

EXECUTIVE SUMMARY

This is the Executive Summary of the annual Report to the Legislature by the Groundwater Coordinating Council (GCC). The report is required by s. 15.347, Wisconsin Statutes and describes the condition and management of the groundwater resource and summarizes the GCC's activities for fiscal year 2008 (FY 08). The full report along with several appendices can be accessed online at <http://dnr.wi.gov/org/water/dwg/gcc/rtl/gccreport.htm>.

In 1984, the Legislature enacted 1983 Wisconsin Act 410 to improve the management of the state's groundwater. The GCC is directed by s. 160.50, Wis. Stats., to "serve as a means of increasing the efficiency and facilitating the effective functioning of state agencies in activities related to groundwater management. The Groundwater Coordinating Council shall advise and assist state agencies in the coordination of non-regulatory programs and the exchange of information related to groundwater, including, but not limited to, agency budgets for groundwater programs, groundwater monitoring, data management, public information and education, laboratory analysis and facilities, research activities and the appropriation and allocation of state funds for research."

Membership of the GCC includes the Secretaries of the Departments of Natural Resources (DNR); Commerce; Agriculture, Trade and Consumer Protection (DATCP); Health Services (DHS); Transportation (DOT); the President of the University of Wisconsin System (UWS); the State Geologist; and a representative of the Governor. Agency designees are listed on the inside of the front cover. More information about the GCC and its activities can be found on the GCC web pages: (<http://dnr.wi.gov/org/water/dwg/gcc/index.htm>).

Highlights from each of the Chapters of the Report are summarized below.

GROUNDWATER COORDINATION

The GCC, its Subcommittees, and member agencies worked together to address groundwater management issues and coordinate groundwater activities in FY 08. Examples include:

The UW Water Resources Institute (WRI) funded and worked closely with the GCC Education Subcommittee on a comprehensive groundwater education/outreach project that resulted in: 1) a pamphlet entitled *Protecting Wisconsin's Buried Treasure*, that documents the accomplishments, impacts and benefits of the Groundwater Research & Monitoring Program. 2) fact sheets on nitrate and arsenic groundwater resource issues; and 3) activities for Groundwater Awareness Week (March 9-15), The later included groundwater-related press releases prepared by UW-SP and WRI, and a public radio talk show with DHS and DNR representatives discussing groundwater issues.

The GCC's Education and Local Government & Planning Subcommittees helped guide development of a DNR - and US Geological Survey-funded website that provides groundwater information to help communities with comprehensive planning (<http://wi.water.usgs.gov/gwcomp/index.html>). Legislation enacted in 1999 requires local units of government to develop a Comprehensive Plan by 2010 in order to undertake land-use activities. Comprehensive plans must address natural and agricultural resources, housing, utilities, and land use. The planning process presents a unique opportunity to implement groundwater protection at the local level. Since its official launch in March of 2008, the website is averaging nearly 800 information requests per day. Over 950 different individuals have visited the site.

Three groundwater workshops for teachers were held in January of 2008 in Green Bay, Stevens Point, and Jefferson. Staff from the DNR, WGNHS and CWSE at UW Stevens Point instructed teachers on using a groundwater sand tank model and provided other groundwater teaching aids. Fifty – three teachers from 24 different schools and nature centers attended the workshops and received a free model for their school or center.

The GCC and the UWS Groundwater Research Advisory Council (GRAC) continued coordination of the annual solicitation for groundwater research and monitoring proposals among state agencies. The FY 09 solicitation for groundwater research and monitoring proposals was released in October 2007 (see *Appendix D*). A total of 15 project proposals were received. A comprehensive review process resulted in the selection of 7 new projects for funding for FY 09, four by UWS and three by the DNR. The GCC approved the proposed UWS groundwater research plan as required by s. 160.50(1m), Wis. Stats. The FY 09 groundwater monitoring and research projects are listed by funding agency in Table 2, including projects that were carried over from FY 08.

SUMMARY OF AGENCY GROUNDWATER ACTIVITIES

State agencies and the University of Wisconsin System addressed a number of issues related to groundwater protection and management and implementation of Chapter 160, *Wis. Stats.* in FY 08. Two highlights are below.

Groundwater Protection Act Implementation – Under the Groundwater Protection Act (2003 Act 310) changes to the application process increased DNR’s authority to consider the environmental impacts of high capacity wells on critical surface water resources. In FY 08 a new rule, NR 820 (effective September 1, 2007), created a mechanism for evaluating proposed high capacity wells to determine if there will be a significant environmental impact on springs, trout streams, outstanding and exceptional resource waters. The rule also defines the extent of Groundwater Management Areas as required by Act 310. Chapter NR 820 also requires owners of high capacity wells to report the volume of water pumped from their wells on a monthly basis. DNR staff has made substantial progress updating the inventory and collecting and verifying basic information for the roughly 10,000 existing high capacity wells in the state. Using this updated information, over 7,600 annual pumpage reporting forms were mailed to owners of high capacity wells in late 2007 and early 2008. These pumpage reports will help to establish baseline information regarding water use in the state.

The Groundwater Advisory Council completed its assignment in December 2007 with submission of a second report to the Legislature assessing the effectiveness of Act 310. The GAC concluded that Act 310 is working as intended, as a first step in integrated water management. The Council recognized that the law has provided an added level of environmental protection for trout streams, outstanding resources waters, exceptional resource waters and springs by ensuring that potential impacts to these resources will be evaluated and reduced as part of the high capacity well approval process. The GAC acknowledged that more work remains to build upon the initial improvements in groundwater management provided under Act 310. The 2007 report contains extensive recommendations and alternatives for enhancing the effectiveness of Act 310.

DATCP’s April 2008 report, “Agricultural Chemicals in Wisconsin Groundwater” (http://www.datcp.state.wi.us/arm/agriculture/land-water/enviro_quality/pdf/ARMPub180.pdf), summarizes results of private well survey conducted in 2007. The purpose of the survey was to obtain a current picture of agricultural chemicals in groundwater and to evaluate changes in water

quality over time. Samples collected from private wells, drawing water from different aquifers, were analyzed for 32 compounds including herbicides, herbicide metabolites, one insecticide, and nitrate-nitrogen. The results of a time trend analysis did not show any statistically significant changes for parent atrazine, total atrazine, nitrate-nitrogen, alachlor ESA and metolachlor ESA between 2001 and 2007. The estimate of the proportion of wells that exceeded the 10 mg/l enforcement standard for nitrate-nitrogen was 9.0%.

CONDITION OF THE GROUNDWATER RESOURCE

Major groundwater quality and quantity concerns in Wisconsin include:

Volatile Organic Compounds (VOCs): Sources of VOCs in Wisconsin's groundwater include landfills, underground storage tanks, and hazardous substance spills. Thousands of wells have been sampled for VOCs and at least fifty-nine different VOCs have been found in Wisconsin groundwater. Trichloroethylene is the VOC found most often in Wisconsin's groundwater.

Pesticides: Pesticide contamination in groundwater results from field applications, pesticide spills, misuse, or improper storage and disposal. The most commonly detected pesticides in Wisconsin groundwater are: metabolites of alachlor (Lasso) and metolachlor (Dual), and atrazine and its metabolites. DATCP databases show that about 40% of private wells tested have atrazine detections, while about 1% have atrazine over the groundwater enforcement standard of 3 µg/L. A 2001 DATCP survey of private drinking water supplies showed that 38% of wells contain a detectable level of an herbicide or herbicide metabolite. A 2007 DATCP private well survey estimated that the proportion of wells in Wisconsin that contained a pesticide or pesticide metabolite was 33.5%. Areas of the state with a higher intensity of agriculture generally had higher frequencies of detections of pesticides. The two most commonly-detected pesticide compounds were the herbicide metabolites metolachlor ESA and alachlor ESA which each had a proportion estimate of 21.6%.

Nitrate: Nitrate-nitrogen is the most common contaminant found in Wisconsin's groundwater. Nitrate can enter groundwater and surface water from a variety of sources including farm fields, animal feedlots, septic tanks, and decaying vegetation. Concentrations of nitrate in private water supplies frequently exceed the state drinking water standard of 10 mg/L. In 2005, DNR aggregated and analyzed data from three extensive statewide groundwater databases. This combined dataset from DNR's Groundwater Retrieval Network (GRN) database, the Center for Watershed Science and Education database, and DATCP's groundwater database, includes only the most recent nitrate result for each sampled private well. Out of the 48,818 samples, 5686 (11.6 %) equaled or exceeded the 10 mg/L standard. A 2007 DATCP survey estimated the proportion of private wells that exceeded the 10 mg/l enforcement standard for nitrate-nitrogen at 9.0%.

Microbial agents: Microbiological contamination often occurs in areas where the depth to groundwater is shallow, in areas where soils are thin, or in areas of fractured bedrock. Microbial agents include bacteria, viruses, and parasites. These agents can cause acute illness and result in life-threatening conditions for young children, the elderly and those with chronic illnesses. In one assessment (Warzecha et.al., 1994), approximately 23% of private well water samples statewide tested positive for total coliform bacteria, an indicator species of other biological agents. Approximately 3% tested positive for *E. coli*, an indicator of water borne disease that originates in the mammalian intestinal tract.

Viruses in groundwater are increasingly becoming a concern as new analytical techniques have

detected viral material in private wells and public water supplies. Research conducted at the Marshfield Clinic indicates that 4-12% of private wells contain detectable viruses. (Borchardt 1997, 1999). Another study, conducted in conjunction with the USGS, found that 50% of water samples collected from four La Crosse municipal wells were positive for enteric viruses (Hunt and Borchardt, 2002, Borchardt et al. 2004). More recent and on-going studies have shown a link between viruses found in the municipal wells and wastewater system in Madison (Bradbury, 2007, personal communication).

Radionuclides: Naturally-occurring radionuclides, including uranium, radium, and radon are becoming an increasing concern for groundwater quality, particularly in the Cambro-Ordovician aquifer system in eastern Wisconsin. The water produced from this aquifer often contains combined radium activities in excess of 5 pCi/L and in some cases in excess of 30 pCi/L. Approximately 35 public water systems exceed the drinking water standard of 15 pCi/L for gross alpha activity (Nelson, personal communication). New federal standards are causing many communities to search for alternative water supplies or treatment options.

Arsenic: Naturally occurring arsenic has been detected in wells throughout Wisconsin. DNR historical data show that 3,830 public wells and 3,013 private wells have detectable levels of arsenic. About 10% of these wells exceed the new Federal drinking water standard of 10 µg/L. The highest concentration of arsenic detected in a private well in Wisconsin is 15,000 µg/L. Arsenic has been detected in well water samples in every county in Wisconsin. However, the problem is especially prevalent in northeastern Wisconsin where increased water use has likely released arsenic from rocks and unconsolidated material into the groundwater. The State continues to proactively address arsenic concerns through well drilling advisories, health studies, well testing campaigns, and studies aimed at improving geological understanding and developing practical treatment technologies.

Groundwater quantity. Despite a general abundance of groundwater in Wisconsin, there is a concern about the overall availability of good quality groundwater for municipal, industrial, agricultural, and domestic use and for adequate baseflow to our lakes, streams, and wetlands. Groundwater use grew from 570 to 804 million gallons per day (Mgal/d) from 1985 to 2000. Groundwater quantity problems have occurred both naturally and from human activities, and often affect groundwater quality. Regional effects of groundwater withdrawals are well documented in the Lower Fox River Valley, southeastern Wisconsin, and Dane County. Localized effects of groundwater pumping on trout streams, springs, and wetlands have been noted throughout the state. Groundwater quantity legislation enacted in 2004 was the first step towards managing groundwater quantity on a comprehensive basis. The DNR began to implement the provisions of the new law in FY 06 and FY 07 and began implementing a new rule, NR 820, regulating high-capacity wells in FY 08. The Great Lakes Compact, signed by Governor Doyle in 2008, requires Wisconsin to have water conservation goals within the Great Lakes Basin.

BENEFITS OF MONITORING AND RESEARCH PROJECTS

The GCC provides consistency and coordination among state agencies in funding groundwater monitoring and research to meet state agency needs. Approximately \$14.6 million has been spent by DNR, UWS, DATCP, and Commerce through FY 08 on 360 different projects dealing with groundwater or related topics. While the application of the results is broad, this report describes topic areas where the results of state-funded groundwater research and monitoring projects have been successfully applied to groundwater problems in Wisconsin. These areas include:

- Pharmaceuticals, personal care products, and endocrine disrupting compounds

- The Atrazine Rule
- Groundwater monitoring at solid waste disposal sites
- Arsenic monitoring and research in Northeastern Wisconsin
- Groundwater movement in shallow carbonate rocks
- Developing new tools for groundwater protection
- Prevention and remediation of groundwater contamination
- Detection and monitoring of microbiological contaminants
- Groundwater drawdowns
- Comprehensive planning
- Rain garden design and evaluation
- Methylmercury formed in groundwater
- Estrogenic in groundwater

DIRECTIONS FOR FUTURE GROUNDWATER PROTECTION

The GCC recommends the following priorities for future groundwater protection and management:

- Protect funding for groundwater monitoring and research
- Acute and chronic impacts to groundwater from manure management practices.
- Investigate adverse impacts from groundwater withdrawals
- Other unresolved groundwater quantity issues – How water-rich are we?
- Investigate extent and origins of naturally occurring substances in groundwater
- Evaluate occurrence of recently discovered groundwater contaminants
- Research the impacts of various land uses on the groundwater resource
- Evaluate potential impacts of climate change and global warming on Wisconsin's groundwater
- Evaluate the impact of the production of biofuels on Wisconsin's groundwater. This includes concerns with farmers moving out of CRP program
- Address groundwater quantity management issues at both statewide and regional levels
- Find solutions to groundwater nonpoint pollution problems
- Meet the need for continued funding for implementation of nutrient management planning
- Provide resources to local governments for Smart Growth/Comprehensive Planning activities
- Develop methods to assess and protect against health hazards posed by exposure to 'orphan' contaminants as well as multiple contaminants in a water supply
- Support implementation of a Statewide Groundwater Monitoring Strategy
- Support Implementation of the Great Lakes Compact
- Coordinate and facilitate consistent messages on groundwater related issues
- Promote consistency between the agencies on data management issues
- Ensure access to findings of groundwater research and monitoring projects