November 9, 2010

The Honorable Satveer Chaudhary, Chair
Environment and Natural Resources Committee
Room 205 State Capitol
75 Rev. Dr. Martin Luther King Jr. Blvd.
St. Paul, MN 55155

The Honorable Ellen Anderson, Chair
Environment, Energy and Natural Resources Budget Division
Room 120 State Capitol
75 Rev. Dr. Martin Luther King Jr. Blvd.
St. Paul, MN 55155

The Honorable Kent Eken, Chair
Environment Policy and Oversight Committee
575 State Office Building
100 Rev. Dr. Martin Luther King Jr. Blvd.
St. Paul, MN 55155

The Honorable Jean Wagenius, Chair
Environment and Natural Resources Finance Committee
449 State Office Building
100 Rev. Dr. Martin Luther King Jr. Blvd.
St. Paul, MN 55155

RE: The Minnesota Pollution Control Agency's Long-Range Plans Relative to Air, Land and Water Pollution

Dear Committee Chairs:

The Minnesota Pollution Control Agency (MPCA) is pleased to provide you with the following information to satisfy the requirement in Minn. Stat. § 116.1 to report to the Legislature in even-numbered years, the MPCA's long-range plans relative to air and land pollution and also the requirement in Minn. Stat. § 115.42 to report the MPCA's long-range plans relative to water pollution.

1. The MPCA 2008 Strategic Plan establishes the MPCA's guiding principles and five vision areas to guide the MPCA's work. Three of the five vision areas are the familiar air, land and water media. A fourth vision enhances the MPCA's focus on helping Minnesotans take responsibility to protect our environment through the purchase of green products and services, the expansion of Minnesota businesses into green products and services, and the increase of Minnesotan's environmental knowledge. The fifth vision pertains to a well-managed organization. Each vision statement is supported by three to five goals and three to ten objectives most of which have measurable results and dates. These goals and objectives constitute the MPCA's long-range plan and program.

2. An overview of environmental conditions in Minnesota. The excerpt is from the Environmental Performance Partnership Agreement between the MPCA and the U.S. Environmental Protection Agency (EPA), which covers the period from October 1, 2008, through September 30, 2012.

The MPCA Strategic Plan and Environmental Performance Partnership Agreement (EnPPA) are integral to the MPCA's focus on environmental results. These documents are part of the MPCA's efforts to plan, implement, measure, evaluate and adjust its performance in achieving desired environmental results.

The following links are also useful in looking at the MPCA's long range plans for water, air and land:

The report Minnesota's Water Quality Monitoring Strategy describes a ten-year plan for surface and ground water monitoring. The plan includes information on all types of monitoring, condition monitoring, problem investigation monitoring and effectiveness monitoring along with a timeline for implementation. Under the plan, Minnesota will completely assess its lakes and streams on a ten-year cycle and will re-establish its groundwater monitoring network in cooperation with the Minnesota Departments of Agriculture and Health. The report is available on the internet at: http://www.pca.state.mn.us/publications/reports/p-gen1-10.pdf

The second edition of the MPCA's Environmental Information Report (EIR) contains assessments of a wide variety of environmental stresses facing Minnesota, and identifies and compares their sources. Current environmental programs are taken into account; the analysis examines the health and ecological stresses that remain. The EIR provides an assessment of our confidence in these measurements, as well as an indication of current trends of the various stressors and sources that contribute to environmental risks. The report is located at the following link: http://www.pca.state.mn.us/index.php/about-mpca/mpca-overview/agency-strategy/environmental-information-report.html?menuid=&redirect=1

The 2010 Integrated Water Report to the EPA describes the conditions of the surface and ground water in the State of Minnesota. The report is a combination of Sections 305(b) and 303(d) of the Federal Clean Water Act which both call for states to report on their waters to help measure progress toward the national goals of fishable and swimmable waters. This report identifies impaired waters and waters attaining standards that can be removed from the impaired waters list. The report can be found at: http://www.pca.state.mn.us/index.php/view-document.html?gid=5968

Additional information on the MPCA's Strategic Plan can be found at: www.pca.state.mn.us/publications/reports/strategicplan.html

Additional information on the EnPPA can be found at: www.pca.state.mn.us/programs/enppa.html

If you have questions about the enclosed information, please feel free to contact me at 651-757-2241.

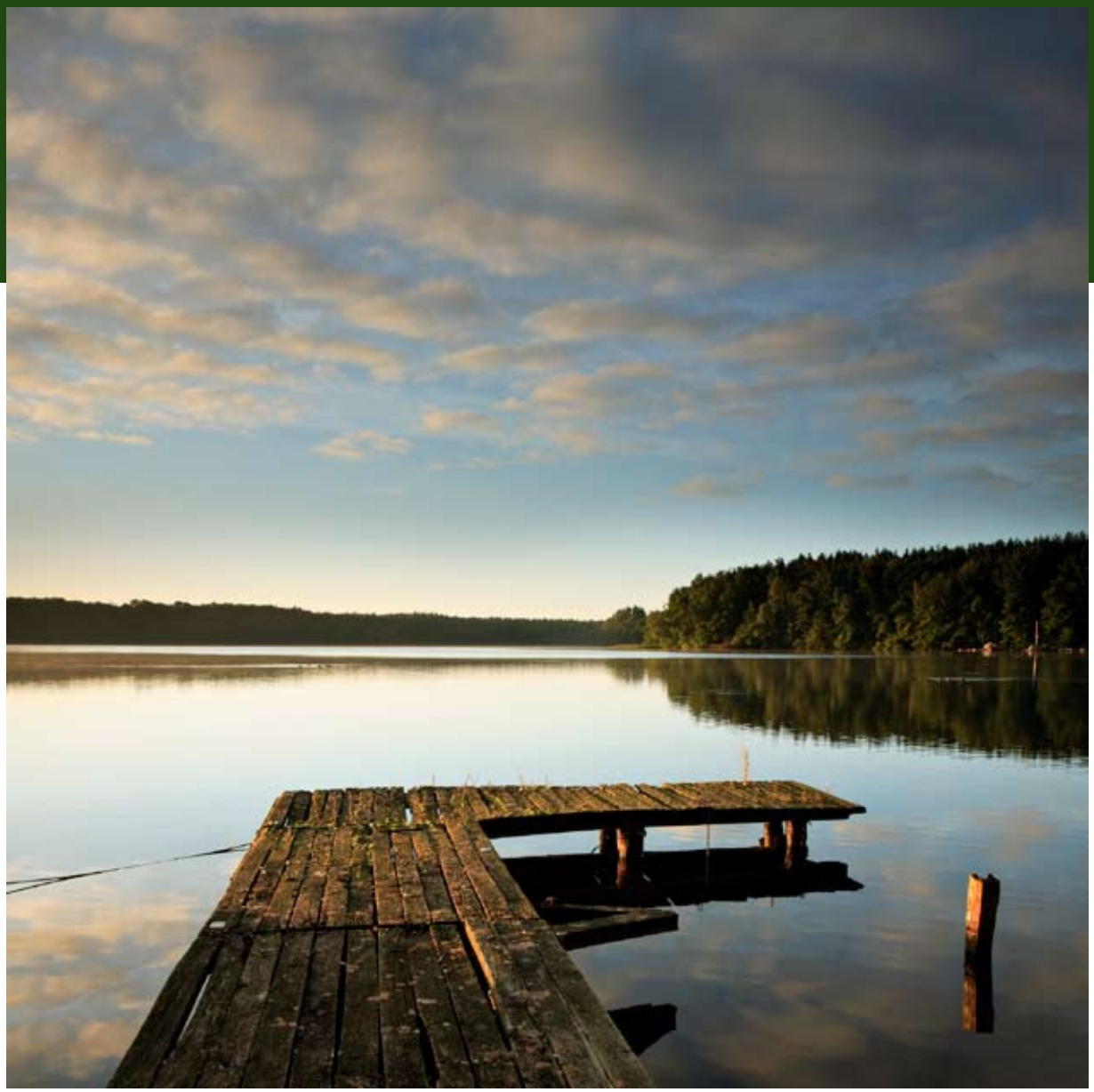
Sincerely,

Jodi Boyne
Public Affairs Director

JB/LEC:km

Enclosures

lrwq-iw-1sy10



Strategic Plan 2008

Minnesota Pollution Control Agency

Minnesota Pollution Control Agency

2008 Strategic Plan

Welcome to the revised Minnesota Pollution Control Agency strategic plan, finalized in May 2008.

The plan serves to chart the strategic direction of the agency for the next several years. As such, it contains a balance of goals and objectives reflecting the agency's "core" work as well as agency aspirations — strategic efforts we believe are needed to better align results with our mission. It also contains "stretch" goals and objectives intended to challenge the agency in improving the environment.

This strategic plan is not an agency work plan. It does not directly reflect all of the MPCA's work. Nor does it contain much information about the strategies used to accomplish the goals and objectives. These strategies are expressed in our annual work planning efforts.

The plan contains many new and revised goals and objectives. A few important examples follow:

- Increased focus on addressing the challenges of global climate change. Objectives A3b, L1a, R4a and R4b all reflect efforts to reduce greenhouse gas emissions.

- A new Goal E5 representing the agency's intention to continue to build on the state's capacity to address emerging environmental issues. Emerging issues are those issues not currently part of regular environmental protection activities in Minnesota, such as endocrine disrupting compounds and nanotechnology.

- Significant changes in the agency's responsibility goals (Minnesotans Take Responsibility to Protect Our Environment) to focus on creating sustainable behaviors and processes to encourage conservation of resources and a healthy environment.

As you read the plan, you may note that not all of the goals and objectives are expressed at the same strategic level. Some are more reflective of program outputs or productivity measures than environmental improvement measures. Also, general differences in strategic level may exist between the vision statements in the plan (Air Vision vs. Water Vision, for example). The MPCA needs to retain such differences in this iteration of the plan because of varying stages of program evolution and limitations on the agency's ability to measure progress in some areas.

Vision: Minnesotans Take Responsibility to Protect Our Environment

Goal R.1 Minnesotans buy green products and services.

Objective R1a) By January 1, 2013, provide green building assistance targeted at new or substantially reconstructed buildings to achieve a 25 percent reduction in greenhouse gas emissions using 2003 as a baseline.

Objective R1b) By January 1, 2012, each household participating in a collection program produces 15 percent less household hazardous waste than in 2005.

Objective R1c) By January 1, 2013, state and local governments increase the purchase of environmentally preferable products and services by 30 percent over 2006 levels.

Goal R.2 Minnesota businesses produce green products and provide green services by reducing or eliminating the use of environmentally harmful substances.

Objective R2a) By 2013 the amount of problem materials in the mixed municipal waste stream will be reduced by 20 percent from 1999 levels.

Objective R2b) By January 1, 2013, increase sustainable industrial manufacturing jobs from 9000 to 9600 and gross economic activity from this sector by 20 percent over 2004 levels, which are estimated at $2.98 billion.
See this supporting information: Minnesota's Recycling Industries: Economic Activity Summary

Objective R2c) By January 1, 2013, technical assistance at specific facilities will reduce the amount of pollution generated by 10 percent from 2008 levels.
See this supporting information: Pollution Prevention Evaluation Report

Goal R.3 Minnesotans act on their environmental knowledge to support healthy ecosystems.

Objective R3a) Minnesotans maintain or increase their general environmental knowledge and environmental behavior scores from the baseline data presented in the 2002 *Minnesota Report Card on Environmental Literacy*.

Objective R3b) To achieve MPCA environmental outcomes, increase the number of citizens volunteering at, or for the MPCA by at least 10 percent annually from 2007 to 2013.

Objective R3c) By 2013, Minnesota residents reduce their individual contribution to greenhouse gas emissions to 2005 levels.

Goal R.4 MPCA leads the way to minimize its environmental footprint and assist other public entities to do the same.

Objective R4a) By 2015, greenhouse gas emissions from MPCA facilities and its operations are reduced by at least 15 percent from 2005 levels.

Objective R4b) MPCA catalyzes public entities to take actions to reduce greenhouse gas emissions by 15 percent between 2005 and 2015.
See this supporting information: Next Generation Act, Interagency Pollution Prevention Advisory Team Annual Report, Climate/Energy Citizen Partnership Grant Request for Proposals, and Signers of the U. S. Mayor's Climate Protection Agreement.

Vision: Minnesota's Air Is Clean and Clear

Goal A.1 Minnesota's outdoor air will meet or improve upon all environmental and human health-related federal and state ambient air quality standards.

Objective A1a) Reduce risks to humans and the environment by meeting all ambient air quality standards.

Objective A1b) Reduce overall emissions in Minnesota of sulfur dioxide and nitrogen oxides (pollutants that contribute to fine particle formation) by 30 percent from 2002 levels by January 1, 2012, and by 40 percent by January 1, 2018.

Objective A1c) Reduce direct man-made emissions of fine particulate (PM2.5) by 15 percent from 2002 levels by January 1, 2012 and by 25 percent by January 1, 2018

Objective A1d) Reduce overall emissions in Minnesota of volatile organic compounds (pollutants that are toxic and contribute to ozone formation) by 20 percent from 2002 levels by January 1, 2012, and by 30 percent by January 1, 2018.

Goal A.2 Minnesota's outdoor air quality will meet environmental and human health benchmarks for toxic and other air pollutants.

Objective A2a) The MPCA will target reductions in statewide risk from air toxics by:

- Calculating cancer and non-cancer risks in statewide ambient air using modeling and ambient monitoring by July 1, 2009.
- Identify the pollutants that largely contribute to cancer and non-cancer risk by July 1, 2009.
- Developing strategies to reduce emissions and concentrations of these risk drivers by July 1, 2010.

Goal A.3 Minnesota reduces its contribution to regional, national and global air pollution.

Objective A3a) Reduce mercury emissions from Minnesota air sources to meet TMDL air emission target of 789 lbs/year. Track concentrations of mercury in fish tissue to better understand how changes in state, national and international mercury emissions affect fish mercury concentrations.

Objective A3b) Reduce greenhouse gas emissions in Minnesota by 15 percent from 2005 levels by January 1, 2015 and by 30 percent by January 1, 2025 as set in the *Next Generation Energy Act of 2007*.

Objective A3c) Reduce visibility impairment in the Boundary Waters Canoe Area Wilderness by three percent from the 2000-2004 baseline conditions by January 1, 2012 and by six percent by January 1, 2018.

Vision: Minnesota's Land Supports Healthy Ecosystems and Sustainable Land Uses

Goal L.1 Ensure solid waste is managed to conserve materials, resources, and energy.

Objective L1a) By January 1, 2025, achieve a total reduction of 75 million metric tons of greenhouse gas attributed to changes in waste generation, materials conservation, and resource management practices.

Objective L1b) Reduce the number of households who burn their waste on-site (and the resulting dioxin and other pollutants and associated wildfire risks) by 75 percent from the 2005 baseline by January 1, 2013.

Goal L.2 Minimize or reduce the release of contaminants to or from the land.

Objective L2a) Significant Compliance is achieved annually at 90 percent of solid waste facilities.

Objective L2b) On an annual basis, 90 percent of above and underground storage tanks will be in significant operational compliance.

Objective L2c) On an annual basis, 90 percent of hazardous waste generators and facilities will be in significant compliance.

Objective L2d) By 2011, household hazardous waste (HHW) collection participation increases by 20 percent above the 2005 baseline.

Goal L.3 Restore land to productive use by managing risk from contaminated sites.

Objective L3a) Reduce the number of sites in the Superfund Program at a rate of 10 sites per year.

Objective L3b) Attain a net decline in the number of sites in the Petroleum Tank Release Program of 150 sites per year.

Objective L3c) Complete 100 percent of the construction and 100 percent of the land use plans for all 112 landfills in the Closed Landfill Program by 2012.

Objective L3d) Facilitate the redevelopment of contaminated properties through issuance of 200 assurance letters per year, consistent with standards established to protect human health and the environment.

Vision: Minnesota Has Clean, Sustainable Surface and Ground Water

Goal W.1 Assess the condition of Minnesota's ground water systems and provide information on the effectiveness of Best Management Practices to assist the Agency's efforts to prevent and reduce degradation of ground water and support ground water conservation.

Objective W1a) Assess the ambient condition of Minnesota's ground water, focusing on vulnerable aquifers in nonagricultural areas.

Objective W1b) By December 31, 2012, and every five years thereafter, report on the condition of Minnesota's ground water.

Objective W1c) By December 31, 2010, identify Best Management Practices employed by programs to prevent or reduce ground water degradation, highlight those for which more data is needed to evaluate effectiveness, and develop a plan for addressing the data gaps.

Goal W.2 Assess the chemical, physical and biological integrity of Minnesota's lakes, streams and wetlands to identify if designated uses are being met, and provide information on the condition of waters.

Objective W2a) By December 31, 2017, sample and assess Minnesota's 81 major watersheds to determine if they meet designated aquatic life, recreation and consumption beneficial uses, and to identify pollutant load trends.

Objective W2b) By January 1, 2017, gather water quality data and assess 100 percent of the lakes 500 acres and larger; at least 25 percent of the lakes between 100 and 499 acres; and continue to expand the Citizen Lake and Citizen Stream Monitoring Programs by five percent per year.

Objective W2c) Beginning in 2010, evaluate the overall state-wide quality of Minnesota's wetlands using probabilistic surveys every three years to determine if wetland programs are meeting the goal of no net loss of wetland quality and assist the Department of Natural Resources and the Minnesota Board of Water and Soil Resources in their evaluation of wetland quantity.

Objective W2d) By April 1, 2010, and every two years thereafter, identify impaired waters, report that information to the U.S. Environmental Protection Agency according to their requirements, and provide information about impaired and unimpaired waters to Minnesotans.

Goal W.3 Protect and improve the chemical, physical and biological integrity of Minnesota's lakes, streams and wetlands.

Objective W3a) By May 1, 2011 and every three years thereafter, review Minnesota's water quality standards to incorporate standards that reflect current science and information.

Objective W3b) Wastewater National Pollutant Discharge Elimination System (NPDES) facilities do not contribute to the impairment or degradation of state waters.

Objective W3c) By January 1, 2014, strengthen local programs to reduce the percentage of subsurface soil treatment systems (SSTS) characterized as failing or imminent threats to public health and safety from 39 percent to less than five percent.

Objective W3d) NPDES Stormwater sources do not contribute to the impairment or degradation of state waters.

Objective W3e) Ensure that manure does not contribute to the impairment or degradation of state waters.

Objective W3f) To provide a framework to guide water quality protection and impaired waters restoration efforts, develop watershed management and implementation plans for the 81 major watersheds by 2018.

Objective W3g) Restore impaired waters to meet designated uses.

Vision: Excellence in Operations

Goal E.1 Provide a safe and healthy workplace for all employees, volunteers and visitors.

Objective E1a) Provide a safe workplace; free from work-related accidents and injuries by addressing safety issues and continuously improving agency practices.

Objective E1b) Staff has access to required training, including refresher training, including all new employees within probation period or before performing those duties where training is a prerequisite.

Objective E1c) Promote participation in employee wellness activities by sponsoring appropriate workplace and non-workplace activities.

Goal E.2 Manage agency operations to support the agency's environmental work and core operations in effective and efficient manner.

Objective E2a) Maintain a human resources system that supports the agency's management of its employees in performing work of the agency.

Objective E2b) Using appropriate benchmarks, improve the linkage of the agency's strategic plan, budget, workplans and progress evaluation systems toward achieving environmental goals.

Objective E2c) Using appropriate benchmarks improve the system of managing agency's resources consistent with our priorities.

Objective E2d) Ensure the agency maintains consistent and current administrative policies and practices.

Objective E2e) Manage agency fiscal resources such that agency budgets are reflective of its priorities and financial information is available in real time.

Objective E2f) Develop measures for agency-wide compliance and enforcement efforts so that they remain relevant and current in context of the overall strategic plan.

Objective E2g) Increase employee engagement levels by three percent for each biennial survey/action planning cycle across the agency.

Goal E.3 Achieve excellence through application of appropriate tools and best practices.

Objective E3a) Routinely review agency performance and division dashboard measures and adjust strategic goals and priorities based on the data and best practices as directed by senior managers.

Objective E3b) Refresh the continuous improvement deployment plan routinely to establish appropriate measures and strategies for implementing agency-wide continuous improvement processes.

Objective E3c) Develop and implement a communications strategy that advances the agency goals.

Objective E3d) Develop and implement an education and outreach strategy that advances the agency goals.

Objective E3e) Measure pollution prevention results within targeted agency programs.

Goal E.4 Provide a reliable information management system that supports the agency and its partners in effective and efficient environmental work.

Objective E4a) Provide timely access to environmental data so that 100 percent of our environmental data that is located in databases is available publicly.

Objective E4b) Provide an environmental context for 75 percent of our data that is publicly accessible.

Objective E4c) Provide IT services that enable staff to deliver environmental services more efficiently and effectively such that 90 percent of the IT services are provided within agreed upon timeframes.

Objective E4d) Develop the capability for paperless operation for 75 percent of the agency's major services.

Objective E4e) Design a records management system that incorporates 60 percent of paper records into an electronic document management system.

Goal E.5 Maintain the agency's capacity to recognize and address emerging issues that fall within the agency's authority.

Objective E5a) Continually collect and analyze data regarding the state of Minnesota's environment to identify trends for known stressors, identify new stressors, and assess the need for new or improved actions to protect Minnesota's environment and public health.

Website Information for MPCA Strategic Plan Supporting Documents

Minnesota's Recycling Industries: Economic Activity Summary — www.pca.state.mn.us/oea/market/economic.cfm

Pollution Prevention Evaluation Report — www.pca.state.mn.us/publications/reports/lrp-p2s-2sy08.pdf

2002 Minnesota Report Card on Environmental Literacy — www.seek.state.mn.us/publications/reportcard2002.pdf

Next Generation Act — www.nextstep.state.mn.us/res_detail.cfm?id=4034

Interagency Pollution Prevention Advisory Team Annual Report — www.nextstep.state.mn.us/res_detail.cfm?id=1120

Climate/Energy Citizen Partnership Grant Request for Proposals — www.nextstep.state.mn.us/res_detail.cfm?id=4041

Signers of the U.S. Mayors' Climate Protection Agreement, — http://usmayors.org/climateprotection/list.asp

Environmental Conditions in Minnesota

To put the elements of the 2009-2012 Performance Partnership Agreement (PPA) in context, it is useful to take a brief look at the past four decades of progress and the current state of our waters, our air and our land. A summary of Minnesota's current environmental conditions follows:

Water
Minnesota waters today are decidedly cleaner than they were in the 1960s and 1970s. Industrial and municipal discharges have been addressed. Most combined storm and sanitary sewers have been separated, significantly reducing overflows into the Mississippi. Fish, wildlife and boaters have returned to waters once heavily polluted by human and industrial waste.

Despite decades of progress in cleaning up water pollution, hundreds of Minnesota's lakes, rivers and streams are still not healthy enough for people to safely use and enjoy. These impaired waters do not meet water quality standards and pose risks to people and aquatic life. They contain too much sediment, bacteria, mercury, phosphorus and/or other contaminants. Biotic integrity also is impaired by physical alterations and invasive species.

MPCA staff identified 297 additional impairments in the 2008 assessment process for sections 303d and 305b of the Clean Water Act. There are now 349 rivers and streams impaired for one or more pollutants, and 1,028 lakes and wetlands impaired for one or more pollutants, resulting in a total of 2,575 individual impairments in Minnesota waters to date. Due to the vast abundance of waters in the state and limited staff and funding to assess them, only a small portion, approximately 14 percent of the state's river miles and 18 percent of its lakes, has been formally assessed for impairments.

Once all Minnesota waters have been assessed, more than 10,000 impairments will likely have been found, located in every watershed in the state, given the 40 percent impairment rate noted so far for waters assessed here and nationally. The MPCA is on track to intensively monitor all of the state's major watersheds in the next ten years and through the 2008 sampling season 11 percent of Minnesota watersheds either have been sampled or sampling is underway. Correcting the water quality problems is made more challenging by the diffuse nature of the impairment sources, such as polluted stormwater, agricultural runoff, and atmospheric deposition of contaminants. Furthermore, distant water quality problems, such as hypoxia in the Gulf of Mexico, may be caused in part by nonpoint source pollutants coming from Minnesota and other Midwestern states. These numbers represent huge environmental, economic and quality of life concerns, and underscore the need for stable, effective funding of impaired waters assessment and cleanup by state, local and private partners.

Land
During the 1980s and 90s, Minnesota took decisive and effective steps to clean up industrial and municipal waste dumps and leak sites that contaminated land and groundwater. A series of laws and programs were enacted in Minnesota and nationally to appropriate funds, compel cleanup of the most serious sites, and to create incentives and funding sources to encourage voluntary cleanups.

The state Superfund, enacted in 1983, handles contaminated sites that are large and complicated and that may take several years to fully address. The Remediation Division has done or overseen full investigation and final cleanup or control of 160 out of 237 listed industrial waste sites, and 21 of 46 Minnesota sites on the federal Superfund list. The remainder of the listed sites is in the cleanup process. Most sites need ongoing monitoring and maintenance for many years or decades.

The MPCA's award-winning Voluntary Investigation and Cleanup (VIC) program has overseen over 3,000 contaminated projects since its inception in 1988. A total of 3,841 liability assurances or other determination through the VIC program have been issued upon completion of investigation and, if necessary, remedial activities. This has contributed to those properties becoming candidates for sale, refinancing, or redevelopment. More than 566,000 acres of land have been returned to productive use. About 200 new projects are screened and processed each year in this program, which streamlines the investigation and encourages responsible parties to quickly address problem sites without the fear of protracted litigation that slowed earlier cleanup efforts.

Since 1990, the Resource Conservation and Recovery Act (RCRA) remediation program has completed the investigation and remediation of 262 hazardous waste release sites. The sites consist of hazardous waste generators, permitted RCRA facilities, and former facilities that operated under interim status.

For petroleum leaks, the story is similar. The Petrofund and Petroleum Remediation Program, created in 1987, has investigated and closed more than 15,000 of the 16,700 petroleum leak sites on its roster. About 350 new sites are expected to enter this program each year for the foreseeable future. The Petroleum Brownfield Program, a voluntary program similar to VIC has helped streamline assessment and cleanup actions at more than 2,500 sites, leading to the restoration of more than 1,500 acres in each of the past five years. The voluntary approaches result in liability assurance letters from the MPCA, as well as development plan approvals aiding redevelopment.

The Closed Landfill Program (CLP) was created by the legislature in 1994 as an alternative to Superfund. The CLP is responsible for cleanup and long-term care at up to 112 qualified closed state-permitted municipal waste landfills. Cleanup actions have included relocation of wastes, enhancement of site covers to current standards and installation of groundwater pump/treat and active gas collection systems. Other response actions have included sampling and monitoring, operation of active remediation systems, general site care, reimbursement of certain past costs and land & property management. The CLP now operates 20 active gas collection systems which have destroyed more than 100 million pounds of methane in the past 4 years alone. A pilot Landfill Gas to Energy project was initiated using Stirling engines in 2007 at the WDE Landfill, a former NPL (National Priorities List) Superfund site. The CLP is currently undergoing a redesign effort to better address implementation of program requirements including development of Land Use Plans (LUPs) for landfills. LUPs are recognized as institutional controls to help the CLP, land owners and local governmental units responsibly manage qualified [landfill] facilities.

Groundwater
Groundwater is the source of drinking water for more than 70 percent of Minnesotans and is a major asset to agriculture and industry. Many threats to Minnesota's abundant groundwater have been reduced in recent years by strong cleanup programs and preventive waste management practices, including waste reduction and recycling. However, continued residential and commercial growth along the St. Cloud-Twin Cities-Rochester corridor has begun to strain supplies of clean, available groundwater in some areas. In addition, increasing withdrawals for irrigation and biofuels production have caused localized groundwater shortages and will require careful monitoring in the future.

In recent years, the MPCA has re-established its ambient well monitoring network and is currently seeking additional funding to allow for construction of new wells in vulnerable aquifers to add to the network. The MPCA coordinates water monitoring and data sharing through an interagency agreement with the Minnesota Departments of Agriculture and Health. The three agencies track trends in ambient groundwater quality for nitrates, volatile organic compounds (VOCs) chlorides, pesticides and other parameters, focusing on vulnerable aquifers, recharge zones and areas where land use is changing.

A 2007 MPCA report describing the statewide condition of Minnesota's groundwater made the following conclusions:

- Groundwater quality is generally good and complies with drinking water standards; however, human-caused impacts to groundwater quality are apparent in many areas of the state.
- In urban areas, especially in the Twin Cities metropolitan area, Rochester and St. Cloud, elevated concentrations of chloride and nitrate and detectable concentrations of VOCs are common.
- In rural and agricultural areas, nitrate concentrations are frequently elevated or exceed standards; and pesticides and pesticide degradates are commonly detected, though at concentrations that are nearly always less than applicable drinking water standards.
- Areas of impacted groundwater correlate well with land uses that are known to cause the observed quality impacts. The prevalence of elevated nitrate concentrations in groundwater in regions dominated by agricultural land uses and in unsewered residential areas is particularly noteworthy.

A major challenge now facing groundwater managers is the large number of newly recognized environmental contaminants from consumer products, waste disposal, agricultural and urban runoff, residential and industrial wastewater, and long-range atmospheric transport. These "emerging contaminants" are not currently incorporated into routine monitoring programs. Special studies are underway in Minnesota to determine the magnitude and extent of a number of these compounds in the environment, with particular focus on perfluorinated chemicals (PFCs) and endocrine-disrupting compounds (EDCs).

Air

By many measures, Minnesota has good air quality. Even in the Twin Cities Metropolitan area which includes over three million people, the state has historically fully attained all national ambient air quality standards. This is due in part to favorable geography and weather patterns, but credit must also be given to pollution control efforts by government and industry.

However, significant challenges loom. Since 2007, both the ozone and fine particle ($PM_{2.5}$) standards were lowered. Currently, ozone is at 95 percent of the standard and $PM_{2.5}$ is at 85 percent of the standard. Fine particles from mobile and combustion sources add to regional haze and are of concern as research shows serious heart and lung effects on poor air quality days. In addition, the lead standard has been lowered in 2008, and as a result, there is one new non-attainment area in the Twin Cities.

While most air toxics have been decreasing in concentration, a few such as formaldehyde are near or above health benchmarks. In 2007, daily concentrations of ozone or fine particles were high enough to result in air quality alerts for sensitive groups on nine days in the Twin Cities area. Moderate air quality days (178) were equivalent to good air quality days (178) in 2007.

Attainment of national standards is important for both human health and economic health, as non-attainment designation means development restrictions. The combined effect of lower standards, regional air masses drifting into Minnesota from other states and increasing temperatures may trigger future air quality violations of the standards, and compel more air quality alerts. A broad-based coalition of stakeholders from government, environmental groups and industry--Clean Air Minnesota--is working on voluntary measures to reduce pollutants and prevent non-attainment. Federal clean fuel requirements and other government and industry measures will help, but the outcome is uncertain.

In addition, emissions of carbon dioxide continue to increase in Minnesota, primarily from the burning of fossil fuels. The increased levels of carbon dioxide and other global warming gases are linked to climate change. In Minnesota, observed changes include higher temperatures, shorter winter lake ice cover, higher summer dew points, northward species migration, and more frequent heavy rainfalls and floods.