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DEPARTMENT: POLLUTION CONTROL AGENCY

STATE OF MINNESOTA

Office Memorandum

DATE: December 3, 2008

TO: John Wells
Water Resource Director
Environmental Quality Board
Minnesota Planning

FROM: Amy Rudolph
Legislative Director
Office of the Commissioner

08 - 0997

SUBJECT: Draft 2008 Ground Water Monitoring Status Report

We are sending you copies of the "Draft 2008 Ground Water Monitoring Status Report" in both paper and electronic form. As you know, the amended 1989 Ground Water Protection Act requires the Minnesota Pollution Control Agency, in cooperation with other agencies participating in the monitoring of ground water resources, to provide a draft report on the status of ground water monitoring to the Environmental Quality Board (EQB) in each even-numbered year.

Both the paper and electronic versions of the draft report include a text section and a table of the roles and responsibilities of the various agencies involved in ground water monitoring.

We hope this information is helpful as you prepare EQB's report to the legislature. We would be interested in obtaining a few copies of the report upon its completion.

Please feel free to call me at 296-6977 or Stephen Thompson at 651- 297-8295 if you have any questions.

AR:cmbg

Monitoring to determine statewide ambient ground water quality conditions is jointly conducted by the MPCA, Minnesota Department of Agriculture (MDA), and Minnesota Department of Health (MDH). These three agencies collect and use monitoring data to provide information necessary to assess, and ultimately protect or restore, the quality of Minnesota's ground water resources. A 2004 Memorandum of Agreement (MOA) between the MPCA, MDA, and MDH clarified the agencies' respective roles (as specified in state statute) in operating a statewide integrated ground-water-quality monitoring system.

The agencies' different roles in the integrated ground water quality monitoring system are based on their individual state and federal authorities and requirements. As part of the agreement, the MPCA is responsible for monitoring non-agricultural contaminants in the state's ground water, and the MDA is responsible for monitoring agricultural chemicals such as pesticides and fertilizers. Monitoring by the MDH focuses on ground water used as public water for either public or private water supplies to ensure contaminants are below concentrations which present a threat to human health. To ensure efficiencies in the system, the MOA establishes interagency cooperation in shared monitoring design, sample collection, sampling location selection, evaluation of sensitive areas, and data management. Additionally, the MOA provides for an annual review of the ground water quality monitoring system to allow for modifications. A five-year evaluation in 2009 is stipulated, at which time the agreement will be updated.

2.2 Water-Quality Monitoring and Assessment

Ground water quality monitoring in Minnesota was conducted as part of National, Statewide, multi-county, and site-specific efforts from 2006-2008. National ground-water-quality monitoring was conducted by the U.S. Geological Survey (USGS) as part of the National Water Quality Assessment (NAWQA). This assessment evaluated water quality conditions in 19 aquifers across the U.S which accounted for 75 percent of ground water withdrawls for potable use. Assessments focused on issues of concern within a particular aquifer and addressed one or more general issues. Statewide ambient ground-water-quality monitoring networks sampled a greater number of wells in the State compared to National efforts, and these networks continued to be conducted cooperatively by the MPCA, Minnesota Department of Agriculture (MDA), and Minnesota Department of Health (MDH) through the 2004 MOA. Two multi-county assessments of ground-water-quality conditions were initiated, including citizen volunteer monitoring of nitrate concentrations in southeastern Minnesota and a reconnaissance of perfluorochemicals in the State's ambient ground water. A considerable amount of ground-water monitoring in the State continued to assess known contaminant spills. Site specific monitoring was performed by the MPCA and MDA, and the MDH assessed public health impacts at some of these locations.

2.2.1 National Water-Quality Monitoring

The USGS monitored the water-quality of two heavily used aquifers of interest in Minnesota as part of the NAWQA-- the glacial deposit aquifers (commonly referred to as the surficial aquifer within the State) and the Cambrian-Ordovician aquifer system. The Cambrian-Ordovician aquifer system is a complex multiaquifer system with individual aquifers separated by leaking confining units. The Prairie du Chien-Jordan was the aquifer assessed within this system in Minnesota (Fong et al, 1998). Approximately 90 wells from the surficial and Prairie du Chien-Jordan aquifers were sampled in Minnesota from 2006-2007 to determine concentrations of a wide variety of naturally-occurring and anthropogenic contaminants. Two USGS reports also were released during this timeframe describing the occurrence and distribution of arsenic, uranium, and radon in the glacial deposit aquifers throughout the Nation (Ayotte et al, 2007; Thomas, 2007).

2.2.2 Statewide Water-Quality Monitoring

The MPCA's Statewide ambient water quality monitoring continued to focus on assessing water-quality conditions underlying non-agricultural areas according to the joint interagency plan. Approximately 275 wells representing conditions underlying non-agricultural areas were sampled in 2006 and 2007. About 25 percent of these wells were located in the shallow part of the surficial aquifer, and the remainder was located in deeper parts of the surficial or Paleozoic aquifers. Water samples generally were collected once each year to determine nitrate, chloride, or volatile organic compound (VOC) concentrations.

The MDA continued to assess ambient water quality conditions underlying agricultural areas throughout the State according to the MOA. The primary focus of this effort is to determine the presence and distribution of pesticides in ground water considered susceptible to contamination, typically the upper part of the surficial aquifer system (Minnesota Department of Agriculture, 2007). The MDA's monitoring network consisted of 85 shallow monitoring wells located in the central sand plains and approximately 50 wells located in agricultural areas outside of the central sand plains. Approximately 10-15 springs were sampled in the southeastern part of the State in lieu of wells since springs integrate water-quality conditions in karstic areas (Katz et al, 1999). Eight additional monitoring wells were installed for the network during this period, mainly in areas north of the Twin Cities metropolitan area and outside of the central sand plains.

MDH water-quality monitoring efforts continued to focus on assessing public water supplies, which often utilize ground water. The MDH sampled the quality of finished drinking water in cooperation with the State's public water supply systems to determine contaminant concentrations as part of the Safe Drinking Water Act regulations. Private drinking water wells were not assessed as part of this effort; however, the MDH reviewed nitrate and coliform bacteria data collected by well drillers from newly-installed drinking water wells to determine the potability of the water. Investigative monitoring also was conducted to assist public water suppliers in finding wells with lower concentrations of arsenic, radionuclides, and nitrate. In

addition, the MDH measured tritium values in selected ground water wells to identify locations with recently-recharged ground water which are very susceptible to contamination. The MDH also administered the State's wellhead protection program which was designed to protect sources of ground water from contamination. States were required to have wellhead protection programs under the provisions of the federal Safe Drinking Water Act.

The information collected by the MPCA, MDA, and MDH, as well as results from National and local monitoring efforts, were integrated in a report published by the MPCA in 2007 (O'Dell, 2007). The report indicated elevated concentrations of chloride, nitrate, and VOCs were common beneath urban areas. Nitrate concentrations frequently exceeded standards set for drinking water in the shallow ground water underlying agricultural areas. Pesticides and their degradates also were commonly detected in the shallow ground water underlying agricultural areas; however, concentrations generally were less than applicable drinking water standards. Information on water quality trends generally was not reported because of insufficient available data to conduct most of these analyses.

2.2.3 Regional Water-Quality Monitoring

A citizen volunteer monitoring network was implemented in southeastern Minnesota in 2008 to assess the occurrence of nitrate in drinking water supplies, which primarily utilize ground water sources. The network was developed by the Southeast Minnesota Water Resources Board, MDA, MDH, and MPCA to assess the practicality of establishing a cost-effective, locally driven means of obtaining long-term data on nitrate concentrations in private drinking water supplies and implemented in nine counties. In each of the participating counties, approximately 50 - 100 citizen volunteers were recruited and trained to collect nitrate samples. A total of approximately 600 private drinking water wells were monitored to determine the impact well construction and local land use have on drinking water quality, and describe the regional distribution of nitrate concentrations and any temporal trends. Data collected from this network will allow counties to: 1) evaluate the feasibility of continued citizen volunteer monitoring of ground water, 2) determine the efficacy of their water quality protection programs, 3) identify emerging trends in nitrate concentrations, and 4) target water management resources for program implementation.

The MDH and MPCA continued to assess the occurrence and distribution of perfluorinated chemicals (PFCs) in the ground water. PFCs, such as PFOS, PFOA, and PFBA, are manmade chemicals used since the 1950s to manufacture industrial and consumer products which are heat and stain resistant and water repellant. The MDH continued monitoring public and private water supply wells in southern Washington and eastern Dakota Counties for these chemicals to assess public health impacts. The MPCA assessed the occurrence and distribution of perfluorinated chemicals (PFCs) in the ambient ground water in 2006 and 2007 as part of its ongoing investigation of the fate of these chemicals in the environment. Water

samples were collected from 17 shallow monitoring wells during fall 2006 and analyzed for 13 PFCs. One or more PFCs were detected at or above the reporting limit of 25 ng/L at nine of the 17 sample locations. PFBA was the most commonly detected compound, and usually was detected at the highest concentration (30 - 922 ng/L). PFCs typically were detected in well water samples collected in the Twin Cities metropolitan area, and all concentrations were below MDH drinking water guidance levels. Ambient ground water samples collected in the Twin Cities metropolitan area in November 2007 had similar or lower PFC concentrations. Fifteen monitoring wells and 3 springs in agricultural areas of the State were sampled for PFCs in October 2007 in cooperation with the MDA. PFBA was the only PFC detected in agricultural areas at a reporting limit of 25 ng/L and was detected at two of the 18 sites at concentrations ranging from 32 to 62 ng/L.

The Minnesota Department of Natural Resources (DNR) conducted ground water quality sampling in selected counties. This monitoring was done to determine the natural water quality in selected wells to support ground water sensitivity mapping done as part of the county geologic atlases and regional hydrogeologic assessments. These assessments were completed in cooperation with the Minnesota Geological Survey (MGS). Approximately 80 wells were sampled in each investigated county to determine major ion and trace element concentrations and tritium values. Data were published from Pope and Crow Wing counties in 2006 and 2007.

2.2.4 Site-specific monitoring

A large amount of ground water quality information continued to be collected as part of investigations at contaminant spill or release sites. The MPCA has collected data at approximately 19,000 sites as part of remediation efforts or facility permits, including petroleum product spill sites, hazardous waste sites, landfills, or abandoned industrial and commercial properties. Petroleum product spill sites were assessed most frequently. The most common constituents measured at remediation sites were volatile organic compounds, and major and trace inorganic elements. MDA site specific monitoring activities focused on fertilizer and pesticide spill sites. The MDH also collected data at some hazardous waste sites to assess potential health risks. Results of these assessments reported in public health assessments or health consultations, which are available online at:
http://www.health.state.mn.us/divs/eh/hazardous/sites/index.html

2.3 Ground Water Level/Flow Assessment

The Minnesota Department of Natural Resources (DNR) continued to maintain a ground water level monitoring network across the state. There were approximately 750 wells in the network. The collected data were used to assess ground water

resources, determine long term trends in water levels, interpret impacts of pumping and climate, plan for water conservation, and evaluate water conflicts. Water level readings were measured monthly in cooperation with soil and water conservation districts or other local units of government. Site specific monitoring is required of 123 permittees. An ongoing water supply planning effort is guiding establishment or improvement of monitoring plans for all public water suppliers. Over 650 communities in the state have public water supply systems, and 320 of these are currently involved in the planning effort.

The Metropolitan Council constructed a ground water flow model of aquifers within the TCMA with the cooperation of the Barr Engineering Company, a technical workgroup, and other stakeholders. The model simulated all major aquifers underlying the TCMA, including the glacial drift or recent alluvium, St. Peter, Prairie du Chien Group, Jordan, St. Lawrence, Upper Franconia, Ironton-Galesville, Eau Claire, and Mount Simon-Hinckley. The model was designed to determine: 1) the maximum pumping capacity of a proposed wellfield, 2) the drawdown from a proposed wellfield and if any existing wells may be impacted, 3) future ground water levels, 4) the effect of pumpage on ecological resources such as trout streams and calcareous fens, and 5) the effect of land use on recharge and ground water levels.

The USGS measured ground water levels in three principal aquifers within the TCMA in cooperation with the DNR, MPCA, and Metropolitan Council. Water levels have declined in these aquifers since the 1880's due to increased ground water withdrawls. This effort fills a gap in water level data collection within in the TCMA which has seriously limited the development of potentiometric surface maps and accurate modeling. Water levels were measured once in March and August 2008 in the Prairie du Chien-Jordan, Franconia-Ironton-Galesville, and Mount Simon-Hinckley aquifers. The report is expected by the end of 2008.

3. Current and Emerging Issues

Many of the ground water issues identified in previous reports were still relevant from 2006-2008, such as nitrate and pesticide contamination in selected areas. A few new emerging issues also were identified during this time period, such as the infiltration of stormwater-related contaminants to the ground water and the occurrence of pharmaceuticals and other personal care products in ground water.

3.1 Ground Water Quality

3.1.1. Nitrate

Nitrate contamination of ground water continued to be a substantial issue within the State. Several Minnesota communities, including Mankato, St. Peter, Perham, and Hastings, had municipal water supplies impacted by nitrate contamination (O'Dell, 2007). Statewide assessments of ground water quality during the 1990's have shown increased nitrate concentrations in southeastern, southwestern, and central Minnesota (Minnesota Pollution Control Agency and Minnesota Department of Agriculture,

1991). Studies conducted by the MPCA and USGS in the late 1990s showed nitrate concentrations in ground water varied with land use (Trojan et al, 2003; Fong, 2000). Land uses which may result in nitrate concentrations exceeding health risk limits set by the MDH included irrigated row crop agriculture, residential development on small lots served by individual sewage treatment (septic) systems, and new residential developments on previously farmed land.

Current Monitoring Status

Nitrate continued to be widely monitored in the State's ground water. Networks that measured nitrate concentrations included the ambient ground water monitoring networks of the MDA and MPCA, USGS NAWQA, and the southeastern Minnesota citizen volunteer monitoring network. The MPCA, MDH, and USGS networks also continued to collect nitrate concentration data which can be used to identify any temporal trends. Nitrate concentration data were collected by the MPCA annually at approximately 100 wells from 2006-2008, and about 15 of these wells had been sampled since 2004. The MDA sampled approximately 85 wells on quarterly basis in the central sand plains since 2000, and the USGS has monitored selected wells since 1995 as part of the NAWQA.

3.1.2. Infiltration of road salt and other stormwater-related contaminants

Stormwater infiltration practices are becoming more common as more attention is being directed to developing stormwater volume controls to reduce both the rate and volume of runoff to urban water bodies. Typical infiltration practices (e.g, rain gardens, infiltration basins/trenches, porous pavements, constructed wetlands) can infiltrate effectively but are also prone to rapid loss of permeability if not runoff is not pretreated to remove suspended sediment burdens. There is the potential for contaminant introduction into the ground water from improperly sited, designed, operated and maintained systems. Hence, the Minnesota Stormwater Steering Committee and its Research and Monitoring Committee have been working with cities and the University of Minnesota to better define risks.

Current Monitoring Status

The MPCA is working with municipalities and other partners via two contracts (one with state funding and a newly awarded 319 federal grant) with the University of Minnesota to define potential risks and applied management practices that can be used to minimize ground water pollution risks from stormwater. Several associated partnered studies are also underway with the University of Minnesota's St. Anthony Falls Laboratory pertaining to trout stream infiltration (Vermillion River and Miller Creek), contamination by road salt deicers and stormwater best management practices operation and maintenance conducted by municipalities. The University of Minnesota, is also assessing the fate and transport of stormwater-associated contaminants in the ground water using a combination of laboratory experiments, a regional ground water model of the TCMA and a more detailed model to assess potential risks to wellhead protection zones.

The USGS in cooperation with the Metropolitan Council assessed the ground water quality underlying selected rain gardens in the TCMA (Tornes, 2005). Selected constituents expected to be present in stormwater, including nitrate, chloride, and trace elements, were monitored by the MPCA's ambient ground water monitoring network from 2006-2008. Trace elements only were analyzed from samples collected from approximately 15 shallow wells in 2007.

3.1.3. Perfluorochemicals in the ground water in southern Washington County
Perfluorochemicals were first measured in drinking water supplies in the eastern TCMA in 2004. Most of the known contamination was traced to several landfills and dumps that are located in southern Washington County. Although predicting the transport of these contaminants is difficult in a karsted aquifer system, the contaminant levels appear to remain constant over time.

Current Monitoring Status
The MPCA and MDH continued to monitor the ground water to determine PFC concentrations. Ground water samples collected in the vicinity of active and closed landfills that may have accepted PFC waste were analyzed to determine PFC concentrations. More than 1,700 private and municipal drinking water wells have been assessed for PFCs in the eastern TCMA. The MPCA also monitored the ambient ground water for PFCs from 2006-2007 as described in section 2.2.3 of this report.

3.1.4. Pesticides and their degradates in ground water
Several studies have documented contamination from pesticides and pesticide degradates within the State. The MDH and MDA detected commonly-used herbicides in the ground water underlying agricultural land use on areas considered susceptible to contamination (Minnesota Department of Agriculture and Minnesota Department of Health, 1985; Klaseus and Hines, 1989). Assessments using data collected by the MDA and USGS indicated pesticides or pesticide degradates were detected in the shallow ground water underlying agricultural (O'Dell, 2007; Ruhl et al, 2000) and urban-residential land uses (Andrews et al, 1998).

Current Monitoring Status
The MDA continued to monitor the state's ground water to determine pesticide and pesticide degradates concentrations. Approximately 150 wells and springs were sampled as part of this effort in 2006-2007. Well water samples were analyzed for a suite of approximately 50 pesticides and pesticide degradates. The MDA, in cooperation with the MPCA, collected samples for pesticides and pesticide degradates at approximately 40 wells located in urban areas in 2006-2007. The USGS also continued to analyze samples from selected wells for a wide suite of pesticides and pesticide degradates through the NAWQA.

3.1.5. Pharmaceuticals and personal care products
Pharmaceuticals and personal care products include synthetic hormones, over-the-counter and prescription medication, and ingredients found in cosmetics, toiletries, detergents, and cleaning products. Some of these compounds were identified as

endocrine-disrupting compounds, and prenatal exposure to natural and synthetic hormones was associated with increased occurrence of tumors in humans and animals. Sources of pharmaceuticals and personal care products to ground water include wastewater treatment plant effluent discharged to land, septic waste, confined animal feeding operations, and landfill leachate.

Current Monitoring Status

The USGS determined the occurrence of pharmaceuticals, antibiotics, and household, industrial, and agricultural use compounds and sterols at selected ground water wells from 2002-2004 (Lee et al, 2004). Wells sampled for this study were selected based on proximity to contaminant sources and surrounding land-use characteristics. A total of 31 compounds were detected in the ground-water samples. The greatest number of contaminants was detected in two wells installed to characterize the water-quality underlying a waste dump. This study sampled a small number of wells, making it difficult to extrapolate the results across Minnesota.

3.1.6 Naturally Occurring Contaminants

Arsenic and radium are naturally-occurring carcinogens found throughout Minnesota. Arsenic is most commonly found in the northwestern and west central parts of the state, and radium is found in southern and central Minnesota. The federal drinking water standard for arsenic was lowered from 50 parts per billion (ppb) to 10 ppb in 2005. This change resulted in violations for approximately 20 community public water systems. Many of these suppliers have or will be installing arsenic treatment systems, interconnections to other public water suppliers, or new wells with lower arsenic concentrations. In addition, the standard for radium was set at 5.4 picoCuries/liter, resulting in a total of approximately 40 violations.

Current Monitoring Status

All community public water supply systems were monitored on a routine basis for radium and all community and noncommunity nontransient public water supply systems were monitored on a routine basis for arsenic as part of the Safe Drinking Water Act. The revision to Minnesota Rules 4725 required all new drinking water supply wells be sampled for arsenic. The MDH also participated with the MDA in nitrate clinics that also offered free arsenic analyses. As monitoring data becomes available, the extent and magnitude of arsenic and radium in Minnesota aquifers will be better understood. Where feasible, these data will assist some public water suppliers with installing new wells in aquifers with less arsenic or radium, therefore reducing treatment costs.

3.1.7 Volatile organic compounds

Over the past 20 years, MPCA's remediation programs including the petroleum remediation, Superfund, and voluntary investigation and cleanup programs, have addressed contamination from VOCs at thousands of chemical release sites. Assuming these programs addressed the major sources of VOC contamination to soil and ground water and there are no further VOC inputs to ground water, concentrations of VOCs in urban ground water should gradually decrease with time.

Current Monitoring Status
Sampling for VOCs at individual chemical release sites is conducted through the MPCA's remediation programs. Monitoring generally was conducted by a state contractor or by a responsible party, and involved either investigating known contamination problems or measuring the effectiveness of remediation or containment measures. The MPCA's ambient ground water monitoring program included VOC analyses, and the data will be examined to determine long-term trends in ground water underlying urban areas. The USGS continued to collect VOC data through the NAWQA.

3.2 Ground Water Level/Flow

There was a renewed interest in understanding ground water quantity and flow issues within Minnesota. This interest was partly due to the increase in the construction of biofuel-producing facilities and concerns regarding ground water resource limitations. Although the biofuel manufacturing processes have improved rapidly in recent years, most facilities still required three to four gallons of water per gallon of fuel produced, and much of this demand to date was provided by ground water. In addition, many of the plants were located in the southwestern part of the State where ground water resources were less plentiful.

Current Monitoring Status
Water level measurements in wells are required for all ground-water hydrology investigations. The DNR monitored ground water levels in about 750 wells statewide to determine long-term trends in the balance between recharge and water consumption. Water level monitoring is required at all biofuel production facilities by the DNR, and site specific monitoring is required of over 100 other permittees. More ground water level data is anticipated to be collected in the future by water suppliers as part of ongoing planning efforts. The USGS was establishing a real-time ground water level monitoring network that will allow a better understanding of the relations between land use, climate and ground water recharge.

4. Data Reporting

Ground water quality data from selected MPCA programs was available through the Environmental Data Access (EDA) system beginning in January 2008. The EDA system was developed to improve access to environmental data and is available online at the following web address (URL):

http://www.pca.state.mn.us/data/eda/index.cfm

Data from the MPCA's ambient ground water monitoring network, Ground Water Monitoring and Assessment Program (the predecessor program to the ambient monitoring network), and the open, closed, and demolition landfill programs are available through EDA. Ground water quality data collected by other programs including the feedlot, National Pollutant Discharge Elimination System permitting, petroleum remediation, Resource Conservation and Recovery Act cleanup, Superfund, and Voluntary Investigation and Cleanup programs are not available in EDA; however, information on how to access water-quality data from these programs was available through the MPCA's Ground Water Catalog, available online at the following web address (URL):

http://www.pca.state.mn.us/data/edaGWcatalog/gwSearch.cfm

5. Needs

A long-term commitment to collecting and analyzing ground water data is necessary since most ground water moves and changes slowly. Any trends in the ground water system may not be quantifiable for at least five to ten years. Current ground water monitoring programs will be limited in their ability to determine if the quality and quantity of Minnesota's ground water resources are at risk without a long-term commitment to these efforts.

Establishing a mechanism for state and local agencies to share ground water data, including water quality, water level, geophysical logs, and aquifer test information, needs to be established and maintained so effective use of this information among all agencies with ground water responsibilities is achieved. A standardized format for data transfer needs to be agreed upon, and a common server for agency access to ground water information is needed.

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AGENCY ROLES IN WATER RESOURCE MONITORING

Agency	Assistance Available	Data Coordination	Standards/Regulations	Site-Specific, including Regulatory and Effectiveness Monitoring	Statewide, Regional, and Site Monitoring
Agriculture	Local Coop. Monitoring Projects; automated small watershed monitoring coops	Ground Water Clearinghouse; STORET collaborative effort with MPCA	State Fertilizer, and State and federal Pesticide Regulations	Dairy Wells; Food Processing; Agricultural clean-up sites, Red Top demonstration(s)	Agricultural Chemical Incidents Pesticide and Nutrient Monitoring in ground and surface water
Minnesota Planning/LMIC		Minnesota Geographic Data Clearinghouse; Development and distribution of GIS and associated information	Data Compatibility Standards; Geographic Metadata Guidelines		
BWSR	Local Grant Programs; Water Inventory and Monitoring Guidebooks	GIS Interface with Counties for Local Water Planning; LARS Report System			Rainfall Monitoring with SWCDs
EQB	StateWater Plan; Coordination of Interagency Water Policy		Ensure Data Integrated According to Published Standards		
MDH	Community Health Services		Drinking Water Standards; Certified Lab Regulations	Public Water Supply Monitoring; Water Supply Well Samples	Drinking Water Supplies near Metropolitan Landfills
MGS	County Geologic Atlas, Hydrogeologic Research and Mapping	Unique Well Number; County Well Index Database			Regional Studies and Assessments
DNR	Ground Water Sensitivity Mapping; County Geologic Atlas; Regional Hydro-geologic Assessments; Fish population and habitat surveys, exotic species, rare and endangered species, precipitation monitoring	Water Use Database; Well Log Database; Lakes Database; Obwell Database; Precipitation Database, Daily Temperature Database, Fisheries lake database, Streamflow database	Water Appropriations; Sensitive Area Criteria Guidelines, Work in Protected Waters, aquatic plant management, shoreland management	Well Interference, Contamination Pumpouts, Aquifer tests, Calcareous Fen Management Studies, Protected Flows	Ground Water Levels; Ground Water Chemistry, Stream Flows, Lake Levels, Lake and Stream Water Chemistry and Biological Communities, Exotic Species, Habitat, Fish contaminants; Precipitation temperature, wind, snow depth, Regional Studies, Fen Water Levels and Chemistry
MPCA	Technical Assistance for Monitoring Design and Implementation, Data Management, and Data-driven Resource Management	STORET Database; IGWIS Database, Aquatic Biological Community Database	Ground Water Rules; Water Quality Standards; Pollution Discharge/ Management Permits; Lake Attainment Goals, Stormwater Permits	Tanks and Spills; Pollution Discharges; Site Assessments; Solid/Hazardous Waste Compliance, Clean Water Partnerships, Lake Assessment Program, TMDLs, Other Special studies, Toxics, Site-specific Trend Monitoring for Streams	Integrated Condition and Trends for Major Basins' Streams, Citizens Lake and Stream Monitoring Programs, Regional and Trend Lakes, Statewide Ground Water Assessments

Metropolitan Council	Monitoring and Technical Assistance, MEP Grant Program, Watershed and Water Supply Planning Assistance	Water Quality Database, Data Management & Modeling Assistance, Environmental Information Management System (EIMS)	Wastewater Treatment Plant Permit Compliance, Water Quality Standards Compliance in Rivers	Wastewater Treatment Plant Monitoring (Discharges & Ground Water)	Routine River Monitoring, Event-based Stream Monitoring, and Lake Monitoring in the Metro Area. Citizen-Assisted Lake Monitoring Program (CAMP) and Support for WaterShed Partners Volunteer Stream Monitoring Program
USGS	Monitoring of continuous streamflow, aquifer and watershed studies, groundwater levels, stream peak flow/low flow, basin characteristics, stream sediment loading	National NWIS database - streamflow, water quality, groundwater	Agency-wide standards for data collection, analysis and dissemination	Aquifer, watershed, aquatic, and biological studies	Federal, State, and local cooperative monitoring programs - continuous streamflow, NAWQA, groundwater levels, stream peak flow/low flow, basin characteristics