's 421 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 always possible to know the cause of these reductions with certainty. Our picture has become clearer due to a TRI reporting change by one facility that is discussed below in greater detail.

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.

Table 1: Total amount of TRI chemicals generated (in millions of pounds)

Year	2001	2002	2003	2004	2005
Non-manufacturers (electric utilities, chemical distributors)	13.6	14.0	14.6	13.2	13.6
Recyclers (metals and solvents)	156.0	166.3	181.6	199.4	0.9*
Waste treatment (incineration)	14.0	20.0	25.2	18.6	17.2
Manufacturers	138.6	116.9	133.6	134.7	140.5
Total TRI chemical generation	**322.2**	**317.2**	**355.0**	**365.9**	**172.1**

As Table 1 shows, toxic chemical generation declined significantly in 2005, with total generation decreasing statewide from nearly 366 million to 172 million pounds. However, the decline in waste generation is what's known as a "paper change," as it is largely a result of Gopher Resource, a recycler of automotive batteries and other lead-containing wastes, changing their reporting process to reporting only the wastes generated from their recycling processes, rather than having changed anything about the processes they employ. This can also be seen by looking at how TRI chemicals generated by recyclers declined by 99.5 percent from 2004 to 2005.

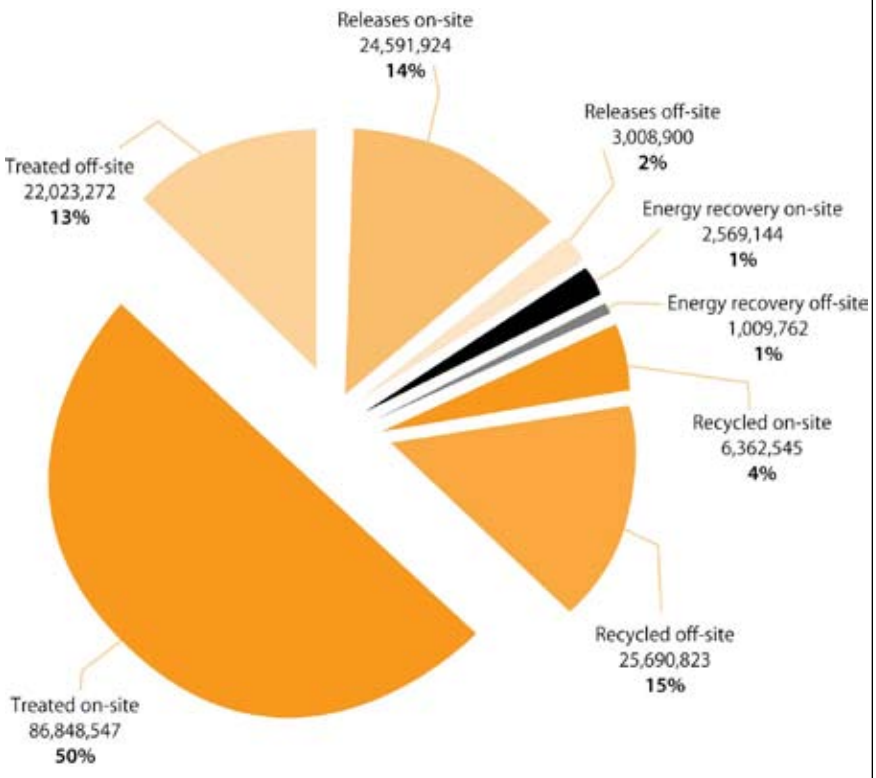
*Previously, Gopher Resource reported all of the lead and other wastes they accept, or their throughput. What this represented was the total amount of lead and other metals they handle contained in the waste products they receive over the course of a year that are then processed so that they can be used to make new products. Starting in 2005, Gopher Resource, which recycles approximately 190 million pounds of lead annually, reports only the wastes generated from their recycling processes, which is more in line with what other TRI reporters do and provides a more accurate picture specifically of TRI chemical waste generation in Minnesota.

How Minnesota businesses manage TRI chemicals

In 2005, Minnesota's 421 TRI reporting facilities generated a total of 172 million pounds of toxic chemical wastes, which were managed as follows:

- Treated: Approximately 63 percent of the TRI chemicals reported in Minnesota are treated, which includes chemicals that are incinerated, stabilized, or neutralized.
- Recycled: Approximately 19 percent of the TRI chemicals reported in Minnesota are recycled.
- Released: About 16 percent of TRI chemicals are released into the environment, either on- or offsite. 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 two 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.

Chart 1: How toxic chemicals are managed in Minnesota (2005)



As Chart 1 shows, approximately 120 million pounds, or 69 percent, of these wastes are managed or released on-site, or within the boundaries of the facility, with the remaining 31 percent transferred to other facilities to be managed or disposed.

With the TRI reporting change by Gopher Resource discussed earlier, we gain a much clearer picture of how wastes are managed in Minnesota. A far greater percentage of TRI chemical wastes are managed through treatment than recycling. Some of this is due to the nature of the chemical waste, such as acid and caustic wastes that are primarily managed through neutralization on-site, whereas metal wastes are largely sent off-site for recycling. Of note is that a much larger percentage of solvent wastes are managed through treatment than recycling. Of the 64 million pounds of TRI chemicals that are readily classifiable as solvent wastes, about 6.2 million pounds were managed through recycling (4.5 million on-site and 1.7 million off-site) whereas 49.1 million pounds were managed through treatment (30.5 million on-site and 18.6 million sent off-site). This is an issue that will be explored more closely to determine whether there are opportunities to reduce solvent use or increase solvent recycling.

In general, Minnesota's pollution prevention efforts focus on working with manufacturers to reduce waste through improving the efficiency of production processes or finding ways to use less toxic chemicals in those processes. A look at how manufacturers manage the TRI chemical waste they generate is shown in Chart 2.

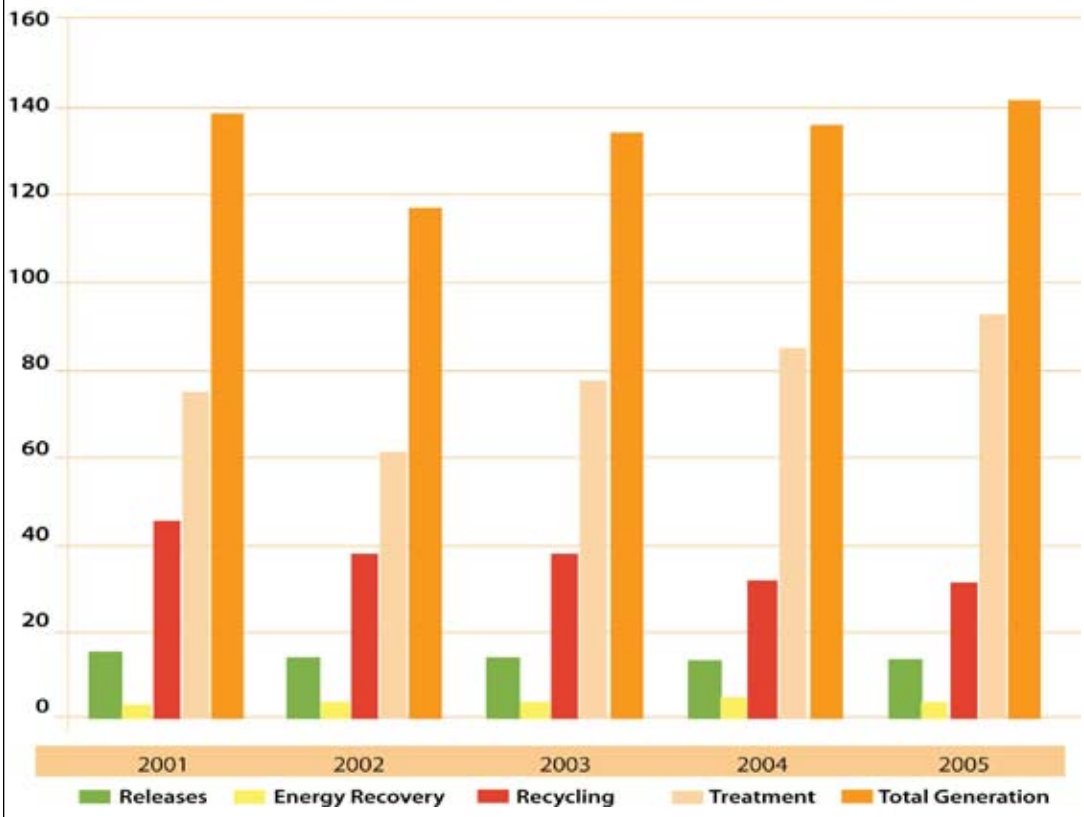


Chart 2: Amount of TRI chemicals generated by manufacturers (in millions of pounds)

As Chart 2 shows, manufacturers continue to make some progress in reducing releases, which declined nearly nine percent between 2001 and 2005. However, the same progress is not being seen in reducing overall TRI chemical generation, which declined significantly from 2001 to 2002, but has since risen back to eclipse 2001 levels. Instead, manufacturers are reporting more on-site treatment, which has risen over 20 percent from

Year	2001	2002	2003	2004	2005
Releases	15.1	14.1	14.1	13.1	13.9
Energy recovery	3.3	3.5	3.5	5.0	3.4
Recycling	45.5	38.6	38.1	32.0	30.8
Treatment	74.7	60.7	77.9	84.6	92.4
Total TRI chemical generation	**138.6**	**116.9**	**133.6**	**134.7**	**140.5**

2001 to 2005. Additionally, the percentage of waste recycled by manufacturers continues to decline, from 33 percent in 2001 to 22 percent in 2005. This coincides with a trend of increasing waste management through treatment, which has risen from 54 percent in 2001 to 66 percent in 2005.

To make further progress in pollution prevention in Minnesota, an increased focus is needed on providing assistance and incentives for manufacturers to embrace activities such as design for environment (DfE), green chemistry, and other approaches that reduce toxic chemical waste

generation, not just releases. This will be discussed further in the "Opportunities to further pollution prevention" section of this report.

Overall trends in TRI releases

In spite of an increase in generation, TRI chemical releases have declined 15 percent over the past five years, though there was a five percent increase in releases from 2004 to 2005. The vast majority of TRI chemical releases come from manufacturers and electric utilities. Increased releases from the coal-fired electric utilities coincide with increasing demand for electric power from their various industrial, commercial, and residential customers.

Table 2: Total Amount of TRI chemicals released (in millions of pounds)

Year	2001	2002	2003	2004	2005
Non-manufacturers (electric utilities, chemical distributors)	12.1	12.6	13.3	11.9	12.1
Recyclers (metals and solvents)	4.3	3.6	3.5	0.3	0.4
Waste treatment (incineration)	0.9	0.6	0.9	1.0	1.2
Manufacturers	15.1	14.1	14.1	13.1	13.9
Total TRI chemical releases	**32.4**	**30.9**	**31.8**	**26.3**	**27.6**

Pollution prevention activities

The MPCA engages in a variety of pollution prevention approaches. Some involve taking advantage of opportunities to integrate pollution prevention into regulatory programs so that a greater focus is put on avoiding pollution rather than managing it. Other efforts may involve outreach to particular industrial or institutional sectors to assist them in better understanding environmental consequences or compliance responsibilities, which then often leads to greater interest in alternatives that minimize those concerns.

MPCA staff work with local governments, developers, and community organizations to demonstrate how design and planning approaches can be used to minimize stormwater runoff or keep it from being contaminated. MPCA also uses grants and loans to support projects that pilot new ideas and technologies, help facilities upgrade to more efficient process equipment, or develop tools that support making better choices for our environment. In addition, the Governor's Awards for Excellence in Waste and Pollution Prevention program administered by MPCA recognizes organizations that are making greater efforts to improve their environmental performance. Finally, MPCA's technical assistance partners provide more specialized hands-on assistance to organizations that need help addressing their environmental concerns.

Table 3 presents the results of pollution prevention assistance work by MPCA and its partners in 2006-2007. MPCA's technical assistance partners saved their clients over four dollars for every dollar invested in these programs.

Table 3: Summary of Pollution Prevention Assistance Results

	Waste reduced *(pounds)*	**Waste reused** *(pounds)*	**Water conserved** *(gallons)*	**Energy conserved** *(Kilowatt-hours)*	**Cost savings**
Healthcare	150,830	NA	ND	NA	ND
Business and agriculture	ND	NA	536,000	18,000	$54,000
Construction	ND	ND	ND	ND	ND
Communities	1,725	NA	ND	NA	$305,000
Technical assistance	6.3 million	11.8 million	18.3 million	20.5 million	$7,882,000
Total	**6.45 million**	**11.8 million**	**18.8 million**	**20.52 million**	**$8,241,000**

NA - not applicable to projects outlined in this area

ND - ongoing project, results have not yet been documented

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

The Governor's Awards Program provides an opportunity to recognize and honor businesses, nonprofits, government agencies, public institutions, and private institutions for their efforts to protect the environment. These organizations have developed innovative ways to prevent pollution and waste, improve resource efficiency, and move toward increased sustainability. There were two categories of Governor's Awards in 2006; one for businesses, private institutions, and nonprofits and MnGREAT, which is for government and public institutions.

In 2007, a new category, Partnerships, was created to address collaboration between private and public organizations. Another change to the program in 2007 was initiated by the Interagency Pollution Prevention Advisory Team, which elected to create two tiers for MnGREAT. The Honorable Mention category recognizes winners at the historical criteria level and the new Governor's Award-MnGREAT salutes the top government winners.

Table 4: 2006 & 2007 Summary of Governor's Award results

	Waste reduced *(pounds)*	Waste reused *(pounds)*	Water conserved *(gallons)*	Energy conserved	Cost savings
Governor's Awards	666,370	70.2 million	249 million	1.25 million KWh 250 million gallons of fuel	$519 million
MnGREAT Awards	1.15 million	1.05 million	25.1 billion	250,000 KWh	$3,632,000
Partnership Awards	411,600	2.68 million	45,000	9.2 million KBTU	$204,500
Total	**2.23 million**	**73.9 million**	**25.3 billion**	**1.5 million KWh 9.2 million KBTU 250 million gallons of fuel**	**$522.8 million**

2007 Governor's Awards for Excellence in Waste and Pollution Prevention

- **Latuff Brothers, Inc.** is the first auto body repair shop in Minnesota to transition from solvent-based paints to water-based paints. The environmental benefits include a decrease of over 1,000 pounds of hazardous waste per year, 3,000 pounds of VOC emissions reduced, and over 1.25 million kWh of electricity saved. Annual costs savings are approximately $17,000.
- **Medtronic's Cardiac Rhythm Disease Management** division set goals to reduce packaging size and weight, reduce packaging toxicity, replace paper manuals with electronic manuals or compact discs, reduce packaging waste in landfills, and promote recycling. The environmental benefits include an annual reduction of over 500,000 pounds of packaging waste and paper and another potential 190,000 pounds if packages are reused. Over $2.3 million in cost savings have been realized over the past two years.

- **Northwest Airlines** established a program of fuel conservation and resource management. Their fleet modernization efforts save 250 million gallons of jet fuel per year, saving more than $500 million annually.

- **Schools for Energy Efficiency** (a division of Hallberg Engineering) has designed a program for kindergarten through 12th grade schools to save energy by changing behavior throughout the district. The environmental benefits include a decrease of over 422,000 tons of carbon dioxide emissions and over 245 million gallons of water. Continued costs savings from optimized energy use now exceed $9 million.

2006 Governor's Awards for Excellence in Waste and Pollution Prevention

- **Allina Medical Laboratories** completed a chemical inventory that reduced 40,000 pounds of hazardous waste, 72,000 pounds of water pollutants, and saves $31,000 annually.

- **Northern Engraving**, a manufacturer of automotive trim, has reduced 1,370 pounds of hazardous waste, reduced 12,000 pounds of air pollutants, and saved over $100,000 in the first year alone.

- **The ReUse Center** diverts construction material from landfills and makes that material available to the public. The center has given second life to 35,000 tons of materials and typically saves customers 75 percent from the cost of an equivalent new product.

- **Sappi Cloquet, LLC** is a paper mill that identified ways to reduce waste and reduce energy use at their facility. Their efforts have resulted in 95 percent of their energy being from renewable sources, reuse of 1 million gallons of water per day, and a reduction in over 50,000 tons of carbon dioxide emissions. These measures save Sappi Cloquet $6.2 million per year.

- **Tastefully Simple** is a direct-sales company that sells ready to prepare foods. Their reduction strategies have resulted in a 33 to 50 percent reduction in waste, saving the company $100,000 per year.

- **Tennant Company** manufactures machines that clean and maintain floor surfaces. They have implemented many diverse waste reduction efforts, resulting in annual reductions of 2,000 pounds of hazardous raw materials, 3 million gallons of water, 35,000 pounds of water pollutants, and annual savings of $1.4 million.

2007 Governor's MnGREAT Awards

- **City of Minneapolis** has implemented an innovative stormwater management program, greening the city's vehicles, implementing a LEED policy for new city buildings, banning mercury products ahead of state mandates, developing an innovative low environmental cleaning policy, and reducing the city's global warming footprint.

- **Duluth Entertainment and Convention Center** participates in source separation and diversion of food residuals to WLSSD's newly established food and yard waste composting site. At the end of 2003, 40,000 pounds of food and food-contaminated paper waste had been diverted to compost. Expanded recycling efforts yielded 30 bales of cardboard and many pounds of office paper.

- **Rice Creek Watershed District - Blue Thumb** was originally developed by Rice Creek Watershed District as an outreach program to assist municipalities in meeting individual water quality goals. The Blue Thumb - Planting for Clean Water program was implemented by partners with similar goals to raise awareness about polluted runoff and to encourage homeowners to do their part to protect water quality by planting native gardens, rain gardens, and stabilize shorelines using native plants.

2007 Governor's MnGREAT Awards Honorable Mentions

- **City of Elk River - The LEED certified Elk River Library Project** was conceived as a way to support the city's commitment to energy efficency through sustainable design. Some of the features of the building include recycled content building materials, local building materials, water-saving technology, and energy efficiency designs that are 60 percent more efficient than standard building code. This is the first LEED certified library in Minnesota.

- **City of Farmington's Green Team** is a volunteer committee of city employees assembled to create and implement initiatives that will promote environmental awareness and responsibility. Issues that have been worked on so far include input into building design, new standards for park equipment, enhancing internal and external recycling and waste reduction efforts, and energy-efficient lighting.

- **MNARNG Camp Ripley Antifreeze Recycling - The Minnesota Army National Guard (MNARNG)** Combined Support and Maintenance Shop located on Camp Ripley is the largest MNARNG repair facility. An antifreeze distillation unit was purchased that would clean dirty antifreeze so that MNARNG would not need to purchase as much new antifreeze. For every 55 gallons of dirty antifreeze collected, approximately 20 gallons of antifreeze can be recovered.

- **MNARNG Camp Ripley Mattress Recycling - Camp Ripley** needed to replace several thousand mattresses that were stored in over 400 different buildings, huts, or barracks located across Camp Ripley. The large number of mattresses requiring disposal led Camp Ripley to choose the mattress recycling program run by Goodwill Industries out of Duluth, Minnesota. Recycling the mattresses saved Camp Ripley close to $32,000.

- **Olmsted County** initiated a partnership contract with the local United Way agency and copier contractor, E.O. Johnson, to provide copiers at no cost to nonprofit agencies when the county replaces and upgrades their copiers. The contractor agreed to refurbish and store the copiers until United Way notifies them of a nonprofit that could use the copier in their facility.

- **Sherburne County Board of Commissioners** adopted the Landfill Abatement Legacy Grant Program to encourage the use of post-consumer recyclable materials in municipal buildings. The Sherburne County Landfill Abatement Legacy Grant is believed to the first program in Minnesota of its kind.

2006 Governor's MnGREAT Awards

- **Carlton County Highway Department** demolished a large 1940s-era concrete building. Out of a potential 480 tons, the county sent only 1.5 tons of material to the landfill. The extra time spent sorting material was offset by the dollar amount received for recycled steel and concrete.
- **City of Mankato Wastewater Treatment Facility** added phosphorus removal and filtration so reclaimed wastewater can be piped directly to the nearby Calpine power plant for cooling water to replace evaporative losses in energy production, saving 25 billion gallons of water and reducing phosphorus by 25,000 pounds.
- **City of Plymouth** - The city's public safety building and city hall incorporates many green features that conserve more than a quarter of a million kilowatt hours of energy, the equivalent of unplugging about 25 homes.
- **Elk River Energy City** installed a landfill-gas-to-electric generating plant that generates over 20 million kilowatt hours of energy annually and is sold to Great River Energy for about $2.2 million per year.
- **Heron Lake Watershed District's WATER (Watershed Assistance Through Education and Resources)** program results from 1992 to 2005 show that phosphorous concentrations have decreased 61 percent, and suspended solids have decreased by 17 percent from the two inlets to Heron Lake.
- **Metropolitan Council Environmental Services' new Solids Management Building** has reduced air emissions of many pollutants by 95 percent and saves $3.4 million annually.
- **Minnesota Department of Transportation Office of Environmental Services** developed a bioremediation technique to treat excavated petroleum-contaminated soil using "biomounds," which has kept approximately 30,000 cubic yards of contaminated soil out of the landfill.
- **Minnesota Pollution Control Agency - The Eco Experience** worked with the Minnesota State Fair and dozens of public and private partners to create a first-of-its-kind exhibit at the 2006 Minnesota State Fair. Unique exhibits allowed approximately 350,000 Minnesota State Fair visitors to interact with cutting-edge displays on important environmental topics.
- **Ramsey-Washington Metro Watershed District** led by example and built their new building to have a minimal ecological impact and also incorporate several green building designs. One of the most innovative aspects of the site is its infiltration-based stormwater management system that uses native plants, rainwater gardens, a green roof, and a porous-asphalt parking lot.
- **Redwood County Environmental Office's Mobile Environmental Education Transport** is a custom-built, 30-foot enclosed trailer that contains many hands-on educational tools designed to teach people of all ages about environmental issues. The main objective of this unit is to increase public awareness about environmental issues facing rural Minnesota and throughout the state.
- **Shakopee Mdewakanton Sioux Community** completed construction of the most advanced wastewater reclamation facility in Minnesota. As a result, each year the facility will save approximately 85 million gallons of water; reduce biosolids by 1.1 million pounds; reduce water pollutants by 25,000 pounds; reduce water runoff by 60,000 cubic feet, and save $200,000.

- **Western Lake Superior Sanitary District (WLSSD)** started a food waste drop-site program in May 2004 as part of a continuing effort to recover and divert organic material from the district's solid waste stream. The four drop-off sites collected approximately 25 tons of food waste in 2006.

2007 Governor's Partnership Awards

- Advanced Granulating Solution, Inc. and Minnesota Nursery & Landscape Association partnered to create a recycling program for horticultural plastics. The environmental benefits include reducing 883,000 pounds of plastic from the landfills (610,000 pounds of plastic pots and 240,000 pounds of clear greenhouse film). The cost savings are estimated to be over $34,500 in waste disposal costs.
- Quality Bicycle Products and LHB, Inc. collaborated to design the highest rated LEED certified building in Minnesota. The environmental benefits include saving over 2.4 million KBTU, over 45 thousand gallons of water per year, and reducing 4,600 pounds of solid waste. Energy cost savings total $12,000 per year, resulting in an 11-year payback to the company for its initial investment.
- St. Luke's Hospital and Institute for a Sustainable Future combined efforts to develop a food waste diversion program that utilizes a local food shelf and the Western Lake Superior Sanitary District compost facility. The hospital diverts 37,000 pounds of food waste per year with an annual cost savings of $3,000.
- St. Paul Public Schools and Ramsey/Washington County Resource Recovery Project - St. Paul Public Schools worked with Ramsey/Washington County to develop a district-wide food diversion program. Cafeteria food waste is separated by students so that it can be shipped to farms where it is fed to pigs. Approximately 900 tons of food waste is diverted from the landfill each school year. The annual cost savings to the school district is approximately $70,000.
- Two Harbors High School and LHB, Inc. collaborated to design a new grade 6 through 12 high school. The school has an Energy Star rating of 85, which reflects that the building operates at 40 percent better than code. The environmental benefits include a savings of over 6.79 million KBTU per year, 2.29 million pounds of CO2, and reduction of 370,000 pounds of solid waste. Annual cost savings to the district exceed $85,000.

The environmental benefits and economic savings due to these winners' pollution prevention activities are significant-and continue to increase as the projects continue. The success stories from these projects throughout the state serve as inspiration for other organizations to implement and benefit from pollution prevention. For more details and information on past winners: **www.pca.state.mn.us/oea/p2/govaward.cfm**.

Technical assistance partnerships

Pollution prevention technical assistance is a demonstrated means to achieve results. The state sponsors 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) is an environmental assistance provider of free, non-regulatory pollution prevention services to Minnesota manufacturers and industry. MnTAP helps businesses become more efficient by providing industry-tailored pollution prevention and waste reduction assistance, conducting applied research, and offering training and education opportunities. To enhance the reach and quality of its programs, MnTAP partners with trade and industry associations, educational institutions, and state and local agencies.

Located at the University of Minnesota, MnTAP is funded through an annual state grant from the MPCA, which totaled $1,730,000 in 2006-2007. Over the last two years, facilities receiving MnTAP assistance have saved over $4,775,250, prevented 17.1 million pounds of waste through reduction or reuse, and conserved 18.3 million gallons of water. Every dollar of state funding to MnTAP results in approximately three dollars in annual savings for Minnesota businesses.

Table 5: 2006-2007 MnTAP environmental and economic impact results

Service provided	Waste reduced *(pounds)*	Water conserved *(gallons)*	Energy Conserved KWh/BTU	Waste reused *(pounds)*	Cost savings
Site visits	1,552,600	3,358,800	5,322,100 KWh		$1,414,600
Student interns	4,092,624	14,927,000	13,146,100 KWh		
			116,400 BTU		$1,403,750
Materials exchange				11,491,800	$1,956,900
Total	**5,645,224**	**18,285,800**	**18,468,200 KWh 402,600 BTU**	**11,491,800**	**$4,775,250**

Technology diffusion

Technology diffusion involves accelerating the adoption of pollution prevention technologies in the marketplace. MnTAP has used 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.

Table 6: 2006-2007 Technology demonstrations and pilot trials

	Demos	Pilots
Fiber reinforced plastics	Raw materials monitoring Vacuum bagging Low styrene resins Silicone bagging	Raw Materials monitoring
Metal casting	Scrap metal pre-heat Stack melting	
Metal finishing	Ventilation systems	Trivalent chrome regeneration Ventilation systems Pro pHx acid treatment PFOS alternatives
Powder coating	Low temperature cleaners/phosphatizing Zero loss drains in compressor systems	Low temperature cleaners/phosphatizing

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 with pollution prevention. 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 346 site visits were conducted in the past two years, primarily at metal finishing shops, food processing facilities, healthcare facilities, and wastewater treatment plants. These site visits were conducted at 186 different industrial facilities. Through energy efficiency training and resource development, MnTAP staff have become more familiar with identifying energy conservation opportunities while conducting site visits, including use of the Department of Energy Best Practices tools. For site visits conducted in 2006 and 2007, companies were able to reduce 1.6 million pounds of waste, conserve 3.4 million gallons of water, 5.3 million kWh, 286,200 therms, and save the companies more than $1.4 million.

Student internships

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, companies that implemented opportunities identified through the intern program have eliminated 4.1 million pounds of waste, including 24 pounds of pharmaceuticals, conserved 14.9 million gallons of water, reduced energy use by 13.1 million kWh and 116,400 therms, and saved the companies more than $1.4 million.

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

Reducing pharmaceutical waste using pollution prevention practices

Pharmaceuticals are present in the environment due to continual input from two primary sources—hospitals and residences—as either metabolites or waste materials flushed into the sewer. Source reduction or pollution prevention options exist for pharmaceutical waste, and this project aimed to educate healthcare facilities on these options and implement them through technical assistance approaches. Source reduction options included improved inventory management, minimization of prescription quantities, and elimination of vendor supplied samples.

To carry out this project, MnTAP held a stakeholder meeting with eight hospital pharmacy staff. The group identified the following top pharmaceutical waste issues:

- **Waste samples:** policy to limit acceptance.
- **Epinephrine/basic saline solution waste**: work with physicians to minimize or eliminate epinephrine.
- **90-day doses**: educate insurance companies regarding disposal costs and environmental impacts of waste drugs.

To address these needs, MnTAP held two educational workshops on September 7 and 8, 2007, in Duluth and La Crosse, respectively. The La Crosse workshop was held in conjunction with the Minnesota Pharmacy Association conference. Each workshop had approximately 30 attendees. In addition, a Web cast was held on October 11, 2007, in conjunction with the Solid and Hazardous Waste Education Center at the University of Wisconsin-Madison. The Web cast was recorded so that it can be shown again in Minnesota and Wisconsin and be available to other states in U.S. EPA Region 5.

MnTAP supported intern projects during the summers of 2006 and 2007 working on reduction of pharmaceutical samples and nursing home drug waste. These projects reduced 406 pounds of pharmaceuticals and saved approximately $4,000 a year in waste disposal costs. Finally, ongoing technical assistance is being provided to workshop attendees and other hospital pharmacy clients in the form of phone and site visit assistance.

find low cost or free materials, save money on disposal costs, and find new markets for surplus materials. In 2006 and 2007, nearly 11.5 million pounds of waste was converted to other facilities' raw materials, saving over $1.95 million.

Retired Engineers Technical Assistance Program

Minnesota's Retired Engineers Technical Assistance Program (RETAP) is a program administered by MPCA that focuses on waste and energy use reduction assistance to non-manufacturing commercial and service facilities. The assistance is provided by retired engineers and scientists, each with many years of experience. Upon request, a team performs a site assessment and can also provide other specific technical assistance in the areas of pollution prevention, waste reduction, and energy use reduction. In November 2007, RETAP added new members and a new program, the Minnesota Climate Change Corps, comprised of skilled, retired professionals who work on either long- or short-term assignments to help reduce a community's carbon footprint (the amount of carbon dioxide released into the environment). City and county governments are the corps' priorities for assistance.

For 2006 and 2007, the program performed 37 on-site assessments, provided technical assistance to the Minnesota Department of Corrections, helped the Phillips Community Energy Cooperative with energy use reduction projects, helped MnTAP with a steam trap evaluation project, assisted the U.S. EPA with casino assessments, participated in the Minnesota Government Reaching Environmental Achievement Together (MnGREAT) Awards judging, and assisted two school districts with resource management contracting issues. One school district RETAP worked with planned on adding an energy manager position that could reduce the district's annual energy consumption by $240,000.

For 2004 through 2006, the MPCA provided $32,000 to fund RETAP, whose recommendations saved clients an estimated $182,000 (2,000,000 kWh), for a savings of nearly $6 for every dollar invested in this program. More information on Minnesota RETAP is available at www.pca.state.mn.us/oea/p2/retap.cfm.

Minnesota Waste Wise

Minnesota Waste Wise (MWW) is a nonprofit, member-supported program that helps Minnesota businesses reduce waste, recycle materials, and save money. MWW was formed in 1994 as a private/public partnership between the Minnesota Chamber of Commerce and the MPCA. MWW received $75,000 in grants from MPCA for 2006-2007 and has an annual budget of approximately $250,000.

MWW provides the opportunity for Minnesota's business community to reduce waste by joining MWW and receiving technical assistance and other waste reduction services, including:

- Performing on-site waste assessments.
- Helping members obtain information about waste reduction, reuse, recycling, and proper disposal.
- Creating waste reduction plans for reducing waste.
- Investigating waste exchange opportunities in partnership with the Minnesota Materials Exchange Alliance and through business-to-business connections.
- Directing members with environmental concerns not addressed by MWW to the appropriate agencies, programs, or organizations.

Table 7: 2006-2007 environmental and economic impact results

Activity	Waste reduced *(pounds)*	Waste reused *(pounds)*	Waste recycled *(pounds)*	Cost savings
Membership services	674,300	245,041	4,030,391	$2,891,316
Materials exchange	0	13,325		$6.907
MWW members				
Total	**674,300**	**258,366**	**4,030,391**	**$2,898,223**

MWW delivers accurate and timely information and assistance regarding waste reduction, management and compliance. In addition to site visits, MWW meets additional needs of its members through presentations, follow-up calls, research, roundtable discussions, and through various fact sheets and publications.

Multimedia P2 inspections and assistance

In 2002, MPCA began working with metro counties, the Minnesota Hospital Association (MHA), MnTAP, and other partners to improve the regulatory compliance and overall environmental performance of the state's hospitals. Shortly before that time, counties and the state had growing data that showed hospitals were largely unaware of the environmental impacts and their compliance responsibilities, particularly under hazardous waste statutes and rules.

State and county regulators chose to use outreach and education as the first option for improving hospitals' performance. Clearly communicated in partnership with the MHA, however, was the intent to follow up with regulatory inspections and enforcement as necessary.

As the inspection phase of the initiative approached, MPCA decided to leverage their single-inspector visits to out-state hospitals by training participating staff in key compliance aspects of other programs outside their primary competence. In this way, inspections that focused primarily on hazardous waste would also look at sewer discharges, air emissions from incinerators, boilers, generators, and ethylene oxide sterilizers, and properly registered and maintained fuel storage tanks.

Inspectors saved preparation, travel, and follow-up (enforcement) time by combining several programs in one inspection. They also were able to discuss a range of pollution prevention opportunities with the hospitals' various departments, and refer hospital staff to MnTAP for follow-up assistance.

For hospitals inspected to date, virtually all have identified previously unevaluated waste (e.g. lab waste, pharmaceuticals, chemotherapy drugs) and are now accurately reporting waste types and quantities to the state and metro counties. Hospitals have also identified and corrected previously-mismanaged waste (e.g. hazardous waste sorted to biohazard waste, solid waste, or improperly sewered). Most hospitals inspected have now completed specific return-to-compliance activities, including setting up training, management, and prevention procedures for wastes and other impacts.

While waste amounts initially increase as hospitals evaluate and report wastes previously overlooked, the hospitals inspected first are now showing a downward trend in waste generation as they learn to reduce and recycle many of their wastes. The 10 metro hospitals inspected in 2004 (of a total of 26) decreased their aggregate waste generation by the end of 2005, dropping from 143 tons to 68 tons. The first 25 outstate hospitals (inspected late 2004 and 2005, of a total of 112 outstate) increased waste evaluated and reported 287 tons. This is a four-fold increase.

Even a conservative extrapolation suggests outstate hospitals' aggregate waste will top 800 tons. MPCA anticipates pollution prevention and recycling activities will eventually cut the outstate hazardous waste amount in half. A significant proportion of this hazardous waste is lab and pharmaceutical waste washed down the drain to public sewers. With referrals by MPCA inspectors to MnTAP for pollution prevention assistance, this sewered waste has a high potential for reduction, in turn reducing the burden on treatment plants and aquatic life.

MWW also manages special programs, such as It's in the Bag, a voluntary recycling program that collects plastic bags from consumers and shrink wrap from businesses. To date, this program has recycled over 4.5 million pounds of plastic from the Twin Cities since October 2003. In addition, from June 2004 to May 2006, Minnesota Waste Wise operated Minnesota Mercury Recovery, a program to recover and recycle mercury switches from end-of-life vehicles. The program was a voluntary partnership of Minnesota Waste Wise, the Minnesota Chamber of Commerce, the former Minnesota Office of Environmental Assistance, and the Alliance of Auto Manufacturers. Minnesota Mercury Recovery aimed to provide an efficient means to recycle mercury convenience lighting switches. In May 2006, the Minnesota Mercury Recovery program was used as a national model; and End-of-Life Vehicle Solutions, a Michigan based organization, assumed management of collecting and recycling mercury switches in Minnesota. In 2006, 36.59 pounds of mercury was recycled through the Minnesota Mercury Recovery program.

For more information about Minnesota Waste Wise, visit the web at www.mnwastewise.org, or call 651-292-4663.

Healthcare pollution prevention assistance

MPCA and our partners have worked with healthcare facilities to ensure that wastes are managed properly and that toxic chemicals are reduced or eliminated when possible. A particular focus has been on product substitution, which not only reduces toxic chemical wastes, but also reduces employee or patient exposure as well.

Mercury reduction

Mercury can be eliminated or reduced from hospitals, dental offices, labs, and other sources. Mercury is a concern in the environment due to its toxicity. MnTAP has helped over 20 hospitals reduce mercury through pollution prevention practices, primarily substitution, resulting in 830 pounds of mercury eliminated and no longer being released to air, wastewater, or land. Installing mercury removal at wastewater treatment plants is very expensive, so implementing pollution prevention practices with businesses is more cost effective. Mercury reduction strategies are a key component of Mercury Minimization Plans required in National Pollutant Discharge Elimination System (NPDES) permits in many communities.

Business and agriculture pollution prevention assistance

MPCA and our partners use a variety of approaches to work with manufacturers, farmers, and other businesses to identify ways to reduce waste or change how or what products or chemicals are used. Technical assistance, financial assistance through grants or loans, and educational outreach are all valuable tools in preventing pollution.

One Stop Program

The MPCA's One Stop Program is designed to help businesses navigate their way through environmental rules and regulations more efficiently, while at the same time increasing the use of pollution prevention activities to reduce the environmental footprint of the business. The One Stop Program was designed to work closely with the Minnesota Department of Employment and Economic Development (DEED) to help businesses, both new and expanding, as early as possible in their planning stages. If a business is able to plan for environmental concerns early in their design process, often that business can design their facility in such a way as to avoid the need for a specific permit or at least reduce the amount environmental impact the facility ultimately has.

This program has assisted a number of facilities around the state, from Roseau to Fairmont, and many places in between. Companies like Polaris, Medtronic, and Andersen Corporation have all worked with One Stop staff to reduce their environmental footprint while at the same time saving time and money in the design and permitting phase of their projects. More information on the One Stop program is available at www.pca.state.mn.us/programs/onestop.html.

National emission standards for hazardous air pollutants outreach and assistance

The Minnesota Technical Assistance Program (MnTAP) has made use of the National Emission Standards for Hazardous Air Pollutants (NESHAPs) and other regulatory drivers since the early 1990s to offer pollution prevention assistance. Some of the NESHAPs they have been working with include dry cleaning, furniture manufacturing, chrome plating, and vapor degreasing. Recently, an amendment to the vapor degreasing NESHAP proposes that levels of three solvents be capped at facilities: trichloroethylene, methylene chloride, and perchloroethylene. MnTAP plans to work with other facilities with vapor degreasers that emit these pollutants to help them implement pollution prevention practices that would bring them below the cap for the short term. For the longer term, MnTAP would help facilities explore and test alternatives to these chemicals.

Phosphorus reduction

MnTAP has been successfully applying pollution prevention approaches to phosphorus reduction for over five years. Phosphorus is a concern because its presence causes rapid algae growth in rivers and lakes. Decomposition of the algae results in oxygen depletion, affecting fish and other organisms. Phosphorus sources include cleaning chemicals, food waste, and phosphatizing prior to painting. To help keep phosphorus out of receiving water, MnTAP has been working with publicly owned treatment works (POTWs) to help industrial dischargers reduce phosphorus primarily through product substitution and changing practices.

This approach was used during summer 2006 with the Brainerd/Baxter POTW in which a student was hired to provide education and phosphorus reduction assistance to businesses. Out of 112 site visits conducted, 35 businesses had phosphorus contributions. Eight of the 35 implemented phosphorus reduction, reducing 876 pounds of phosphorus to the POTW annually. A projected 2,965 pounds a year of phosphorus would be reduced if the remaining 27 companies implement changes, potentially saving the POTW $6,000 a year in reduced chemical use to remove phosphorus at the wastewater plant.

During summer 2007, a student worked with Gustavus Adolphus College (GAC) and the St. Peter Regional Treatment Center (RTC) to characterize phosphorus loading and provide phosphorus reduction recommendations. The student identified phosphorus loading of 900 and 2,344 pounds a year at GAC and RTC, respectively. Phosphorus reduction implemented at GAC resulted in a reduction of 200 pounds a year and for RTC 100 pounds a year, with further reductions anticipated. If all recommended phosphorus reductions were implemented at GAC and RTC, the St. Peter POTW would save $4,300 a year in chemical costs no longer needed to remove phosphorus. Approximately 10 additional site visits to smaller businesses were also conducted.

These approaches can be easily replicated in other communities, and pollution prevention has become a strategy in the preparation of Phosphorus Management Plans, a requirement in NPDES permits in most cities. So far, several additional cities have responded to the city-wide inventory approach. MnTAP conducted 25 site visits to Lake City businesses with POTW staff and site visits are pending for Chisago Lakes area, Hutchinson, Litchfield, Moorhead, and Elk River to assist with reduction of phosphorus and other wastewater pollutants. A new fact sheet on the city-wide inventory approach was developed to promote MnTAP assistance in this area.

Industrial Stormwater No Exposure Certification

Facilities with certain primary activities or Standard Industrial Classification (SIC) Codes are required to obtain and comply with an Industrial Stormwater Permit. About 20,000 Minnesota facilities are affected by this requirement. Regulated facilities need to develop and implement a stormwater pollution prevention plan and obtain and comply with a stormwater permit and pay fees.

An affected facility can avoid the permit requirement if they are able to certify No Exposure. All significant industrial materials must be protected by a storm-resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff in order to qualify for this exemption. Staff in the MPCA Prevention and Assistance Division are beginning to reach out to selected industry sectors, including chemical manufacturers, printers, metal fabricators, electrical equipment manufacturers, and transportation equipment manufacturers, to explain the No Exposure exemption and encourage facilities to certify for No Exposure if they already qualify or to implement pollution prevention measures so that they can qualify. Normal avenues are to put a roof over exposed items or to store things indoors. For this outreach, educational materials will promote these actions along with other messages about changing processes. If a facility can change their processes so that less waste is produced or fewer raw materials are needed, they will not have as great a need for storage, either indoors or outdoors.

When significant industrial material is exposed to precipitation any pollutants on that material can be carried away with rain, snow, snow melt, and/or run off to our surface waters. When the industrial material is removed from contact with precipitation, those pollutants will not be carried to our lakes, streams, and rivers. Water quality is protected. When the number of regulated facilities is reduced, stormwater program staff can better focus their energy, and the remaining regulated facilities can get more of the assistance and attention they might need.

The outreach effort is being designed to identify how much total area in acres is no longer exposed, what significant material or activity was moved indoors or covered in order to qualify, and if they received assistance from the MPCA on No Exposure and if this assistance helped them more clearly understand that idea. The approach used for these selected industry sectors can be honed during this outreach effort and then adapted and tailored to reach other industry sectors where certifying for No Exposure might be possible.

Manure utilization strategies to reduce fecal coliform impact

Soil application of liquid hog manure has many problematic elements, which include overloading of the soil with fecal material, potential for soil runoff to carry fecal material into surface waters, and the perception that manure is a waste product. Progressive farmers have begun to regard liquid manure as a valuable fertilizer as costs of chemical fertilizer increase rapidly. Liquid manure is generally applied by injecting between 6,000 and 10,000 gallons per acre into the soil with deep tilling tools. Deep tilling disaggregates the soil and destroys crop residue cover. Crop residue retention is perhaps the most important factor in preventing soil erosion and nutrient transport.

Through a $29,672 environmental assistance grant, this project by the Cannon River Watershed Partnership will develop methods to utilize hog manure at lower rates (1,500 to 2,000 gallons) per acre by applying the resource in bands where crops grow instead of the traditional broadcast method. This new methodology will allow application of manure without the heavy tillage usually required to incorporate the material. A no-till regime can be maintained to reduce soil

erosion and nutrient transport to surface waters. This project will combine residue retention, manure incorporation, and zone tillage to provide optimum plant nutrition for high production. New kinds of equipment will be designed, built, and tested to accomplish these goals.

Environmentally benign lubrication for high-speed tools

Cool Clean Technologies has developed a novel, environmentally benign process for lubrication and heat abatement for high-speed machining tools that has shown the potential to double tool life. Such cutting tools are a significant part of the manufacturing capabilities of many Minnesota industries, and the downtime due to tool wear can be a significant cost in the manufacturing process. Other lubrication and heat-transfer technologies often utilize hazardous lubricants which can be discharged into the environment. Additionally, the high shear of many tools atomizes the hazardous lubricants into aerosols which may be inhaled. This technology uses a binary mixture of an environmentally benign material (carbon dioxide), coupled with a biodegradable soy-based lubricant. In initial tests, the system has shown great promise as a next generation lubrication system for drilling, cutting, and laser cutting. Using a $38,650 environmental assistance grant, this project will field-test this technology in a practical manufacturing environment to examine the full potential of the system as both a cost saving and environmental measure. In addition to replacing hazardous petroleum-derived lubricating oils in some machining applications, this process should also reduce the usage of hazardous cleaning solvents that are typically required to remove conventional lubricating oils from machined parts.

Powder paint spray wash cleaning system upgrade

JIT Powder Coating Company is using a $100,000 environmental assistance loan as part of a $250,000 project to replace an existing two-stage spray wash cleaning/pretreatment system with a newer five-stage spray wash system. The cleaning/pretreatment chemicals currently used are phosphorus-based and result in the sewering of 840,000 gallons of liquid industrial waste annually. This project will reduce this waste volume by 40 percent. It is estimated that the project will also result in a 40 percent annual reduction in the use of one cleaning/pretreatment chemical that is currently used at a rate of 102,400 pounds annually and allow the company to investigate the use of phosphorus-free chemicals that are not compatible with the current cleaning system, potentially eliminating another pretreatment chemical that is currently used at a rate of 5,200 pounds annually. The current process uses 893,600 gallons of water annually and this is anticipated to be reduced by 60 percent. In addition, the current process uses over 24,000 kWh per year of electricity, which is anticipated to be reduced by 75 percent.

Construction pollution prevention assistance

A growing focus for MPCA has been to create and support the development of tools that will improve building energy performance and improve stormwater runoff management. As with other audiences, technical and financial assistance as well as educational outreach are among the approaches utilized.

Stormwater management for construction impacts

Construction contractors and affiliated professions needed information regarding the new federal and state stormwater management regulations; and a better understanding of the perceived or actual barriers or benefits associated with adoption of stormwater pollution prevention practices. A workshop, Stormwater Basics for Builders, was developed to emphasize preventive stormwater management or whole-site management at construction sites.

The Builders Association of the Twin Cities used a community-based process to identify actions among contractors, developers and property owners, engineers and designers, and regulatory personnel that contribute to protecting the quality of water bodies surrounding construction sites. Survey data regarding the barriers and benefits to adopting preventive and other stormwater management practices and results being used by the Minnesota Stormwater Steering Committee to help guide other program development.

Construction stormwater calendars

When stormwater drains off a construction site, it carries sediment and other pollutants that harm lakes, streams, and wetlands. National Pollutant Discharge Elimination System Stormwater Phase 2 Permits regulate stormwater management at construction sites. The annual construction stormwater compliance calendar was developed to promote regulatory compliance while educating users about practices to prevent erosion and control sediment. Approaches focusing on infiltration/filtration and low-impact development were introduced to help build awareness around impact of compaction during construction. This project was conducted in partnership with MPCA's Small Business Environmental Assistance Program (SBEAP). The calendar was distributed directly to regulated parties upon request and to trade organizations, watershed organizations, and municipalities for redistribution to regulated parties or affiliated professions through local or association programs, and was posted on the internet.

Table 8: Construction stormwater calendar distribution

Year	2004	2005	2006	2007
Printed	500	1,000	100	450
Downloads	1,801	4,359	2,489	2,800*

First two months

The Minnesota Zero Emission Design Protocol

Through a $40,000 environmental assistance grant, the College of Design, the Center for Sustainable Building Research, and the Department of Applied Economics at the University of Minnesota, in collaboration with the American Institute of Architects Minnesota and the Green Institute, are working to develop the Minnesota Zero Emission Design Protocol (mnZED Protocol), which will provide the necessary design methods and tools to evaluate and implement zero

emission design (ZED) strategies that reduce greenhouse gas emissions through architectural design. The protocol will include:

- a decision-making and accounting process to integrate ZED into building design, construction, and operation
- ZED strategies to support design decisions for site, water, energy, materials, and waste
- a Minnesota Greenhouse Gas (GHG) Design Calculator to provide instantaneous GHG equivalencies during the design process.

The mnZED Protocol will be compatible with, yet not limited to, the State of Minnesota's Building Benchmark and Beyond Guidelines and the U.S. Green Building Council's Leadership in Energy and Environmental Design Guidelines. Educational and outreach programs and an online resource will disseminate the protocol and tools to the Minnesota design community.

LEED for Affordable Homes Community Development Demonstration Project

The Neighborhood Development Alliance (NeDA) is building a Leadership in Energy and Environmental Design (LEED)-certified twin home with the intent to use this project as a model demonstration for future new construction in St. Paul. LEED certification has been making gains in the metro area in homes built for middle/upper income families; however NeDA's program will focus on how LEED-certification can have an important role in city-supported housing development in St. Paul. In St. Paul, the majority of the low-income families live in single-family homes, and these families are more heavily impacted by higher utility rates and home maintenance costs. Using a $15,000 environmental assistance grant, the project will track and report on materials and technology used, costs, how decisions were made on choosing what sustainable or energy-efficient items to include, as well as conduct a two-year study on energy consumption and maintenance/repair on the homes.

To further educate the public on sustainable and energy efficient building techniques, NeDA will arrange for four community workshops on the project, which will include discussion of LEED and Energy Star rated homes, the differences between the two, materials, appliances, new technology and information on costs, sources, savings and sources for home rehab loans. As NeDA works primarily with the Latino population on homeownership issues, workshops and corresponding material will also be provided in Spanish.

Community pollution prevention assistance

MPCA works with local and regional government agencies, schools, water conservation districts, and other community organizations to improve air quality, reduce toxic chemical and product use, and minimize stormwater contamination through better planning and design.

Metro Transit Go Greener Initiative

Metro Transit is the major supplier for mass transit in the metropolitan area, operating more than 800 buses over 109 routes. Metro Transit is participating in the Governor's Executive Order 04-08 by using ultra-low sulfur diesel (ULSD) fuel for its diesel fleet. This reduces the amount of sulfur dioxide that is released to the atmosphere. In 2004, the Metropolitan Council, with help from the

MPCA and the Department of Commerce, contracted to purchase about four million gallons of ULSD fuel. This contract also opened the door for other government entities to make purchases benefiting from large volume pricing and shows promise to make a significant improvement to air quality in the metropolitan area. By July of 2005, all Metro Transit buses were running on a ULSD fuel that was also two percent biodiesel. Metro Transit was the first in the state to use ULSD fuel. ULSD fuel is now required nationwide.

In 2006, Metro Transit started running a test group of buses that is five percent biodiesel. In fall 2007, Metro Transit announced that it has increased the biodiesel content of its fuel to 10 percent and will begin using 20 percent biodiesel during summer months in 2008. This is expected to reduce Metro Transit's petroleum diesel use by 1.2 million gallons annually. The agency is also in the process of buying 314 replacement buses, 150 of which will be hybrid electric models. The hybrid buses produce 22 percent better fuel mileage and 90 percent fewer emissions than the buses they replace.

Mercury-Free Zone Program

MPCA initiated its Mercury-Free Zone Program (MFZ) in 2000. The program partners 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, junior high and high schools throughout the state. With the help of Clancy, the nation's only mercury-detecting dog, and a Lumex, a mercury-analyzing instrument, program staff visit pledging schools to look for mercury spills and overlooked mercury and mercury-containing equipment.

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. Each school also agrees to allow MFZ 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 at the school's expense. Schools are also offered a mercury curriculum and educational presentations provided by MFZ staff and Clancy.

In the spring of 2007, the Minnesota Legislature passed a law banning mercury and most mercury-containing instruments in Minnesota schools. In response to this, and as a service to the schools, the MPCA initiated the Get the Mercury Out Now! effort. This effort gives schools the opportunity to get rid of their elemental mercury and mercury-containing equipment and to have the equipment replaced with a limited amount of mercury-free equipment at no cost to the school. A state-contracted hazardous waste hauler contacts enrolled schools and schedules a date and time for the contractor to package and remove each school's elemental mercury and mercury-containing equipment.

Road salt training

As testing is conducted for chlorides, watersheds are being identified for chloride impairments. It is believed that as additional testing and analysis will result in identification of additional watersheds with chloride impairments. Winter maintenance practices using road salt are believed to have a significant contribution in creating chloride impairments. To address this issue, the MPCA worked with Fortin Consulting of Minneapolis to develop an education outreach program aimed at local government and private applicators of road salt. At the voluntary four-hour training, applicators learn how to apply best management practices and if they voluntarily

commit to the practices, they receive a certification. During the first series of workshops, sidewalk and parking lot maintenance crews calculated potential reduction in deicing product. Most applicators find they are able to reduce usage around 90 percent. However, because of liability issues, applications usually start at a 50 percent reduction level and refine application from there. For example, the Ridgedale Mall in Minnetonka has an 80-acre site. Before training, they were using 10 to 12 tons of road salt per one-day snow event. After the training, they cut usage in half.

To date, sidewalk and parking lot deicing education results include five workshops conducted, 259 voluntary certifications, 1,725 pounds of chloride reduction, an additional 992 ton reduction in road salt projected, a minimum savings of $55,071 among applicators from reduced road salt use, and development of a maintenance manual and a clipboard prompt for field work. Based on the success of the workshops, the program is being expanded to small, outstate highway departments. As part of these workshops, crews will again calculate potential reduction in deicing product.

Conservation Design Toolkit

In response to new regulations for stormwater management, an online conservation site design toolkit was developed with help from the MPCA by Lake Superior Streams. Lake Superior Streams is a collaboration of the City of Duluth, the Natural Resource Research Institute, Sea Grant Minnesota, and the University of Minnesota Extension Service. The toolkit contains how-to guidance, resources, ideas, and local case studies detailing options for managing stormwater runoff for local developers and governments, as well as citizens and schools. In addition, training resources for erosion and sediment control are available for contractors. The information is specific to the hydrogeology of the North Shore of Lake Superior, where clays and bedrock presumably impede infiltration of stormwater. Cold climate effects are also addressed. The guidance emphasizes prevention practices to protect local rivers, streams, and inland lakes as well as the Great Lake itself. www.duluthstreams.org/stormwater/toolkit/index.html

Sucker River Watershed Protection Planning Project

This project was initiated after nearby subwatersheds that were listed in the Clean Water Act 303d Impaired Waters program required restoration due to temperature and turbidity impacts. This need for restoration sent a warning signal to protect the unimpaired North Shore watersheds. The South St. Louis County Soil and Water Conservation District used a community-based process to identify actions that help protect water quality for watershed residents and strategies for overcoming barriers or amplifying benefits related to adopting these actions. Several tools and strategies were used, resulting in the development of a guide, The Sucker River Watershed: Protecting the River into the Future, a rain garden demonstration project, the installation of highway road signs to perform targeted messaging by identifying the watershed location, a commitment to install a rain garden at the community school, and a commitment to participate in the forest stewardship program. The guide is applicable to surrounding watersheds. The community-based process is applicable statewide.

Low impact development design teams and model ordinance assistance

This project was designed to provide individuals or municipalities with the necessary skills and ability to follow through on applying low-impact development (LID) principles to demonstration projects and public policy (revised ordinance). Design Teams were assembled to conduct on-site

design workshops and prepare site-specific LID plans. The Minnesota Erosion Control Association, a project partner, provided technical assistance to communities interested in revising stormwater ordinances to include LID principles.

Results

- Ongoing Project NEMO training (Non-point Education for Municipal Officials) **www.nemo.uconn.edu**.
- Four LID site conceptual plans prepared (available in PowerPoint).
- One LID plan implemented in a small industrial park in Little Falls.
- Cost savings of $250,000. Little Falls' choice of a LID plan over a conventional curb-and-gutter design saved infrastructure costs. This cost differential helped to close a budget gap.
- Two stormwater ordinance revision processes initiated.

Applicability

The Design Team model shows sufficient success to be considered a model worth replicating in other localities to help cities and private land owners integrate LID planning into their development process. Because it provides a forum for marketing services, the Design Team model is capable of leveraging participation of design and engineering professionals on an in-kind or discounted basis as part of a technical assistance package. The model offers localities a quick-turn-around product and service through a limited or phased commitment.

Lake City-Low-Impact Stormwater Management and Total Maximum Daily Load Reductions and Municipal Good Housekeeping and Marina P2 Program

The work being done by the project team in Lake City includes six tasks: conduct water quality monitoring and modeling; establish baseline data from the monitoring; develop conceptual low impact development site plans; provide public education opportunities; municipal good housekeeping; and marina pollution prevention.

This project has accomplished many things. The low impact development design team's expectations were exceeded when one of the conceptual plans was implemented. Four other conceptual plans were developed with cost comparisons with traditional development. Seven public education and participation events have been held. Lake City has performed an audit of all city properties, including the marina, in order to identify good housekeeping and pollution prevention opportunities. Finally, utility mailers have been created and printed to educate the public about the good housekeeping project.

Faribault County-Stormwater Management for Small Communities

Using funds from a U.S. EPA Pollution Prevention Incentives for States grant, MPCA is supporting efforts in Faribault County to work with local communities regarding their stormwater issues. The county has hired an outreach specialist who is responsible for creating a community needs assessment for each city in Faribault County. Once the community needs assessments are complete, the Soil and Water Conservation District will assist the communities with their individual needs through technical assistance. The outreach specialist has begun work on the needs assessments and after completing this portion of the project, will begin to develop action plans for each city. Finally, good relationships between the communities and Faribault County are being developed so that the communities will feel comfortable accepting the recommendations in the action plan.

Opportunities to further pollution prevention

The following outlines some areas that the MPCA and/or our technical assistance partners have identified as potential opportunities where pollution prevention approaches could be particularly effective in reducing negative environmental impacts from manufacturing, development projects, and other possible sources of pollution.

Ethanol plant that was unable to utilize waste water for process water

Ethanol plants use four to five gallons of water to produce one gallon of ethanol. With Minnesota's 17 operating ethanol facilities having a production capacity of 675 million gallons per year, this requires approximately three billion gallons of water annually. Most of the water is from our aquifers. There can be alternatives to using aquifer water. One example of an alternative is using grey water from the outflow of a local wastewater treatment plant.

In the spring of 2006, an ethanol facility proposed using city waste water for their cooling and process water in exchange for a variance from some water quality standards rules. After careful consideration from the MPCA and the Attorney General's office, it was determined that this option was limited due to water quality standards rules. A number of options were discussed, but ultimately, the company decided to use aquifer water instead, since they needed to apply for a variance to the water quality standards rules either way.

Had the water quality standards rules been more flexible, the company may have been able to use city waste water instead of aquifer water for their ethanol production process. The company will now need to pump approximately 500 million gallons of water from the aquifer annually, instead of using city waste water.

Currently, the MPCA is working with a number of environmental programs both inside and outside the agency to identify opportunities to increase our flexibility when looking at the entire environmental picture from any type of project.

Ethanol production

Many staff at MPCA are involved in the process of environmental review and permitting of new or expanding ethanol facilities. Much of this work focuses on the site-specific effects of production facilities, including groundwater extraction, discharge of regulated waste and stormwater pollutants, emissions of criteria air pollutants by processes immediate to the facility, and perhaps some of the effects of transportation of feedstocks into the facility.

Because of the recent and projected rapid expansion of the industry, MPCA and partner agencies are giving greater consideration to water use (and reuse), overall energy balance, and opportunities for yield and energy efficiency improvements to both prevent pollution and reduce costs to the facilities. Specifically, MPCA has partnered with MnTAP on a project to benchmark best practices and pollution prevention opportunities specific to Minnesota's 17 operating facilities. MnTAP gathered data from existing data sources and some site visits to generate its first report on benchmarks and opportunities. Activity in 2007 supported the report and new

relationships which hold the potential for 2008 MnTAP Intern Program projects or other technical assistance with ethanol plants to address specific issues at Minnesota plants interested in improvement. MnTAP and MPCA will share performance improvement data developed through this project through various outlets such as fact sheets, conferences, and online. The latest version of the MnTAP report is expected to be available in March 2008 at www.mntap.umn.edu and via MPCA's ethanol web page: www.pca.state.mn.us/programs/ethanol.html

MPCA is also working on a project with the University of Minnesota's Department of Bio-based Products to survey the technical and economic feasibility of ethanol feedstock alternatives to corn grain, including corn stover, forest byproducts, and other plants and grasses. Since corn stover is the most immediately available alternative feedstock, the project report will also present a handful of preferred locations for stover plants. Location preferences will be based on such factors as feasible stover removal rates and overall availability, transportation networks, and calculation of optimal economies of scale for stover plants. Presentation of this material will help the public and private sectors identify needs for further research, allow MPCA and partners to proactively study the environmental feasibility of stover plant locations prior to siting decisions being made, and streamline the industry's process of bringing stover and other alternative feedstock ethanol facilities on line in a timely and sustainable manner. This project report is expected to be available in March 2008 through MPCA's ethanol web page.

Once in, always in

The U.S. Environmental Protection Agency follows a policy referred to as Once In, Always In that can limit the incentive for an existing facility to implement pollution prevention measures. It affects major sources of hazardous air pollutants (HAP) that are regulated by Maximum Achievable Control Technology (MACT) standards. A hazardous air pollutant is one of 188 toxic air pollutants listed in the Clear Air Act. A major source has the potential to emit 10 tons per year of a single HAP or 25 tons per year of any combination of HAP. An area source is a source of HAP that is not a major source. The Once In, Always In policy states that a major source may only become an area source if it limits its potential to emit HAP to below the major source thresholds by the first substantive compliance date of an applicable MACT standard. If that date has passed the source no longer has the option to become an area source for the MACT standard. The source must comply with the MACT standard and obtain and comply with a federal air emissions permit.

On January 3, 2007, the U.S. EPA proposed a rule to allow such a major source to reduce emissions below threshold levels and to become an area source at any time. If a source puts pollution prevention measures in place, it may lower its air emissions to the point where it can accept limits in a state air permit. With proper limits, it could become an area source with respect to the MACT standard. Unlike federal permits that must be renewed every five years, a Minnesota state permit is on-going. The facility saves the time and money involved with renewing their permit. Also, they would not have to meet the requirements of the major source MACT standard. The MPCA and MnTAP commented on U.S. EPA's proposed rule in support of its attempt to find more areas to encourage pollution prevention.

A prohibitionary rider included in U.S. EPA's budget appropriation that was enacted by the U.S. Congress in December 2007 will prevent U.S. EPA from further pursuing this proposal in 2008. However, if the U.S. EPA can effectively change its Once In, Always In policy, more incentives to institute pollution prevention measures would exist. For example, a job shop that uses liquid paint

might switch to less toxic paint formulations, or to more efficient spray equipment that helps minimize overspray, or convert to powder paint coatings where HAP emissions are negligible. There are numerous possibilities that MPCA and MnTAP could work to encourage.

Halogenated solvent cleaning

Facilities that degrease with methylene chloride, perchloroethylene, and/or trichloroethylene in halogenated solvent cleaning equipment must now meet updated requirements. A halogenated solvent cleaning equipment rule originally published in 1994 was updated with a rule published by U.S. EPA on May 3, 2007. The new rule requires that they continue to meet all the original requirements published in 1994 and meet a new facility-wide emission limit.

U.S. EPA did make an exception for certain industries, including facilities that manufacture narrow tubing, facilities that manufacture specialized products requiring continuous web cleaning, aerospace manufacturing and maintenance facilities, and military depot maintenance facilities. These facilities do not have to meet these facility-wide limits.

These new facility-wide emission limits could be lower than some of the current actual emissions at some Minnesota facilities subject to this rule. These companies will need to take steps to reduce their emissions and they will be a good opportunity for outreach in pollution prevention practices tailored to their industry practices. MnTAP completed a summer 2007 intern project with a company that makes parts/components for implantable medical devices, where trichloroethylene is used to degrease intricate parts. MnTAP did a significant review of current chemical use and of cleaning equipment to identify three reduction opportunities that have been implemented on one of two degreasers that may reduce emissions by 7,000 pounds per year. An additional change is pending that may cut this degreaser's emissions another 7,000 pounds per year. The company purchased tools to quantitatively measure their emissions. MnTAP is evaluating a targeting effort with other vapor degreasing facilities to reduce halogenated solvent emissions.

Stormwater management

Historically, the management approach for rain or snow generally has been to concentrate the water into ditches and pipes and move it off site as fast as possible. As effects of this approach (flooding, severe erosion, and pollutant transport) become more apparent, a new methodology for treating runoff as a resource has come into development.

This approach presents an entirely new set of management strategies, with the idea being to keep the runoff on site to the degree possible through storage in natural or restored water features and/or letting it infiltrate. Additionally, excess runoff produced during heavy and short-lived events can overwhelm an infiltration system and move off site. To prevent significant damage, flow that would leave the site can be diffused and reduced in volume. In this way, flooding and erosion from large volumes of concentrated flow is prevented.

While mechanical, end-of-pipe solutions are sometimes necessary, especially in small urban lots, innovative solutions can come about when surface runoff is thought of as a resource. Options for storm runoff management range from a simple rain garden receiving roof runoff from a single family dwelling to an approach using a series of treatment steps within a large development. Currently, the MPCA and partner organizations oversee several interconnected programs focused on surface water management.

Encouraging reduction of toxics use

As noted earlier in this report, Minnesota has continued to make progress in reducing toxic chemical releases; however, the generation of toxic chemical wastes has not shown a similar decline. For several years, Minnesota has encouraged and worked with manufacturers to implement Design for Environment (DfE) as a way to weave environmental considerations into product design and avoid raw materials or manufacturing processes that generate toxic chemical waste. Examples of the successes with DfE in Minnesota can be found at www.pca.state.mn.us/oea/p2/design.cfm

A similar approach that has seen growing interest is in the area of green chemistry, which "involves the design and redesign of chemical syntheses and chemical products to prevent pollution and thereby solve environmental problems."[1] As part of the 2007 Minnesota Air, Water and Waste Environmental Conference, a session on green chemistry was held to introduce these ideas to Minnesota environmental professionals. Attendees learned from Professor Paul T. Jackson about efforts to incorporate green chemistry concepts into the curriculum at St. Olaf College in Northfield, and from Dr. Berkeley Cue about green chemistry initiatives in the pharmaceutical industry. Additionally, Dr. Mark Rossi presented a set of case studies highlighting companies that are incorporating evaluation steps into their manufacturing processes that allow for the development of products that yield better environmental and economic benefits.

MPCA staff are also taking part in the Great Lakes Green Chemistry Network, which includes participants from industry, academia, non-governmental organizations, and state and federal governments working together to lay the foundation for a Green Chemistry Network to further green chemistry practice in the binational Great Lakes region. A recent dialogue centered on state-level green chemistry initiatives and included a discussion of the Green Chemistry: *Cornerstone to a Sustainable California*[2] report prepared by the Centers for Occupational and Environmental Health at the University of California-Berkeley.

In addition, MPCA and MnTAP staff have begun to explore the possibility of providing grant funding to companies willing to host clean technology demonstration sites. This would provide another opportunity to promote the adoption of innovative technologies and share best practices.

MPCA staff will utilize the results from our work with DfE and exploration of green chemistry approaches to engage in additional green chemistry activities as well as identify new opportunities to promote toxic chemical use reduction to Minnesota manufacturers as part of a greater focus on encouraging pollution prevention at the source.

Examining materials accounting

In 1993, the former Minnesota Office of Waste Management prepared a Toxic Chemical Use Report that discussed the idea of requiring manufacturers to report not only the quantities of toxic chemical wastes they generate but also the quantities of toxic chemicals that are used in their manufacturing processes, which is known as the materials accounting approach, or toxic chemical use reporting. The report recommended not requiring toxic chemical use reporting, due partly to progress in pollution prevention that was being achieved as a result of the enactment of

[1] Anastas, P.T.; Warner, J. C. Green Chemistry: Theory & Practice, Oxford University Press: New York, 1998

[2] Green Chemistry: Cornerstone to a Sustainable California **http://coeh.berkeley.edu/docs/news/green_chem_brief.pdf**

the Toxic Pollution Prevention Act at that time. As discussed previously, progress in reducing the generation of toxic chemical wastes has stalled in recent years, and re-examining the feasibility of this option may be warranted.

There are currently two states, Massachusetts and New Jersey, which have established a materials accounting approach with respect to the Toxic Release Inventory (TRI). MPCA is studying TRI data and related information for these states and others that employ pollution prevention programs to compare trends in toxic chemical waste generation. Findings and recommendations will be presented in the 2010 Pollution Prevention Evaluation Report.

Strengthening community right-to-know

In December 2006, the U.S. EPA announced a Final TRI Burden Reduction Rule that has the potential to significantly impact the quality of data used in MPCA's pollution prevention assistance work as well as our community right-to-know established in the federal Emergency Planning and Community Right-to-Know Act and the state Hazardous Chemical Emergency; Planning And Response statute (Minn. Stat. § 299K). MPCA submitted comments for the public record opposing these rule changes, and Minnesota is one of 12 states that have joined together in a lawsuit against the U.S. EPA in November 2007 to overturn this rule.

Reporting thresholds for persistent, bioaccumulative and toxic (PBT) chemicals

The TRI Burden Reduction Rule will allow reporting facilities to use the less-detailed Form A reporting form for PBT chemicals provided there are no releases or other disposal and no more than 500 pounds of total waste managed. Previously, the more-detailed Form R reporting form was required for all PBT chemicals reported to the TRI. The Form R provides details about releases and other waste management (e.g. total quantity of releases to air, water and land; and quantities of waste managed through recycling, treatment or combustion for energy recovery). The Form A only provides the name of the chemical reported and the facility where it was generated as waste.

MPCA staff believe this rule undermines the rationale for lowering the PBT reporting thresholds that was introduced in the 2000 reporting year. These chemicals were specifically singled out for lower reporting thresholds because of their significant toxicity even in very small quantities.

In Minnesota, Form R submissions for PBT chemicals, including some that met the old reporting thresholds, make up approximately 20 percent of the over 1,200 Form Rs submitted annually by over 400 facilities. An analysis of 2004 TRI data shows the above change may eliminate 51 of the 268 Form Rs submitted annually for PBT chemicals. It may also eliminate available TRI data for 14 Minnesota industrial facilities, nine of which are located in or near large populations in the Twin Cities metropolitan area. This would significantly impact the quality data available to track pollution prevention efforts for PBT chemicals such as lead, benzo (g,h,i) perylene and polycyclic aromatic compounds.

Additionally, since approximately 75percent of the reported quantities of these chemicals are sent off-site for treatment, energy recovery, or recycling, they still certainly pose a risk for accidental release in surrounding communities even if there are no regular releases associated with the manufacturing processes in which they are used or are coincidentally manufactured.

Reporting thresholds for non-PBT chemicals

In the same final TRI Burden Reduction Rule noted above, U.S. EPA announced an expansion of the conditions for which reporting facilities can now use the Form A for non-PBT chemicals. So long as releases or other disposal do not exceed 2,000 pounds and total waste management does not exceed 5,000 pounds for a non-PBT chemical, reporting facilities may use the Form A in place of the Form R.

As above, this rule may significantly weaken data quality for tracking, targeting, and providing technical pollution prevention assistance. This assistance results in cost savings for industry from reduced waste and expenses associated with managing hazardous materials. In this case, an analysis of 2004 TRI data shows the rule may eliminate 213, or 23 percent, of the 1,219 Form Rs submitted annually in Minnesota. It may eliminate available data for at least 30 of the 418 industrial facilities that currently report to the Toxic Release Inventory. This loss of data is likely to hinder the celebrated, continued pollution prevention progress achieved since Emergency Planning and Community Right-to-Know Act (EPCRA) was passed in 1986, progress which mutually benefits reporters, the environment, and the community.

Minnesota state agency staff and technical assistance providers use TRI data in a variety of ways. Recent examples include using TRI data for the fiber-reinforced plastics and wood products industry sectors to identify and track candidates for adopting new pollution prevention technologies to reduce styrene and volatile organic compound (VOC) solvent waste generation. The data provided on the Form R is being considered as a model for enhancing the compliance agreements between the MPCA and fluorescent lamp recyclers. TRI data served as an impetus for the former Minnesota Office of Environmental Assistance (since merged with the MPCA) to launch the Let's Get the Lead Out! voluntary fishing tackle exchange campaign[3] after a major lead fishing tackle manufacturer was identified as a priority facility in the 2000 Pollution Prevention Evaluation Report[4]. In addition, TRI data has played a valuable role in the successful development of Good Neighbor Agreements between the Southeast Como Improvement Association (SECIA) in Minneapolis and adhesive labels manufacturer Ritrama, Inc. as well as boxboard manufacturer Rock-Tenn, to reduce toluene and VOC emissions, respectively.

Furthermore, in Minnesota, TRI data is used in collecting revenue that funds direct pollution prevention technical assistance to business and industry. Minnesota's pollution prevention fee is assessed to TRI reporters based upon a combination of the number of Form Rs submitted and the number of pounds released and transferred off-site for treatment. As stated above, the rule may result in over 40 fewer facilities required to submit Form R reports and the loss of 264 individual TRI Form R reports, leading to an estimated reduction in revenue of over $43,000 annually that is available for pollution prevention technical assistance programs. Additionally, the Emergency Planning and Community Right-to-Know program at the Department of Public Safety has estimated a reduction in revenue of $29,000 annually as a result of this rule

The MPCA recommends that the State Legislature amend Minn. Stat. § 299K.08 to require Minnesota facilities to continue following the TRI reporting requirements that were established prior to the December 2006 Final Rule that was issued by the U.S. EPA.

[3] For details on the Let's Get the Lead Out campaign, see **www.pca.state.mn.us/oea/reduce/sinkers.cfm**

[4] The 2000 Pollution Prevention Evaluation Report is available online at **www.pca.state.mn.us/oea/p2/p2evaluation2000.cfm**

Minnesota Pollution Control Agency

2008 Pollution Prevention Evaluation Report